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European Journal of Anaesthesiology (ISSN: 0265-0215) is published monthly by Wolters Kluwer Health, Inc. and distributed in the US by Mercury Airfreight International, Inc., 365 Blair Road, Avenel, NJ 07001. Periodicals postage paid at Rahway, NJ. POSTMASTER: send address changes to European Journal of Anaesthesiology, PO Box 1610, Hagerstown, MD 21740, USA.

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Functional brain alterations during delirium in ICU: a nested case-control resting-state fMRI study

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Background and Goal of Study: Delirium is a severe complication in critically ill patients, associated with unfavorable clinical outcomes; although nosologically and clinically well-characterized, its pathophysiology is still under investigation. In order to fill the gap in the literature about the pathophysiology of delirium, we investigated the alteration of brain resting-state network dysconnectivity [1] and its possible correlation with delirium.

Materials and Methods: We have enrolled 11 ICU patients with delirium diagnosed by CAM-ICU (2 consecutive positive evaluations performed by two different observers). The patients underwent functional resting-state fMRI (rsfMRI); the functional connectivity was assessed with Independent Component Analysis. Data were compared with rsfMRI of 11 healthy controls matched for sex and age.

Results and Discussion: Preliminary results showed mixed connectivity alterations in resting-state networks (RSN) (Figure 1). Cortical alterations were present in caudal dorsolateral prefrontal cortex (dLPFC) and anterior prefrontal cortex (aPFC) (Brodman Areas (BA) 10 and 8, respectively), with reduced connectivity in Default Mode Network (DMN), Salience Network (SN) and Executive Control Network (ECN), while in mid dorsolateral PFC (mDLPFC) (BA 9) we found hyperconnectivity in SN and ECN. Subcortical alterations included: hyperconnectivity in Pedunculopontine Nucleus (PPN), Laterodorsal Temporal Nucleus (LDT), Ventral Tegmental Area (VTA) and Substantia Nigra on the right, and hypoconnectivity in the left hippocampus and insula (bilaterally).

Conclusion: The preliminary results support our hypothesis on delirium genesis: the subcortical hyperconnectivity of PPN, LDT, VTA, and Substantia Nigra could induce functional alteration in the frontal lobes that involves the anterior component of different RSNs.

2 groups pre-op (p=0.82).

Conclusion: Despite 75% of our liver grafts coming from marginal donors, it does not seem to have a negative impact on the outcome of the LT or the recipient, despite the difference in AST. This could lead to greater enthusiasm using marginal organs, given their now proven safety profile, reducing waiting lists times and mortality on the LT waiting list.

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Lidocaine increases the inhibitory effect of ex vivo lung perfusion on the inflammatory response in lungs obtained from asystole donors

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Background and Goal of Study: The shortage of donors is the most important limiting factor for the clinical application of lung transplantation. Ex vivo lung perfusion (EVLP) procedure is a known method to promote lung recovery. However, it results could be even better if modulatory treatments of lung injury secondary to ischemia-reperfusion (IIRL) were applied. Regarding to novel therapies that modulate lung injury, growing interest has been aroused for the anti-inflammatory and cytoprotective properties of local anesthetics such as lidocaine (LIDO).

The objective of this study was to investigate a possible role of EVLP in the viability of transplanted lungs derived from asystole donors and its possible modulation by lidocaine addition.

Materials and Methods: The surgical procedure consisted on a left lung transplantation model: 1- Hypoxic cardiac arrest is induced in donor pigs and lungs harvested; 2- After 60 min of warm ischemia, left lung was stored in cold preservation solution for 3 hours; 3- Left lung was evaluated and reconditioned ex vivo in a lung perfusion machine for 3h (with different protocols); 4- Left pneumectomy was performed in the recipient pig followed by transplantation of the donor lung; 5- Assessment of lung function during 3 hours after reperfusion; 6- Lung biopsies were performed and pigs were euthanized. Animals were divided into 3 groups: 1- EVLP: ex vivo lung reconditioning with O2/air ventilation and perfusion with Steen solution; 2 (LIDO): ex vivo lung reconditioning with lidocaine and perfusion with Steen solution, 3 (CONTROL): same procedure without ex vivo lung reconditioning. mRNA expression of pro-inflammatory cytokines and apoptotic markers were determined by RT-PCR.

Results and Discussion: Ischemia-reperfusion increased mRNA expression of the pro-inflammatory cytokines (TNFα, IL1β, IL6, IL8 and IL12) and apoptotic (caspase 3, AIF) markers. mRNA expression of all inflammatory and apoptotic markers decreased significantly (p<0.01) in the EVLP Group relative to the Group without EVLP. The effect of EVLP was enhanced by LIDO (p<0.001).

Conclusion: EVLP may allow recovery of lungs obtained from asystole donors, considered non-viable, turning them into valid candidates for transplantation. This beneficial effect of EVLP may be enhanced by the addition of lidocaine.

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The minimum effective volume (MEV90) of ropivacaine for ultrasound-guided caudal block in anorectal surgery

Anaesthetics local anesthesia

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Background and Goal of Study: Caudal epidural block (CB) provides reliable anesthesia and analgesia of lumbar and sacral nerve roots, which has been widely used in adult anorectal surgery. Despite the widely utilization, the minimum effective volume (MEV90) of ropivacaine for CB remains unknown, which is of the essence for determination of unnecessary administration of potentially toxic doses. Moreover, the volume of caudal block might show a gender difference because of the anatomical structure difference in gender. Hence, the present study was designed to explore MEV90 of 0.5% ropivacaine for ultrasound (US)-guided CB in male and female adult subjected to anorectal surgery.

Materials and Methods: A minimum of 45 patients scheduled for anorectal surgery were included in each gender group. All the patients received US-guided CB using ropivacaine 0.5%. The study was based on a biased coin design (BCD) up-and-down method (UDM) (BCD-UDM), where the volume of ropivacaine administered to each patient depended on the response of the previous one. The first participant received 10ml. In case of failure, the ropivacaine volume was increased by 2ml in the next subject. If the previous patient had a successful block, the next subject was randomized to a lower volume (with a decrement of 2ml), with a probability of 0.11, or the same volume, with a probability of 0.89. Success was determined at 5-minute intervals for 20 minutes after the administration of the local anesthetic by pinprick testing of the perineal area and the presence of a lax anal sphincter.

Results and Discussion: In this double-blind, prospective study, a total of 98 ASA physical status I-II patients (50 male and 48 female) were included, and none of them had severe complications. The MEV90 of ropivacaine for CB were estimated to be 11.8ml (95% CI 10.3-13.5ml) for female and 12.9ml (95% CI 11.3-14.7ml) for male, respectively, and no significant difference of MEV90 was presented between male and female patients. By extrapolation to minimum effective volume in 99% of subjects (MEV99) and pooled adjacent violators algorithm (PAVA) adjusted responses, it would be optimal to choose ropivacaine 14.0ml for all patients.

Conclusion: We concluded that US-guided CB using 0.5% w/v ropivacaine 14 ml can provide successful block in 99% of middle-aged adults subjected to anorectal surgery.
Development and Validation of a Score for Prediction of Adverse Discharge in Elderly Patients after Lower Extremity Surgery (ADELES)

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Background and Goal of Study: Adverse discharge - death in hospital or discharge to a skilled nursing facility - is frequent [1] and devastating [2] in elderly patients undergoing lower extremity surgery. Predicting individual patient risk allows initiation of preventive measures and allocation of critical resources. We developed and validated a prediction score for adverse discharge disposition in a high-risk cohort of elderly patients after lower extremity surgery (ADELES).

Materials and Methods: This was a retrospective, multi-center cohort study in two academic hospital networks in New England, USA using hospital registry data. 20,172 patient cases >60 years previously living at home and undergoing lower extremity surgery were included. We tested preoperatively available candidate predictors for their predictive value for adverse discharge disposition using a stepwise backward elimination process and developed a score from significant predictors (threshold p<0.10).

Results and Discussion: 7,544 patients (37.4 %) experienced adverse discharge. The final score comprised 20 variables depicting socioeconomic characteristics, surgical management and frailty-related factors (Figure 1). Achievable score values ranged from 0 to 56. Assessment of C-statistics showed an area under the receiver operating characteristic curve of 0.85 [95% CI 0.84-0.85] (Brier score 0.16) in the development and 0.72 [0.71-0.73] (Brier score 0.20) in the independent validation cohort, confirming good predictive performance. Decision curve analysis confirmed a positive net benefit of up to 84% and 57% risk threshold in the development and 0.72 [0.71-0.73] (Brier score 0.20) in the independent validation cohort, respectively.

Conclusion:

These results showed that dexmedetomidine provided lower sedation and mask acceptance were comparable in the two groups. There was no significant difference in terms of adverse effects in both groups. Sedation and mask acceptance were comparable in the two groups. There was no significant difference in terms of adverse effects in both groups.

References:
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Prediction of fluid responsiveness by means of stroke volume variation measured by pulse wave transit time - based cardiac output monitoring
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Background and Goal of Study: Evaluation of the stroke volume (SV) and stroke volume variation (SVV), which could predict fluid responsiveness, is important for perioperative cardiovascular management. In this study, we evaluated fluid responsiveness using a non-invasive pulse-wave transit time (PWTT) - based cardiac output monitoring, the estimated Continuous Cardiac Output (esCCO).

Materials and Methods: Forty-six adult patients undergoing open abdominal surgery were included. Fluid loading with 300 mL of a colloidal solution in 15 min was performed during surgery under general anesthesia. Fluid responsiveness was defined as a 10% or more increase in Stroke Volume Index (SVI) measured by the esCCO. Several parameters were measured before and after fluid loading, and an SVV cut-off value for fluid responsiveness was calculated using the receiver operating characteristic (ROC) curve analysis.

Results and Discussion: Fluid responsiveness was observed in 27 of the 46 patients. SVV and cardiac index exhibited significant changes in the responsive group. In addition, the area under the ROC curve was 0.904 (range, 0.819–0.988) for a 10% or more increase in SVI after fluid loading. The cut-off SVV value was 6.4.

Conclusion: In this study, we successfully used the non-invasive monitor esCCO to show fluid responsiveness during general anesthesia for open abdominal surgery and the esCCO derived-SVV has an excellent diagnostic value which is evidence by the high AUC of ROC curve analysis.

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Smartphone-based optical blood pressure monitoring in the acute care setting: Accuracy compared to invasive blood pressure measurement
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Background and Goal of Study: Arterial pressure (AP) monitoring is mandatory in the acute care setting. Technological improvements are opening new paths beyond oscillometric or invasive solutions. Smartphones may play a role, providing access to simplified and accurate monitoring beyond the operating room, thus impacting the management of hypertensive diseases. The main goal of this study was to assess the performance of a smartphone-based optical AP measurement to estimate and track changes of AP compared to invasive measurements.

Materials and Methods: Study population consisted of 120 patients aged >17 years, scheduled for an elective surgery requiring general anesthesia and invasive AP monitoring at the Lausanne and Geneva University Hospitals. Blood pressure values were acquired simultaneously through a radial arterial catheter and a smartphone camera positioned at the patient’s finger. Signals were recorded during induction of general anesthesia and compared offline by a dedicated pulse wave analysis algorithm (uBPM®) designed to estimate AP values on optical signals following an initial 1-point calibration procedure.

Results and Discussion: We provide the preliminary results from the first 100 patients for systolic (SAP), diastolic (DAP) and mean AP (MAP) (Figure 1). We observe strong coherence of our estimations with a concordance rate (CR) of 90% (CRIAAP = 92.0%, CRDAP = 91.3%, CRMAP = 91.7%). Pearson’s correlation reflects a good trending ability with coefficients over 0.80 (P < 0.001) (SAP: 0.83, DAP: 0.88, MAP: 0.80).

Conclusion: This study demonstrates the potential for accurate estimation of AP through a smartphone-acquired optical signal in adults undergoing induction of general anesthesia. These preliminary results compared to invasive measurements could lead the way for mobile devices to leverage the monitoring AP in the near future. Such results may impact health assessment capabilities in developed and third world countries with devices widely available.
Role of echocardiography during liver transplantation: benefits and potential complications

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Background and Goal of Study: Transesophageal echocardiography during liver transplantation is still underused; the rapid hemodynamics changes that occur in this surgery can make interpretation difficult, and the risk of rupture of esophageal varices is a fearsome complication. The goal of this study is to describe the safety and impact of TEE during each stage of liver transplantation.

Materials and Methods: We collected 24 patients in whom TEE was used as a monitoring system, performed by anesthesiologists with regular training. Before beginning of surgery, a complete TEE scan was performed. During each stage of the surgery, an assessment of cardiac filling volumes and contractility were obtained at two levels: 1) the mid-esophageal four-chamber view (ME 4C) to evaluate the interaction of left and right ventricles and detect possible venous air embolism, and 2) the trans-gastric short axis view (TG SAX), using mid papillary muscles as landmarks, to evaluate left ventricular size and segmental wall motion. Complications of TEE were registered: dental trauma, variceal bleeding, esophageal trauma and recurrent laryngeal nerve injury.

Results and Discussion: In 6 patients, cardiac monitoring was not possible in the TG SAX view due to subsequent retraction of the stomach produced by surgical separators. And, in 2 patients, surgeons were bothered by the presence of the probe in a deep TG view. The main findings are shown in table 1.

According to the previous literature, the TEE has a low complication rate. The hemodynamic instability after graft reperfusion could be justified by the common phenomenon of pulmonary embolism; so, is a priority to perform a proper washing of the liver graft before reperfusion, to decrease air embolism, and avoid hemodynamic disturbance.

Conclusion: In summary, the benefits of using TEE in LT outweigh the risks of potential complications. Monitoring with TEE guides us in the diagnosis, treatment and clinical decision-making in LT surgery.

References:

Transcutaneous carbon dioxide monitoring during apnoeic oxygenation: not always correct

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Background and Goal of Study: High-flow nasal cannula (HFNC) oxygenation gained substantial importance during the last years and is increasingly used during deep sedation or general anaesthesia. As end tidal carbon dioxide (CO2) measurement during HFNC-oxygenation is not feasible, continuous transcutaneous CO2 (ptcCO2) monitoring might be used to prevent hypercapnia. This study tests if ptcCO2 is as accurate as paCO2 measured by arterial blood gas samples (ABG) in apnoeic oxygenated patients under general anaesthesia.

Materials and Methods: With ethic committee approval and written informed consent, we included 98 patients under general anaesthesia for elective surgeries in an apnoeic oxygenation study [1]. We collected simultaneous pairs of ptcCO2 and ABG measurements every 2 minutes during apnoeic oxygenation. A TCM 5 with a “tc sensor 84” (Radiometer, Copenhagen, Denmark), placed in the subclavicular area according to manufacturer’s recommendation, measured ptcCO2 and ptCO2. ABG was analysed by a Radiometer ABL800 flex blood gas analyser. Agreement between both CO2 measurements was analysed by the Bland-Altman method.

Results and Discussion: We compared 914 pairs of ABG and transcutaneous CO2 measurements. While in linear regression analysis they correlated significantly (R2 = 0.79, p<0.001), Bland-Altman analysis revealed a statistically significant bias of -20.8 ± 6.6 (mean ± SD) mmHg, 95% limits of agreement were -33.7 mmHg and -7.8 mmHg.

Conclusion: One of the factors for the limited accuracy might be the type of the sensors. The O2-electrode probably influences ptcCO2 measurements during apnoeic HFNC-oxygenation with 100% O2. As ptcCO2 measurements are applied for continuous monitoring of CO2 accumulation during apnoeic HFNC-oxygenation, a combined sensor using electrodes for measurement of O2 and CO2 underestimates CO2-levels and is therefore less suitable in that setting. Sensors solely measuring CO2, might monitor ptcCO2 more correctly during apnoeic oxygenation.

References:
The influence of bispectral index monitoring on the frequency of hemodynamic incidents during anesthesia

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Background and Goal of Study: Maintenance of anesthesia by inhalation agents is most often performed under the control of expiratory gas analysis (ETAG). In this case, anesthetists are guided by the minimum alveolar concentration of the anesthetic. However, this value is very arbitrary and can lead to excessive or insufficient depth of anesthesia, which in patients with impaired reflex regulation can lead to hemodynamic instability. Estimation of the depth of sedation using the bispectral index (BIS) may possibly prevent these abnormalities. The aim of the study was to compare the frequency of hemodynamic critical incidents in patients with impaired reflex regulation of the cardiorespiratory system during ETAG-guided and BIS-guided anesthesia.

Materials and Methods: The study included 150 patients who underwent elective major abdominal surgery with impaired reflex regulation of the cardiorespiratory system (breath-holding duration less than 34 sec) [1]. Patients were randomized into two subgroups: in the first, anesthesia was performed on the basis of end-tidal anesthetic control and hemodynamic parameters, in the other, by control of the bispectral index with a target value of 40-60.

Results and Discussion: Analysis of the frequency of critical incidents showed a decrease in the incidence of intraoperative hypotension in the group of patients during anesthesia under the control of the bispectral index. The level of maximum concentration of inhalation anesthetic was statistically lower in the group of patients during anesthesia under the control of the bispectral index compared to the control group (0.83 ± 0.12 versus 1.12 ± 0.17 after the first hour of anesthesia, 0.82 ± 0.13 versus 1.12 ± 0.23 after the second hour of anesthesia and 0.86 ± 0.14 versus 1.12 ± 0.20 after the third hour of anesthesia (all p <0.05)).

Conclusion: The use of a bispectral index to control the depth of sedation in patients with a high risk of hemodynamic disturbances can reduce the incidence of hypotension.

References:

Noninvasive continuous cardiac output monitoring in patients undergoing spinal surgical procedures in prone position

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Background and Goal of Study: Patients undergoing spinal surgery frequently exhibit hemodynamic instability in prone position. The goal of this study was to study mechanisms of hemodynamic deterioration in prone position under propofol-desflurane/sufentanil anesthesia and to compare the intraoperative hemodynamic management using an algorithm based on noninvasively measured cardiac output (ClearSight system, Edwards Lifesciences) and derived hemodynamic parameters with a management based on anaesthesiologist's judgment.

Materials and Methods: 50 adult ASA I – III patients were randomized into the ClearSight (CS) and conventional (C) groups. Exclusion criteria included body weight >120 kg, preoperative fasting >12 hours, planned postoperative artificial ventilation, preoperative hypotension (MAP<65 mmHg), history of pulmonary hypertension, valvular disorder, periferal vascular disease and expected perioperative blood loss > 1500 ml. Management of anesthesia in both groups and hemodynamic parameters, in the other, by control of the bispectral index with a target value of 40-60.

Results and Discussion: When the EMG neuromuscular monitors have been recently reevaluating, a new EMG module, AF-201P is developed and released by Nihon Kohden corp., Japan. The purpose of this study was to compare the post-tetanic counts (PTC) between AF-201P and TOF Watch SX® during rocuronium-induced deep neuromuscular block.

Materials and Methods: The study protocol was approved by the Hospital Ethics Committee on Human Rights in Research. After registration with the University Hospital Medical Information Network (ID: UMIN 000034996), 41(sixteen male and twentyfemale, 57±10.4kg body weight) adult patients consented to participate in this study. The integrated AF-201P stimulating and sensing electrode was placed over the unilateral ulnar nerve on the distal volar forearm and the belly of the abductor digiti minimi muscle. The TOF Watch SX® was then applied with a provided hand adaptor to the opposite arm to observe twitch responses of the adductor pollicis muscle. After calibration of maximal currents and the first twitch height of each monitor and stabilization of the train-of-four (TOF) responses, 0.6mg/kg rocuronium was intravenously administered. During the repetitive TOF stimulations every 15 s, the PTC were simultaneously observed every 3 minutes using two monitors. Whenever observing over 5 PTC or reappearance of the 1 TOF count with TOF Watch SX®, 0.2mg/kg rocuronium was administered. The PTCs measured by AF-201P and TOF Watch SX® were compared using a linear regression analysis. Agreement between the two methods was assessed using the statistical method of Bland and Altman and bias and limits of agreement were calculated.

Results and Discussion: The PTC data of 1732 points of the PTC data were obtained and analyzed. Regression analysis revealed no statistically significant difference in PTCs between two monitors (PTC measured by AF-201P = 0.49 PTC measured by TOF Watch SX® + 0.93, R2=0.31). Bland–Altman analysis also showed acceptable ranges of bias (95% CI) and limits of agreement (0.34 [0.23 to 0.46] and – 4.56 to 5.25) for the PTCs. However, it should be paid attention to the possibility that the difference in PTCs between two monitors may increase as the TOF value increases.

Conclusions: The results of our study demonstrated that AF-201P, a new EMG device, is reliable for evaluating deep rocuronium-induced neuromuscular block and similar to TOF Watch SX® that is commonly used in clinical anesthesia.
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Changes in mean systemic filling pressure as an estimate of hemodynamic response to anesthesia induction with propofol

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Background and Goal of Study: Mean systemic filling pressure (MSFP) minus the central venous pressure (CVP) is the driving force of the venous system. This pressure gradient between the venous system and the right atrium, is only a few cmH2O, so a small change in the gradient can cause a significant hemodynamic deterioration. (1) MSFP has a significant effect on the venous return, and therefore on the cardiac output. It is known that the use of hypnotic substances during anesthesia induction can cause hemodynamic instability, however, the mechanism responsible for the effect is not fully known. Our objective was to measure Propofol bolus effect during anesthesia induction on different components of the venous and arterial system and on the hemodynamic state of the patient.

Materials and Methods: We collected data from patients undergoing a major surgery requiring hemodynamic monitoring. Hemodynamic measurements (including MSFP, CVP, heart rate, mean arterial pressure, cardiac output, systemic vascular resistance and venous return) were performed before, during and after induction of anesthesia using the p arm method.

Results and Discussion: We examined the results of 15 patients. All patients have shown a decrease in their MSFP after induction with Propofol (pre-induction 25.3±6.2 mmHg, post-induction 18.3±5.7 mmHg). The pressure gradient of the venous return was reduced since the CVP showed only a small change (pre-induction 6.8±5.6 mmHg, post-induction 6.4±5.4 mmHg).

Conclusion: These results support our primary hypothesis that propofol induced hypotension is mediated mainly through a decrease in preload, caused by the change in the vasomotor venous tone and MSFP. These results suggest that a better management of hemodynamic deterioration during induction of anesthesia should focus mainly on the venous system components.

References:

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Comparison between phase lag entropy and bispectral index using population pharmacodynamic analysis during target controlled infusion of propofol

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Background and Goal of Study: Monitoring the depth of anaesthesia with processed electroencephalogram (EEG) monitors has become a routine practice during general anaesthesia. However, several limitations of those monitors have been discovered. PLE (Phase Lag Entropy) is a recently developed EEG-based anaesthetic depth measurement algorithm. In contrast to the classical methods, PLE additionally calculates diversity of the temporal dynamics of functional connectivity. We performed pharmacodynamic analysis to compare the performance of PLE to the bispectral index (BIS).

Materials and Methods: After obtaining written informed consent, we observed 18 adult patients scheduled for elective surgery under general anaesthesia. A PLE sensor and a BIS sensor were attached to a patient’s forehead together before anaesthesia. For induction of anaesthesia, propofol was administered with target-controlled infusion system using the Schnider model for propofol. The effect-site concentration (Ce) of propofol was increased to 2, 3, 4 and 5 μg/mL with an interval of 4 minutes, and Ce was decreased again to 3 μg/mL. The values of Ce, PLE and BIS were recorded simultaneously by each device, and the data were transferred to a computer after surgery. The pharmacodynamic parameters for PLE and BIS were estimated by NONMÉM VII (Icon Development Solutions) by minimizing the residual random variability was modelled using an additive error model.

Results and Discussion: A significant (P < 0.001) correlation between PLE and BIS was found (r = 0.83, Pearson correlation coefficient). Pharmacodynamic modeling resulted in estimated E0 values equal to 85.9 (relative standard error [RSE] 9.9%) for PLE and 91.9 (RSE 0.97%) for BIS. Emax parameters were estimated to be 38.6 (RSE 9%) for PLE and 37.7 (RSE 7.5%) for BIS. Ce50 parameters were estimated to be 2.69 μg/mL (RSE 3.75%) for PLE and 2.73 μg/mL (RSE 3.77%) for BIS. Gamma parameters were estimated to be 6.79 (RSE 14.4%) for PLE and 8.20 (RSE 17.8%) for BIS.

Conclusion: Population pharmacodynamic models using sigmoid Emax model adequately described the responses of BIS and PLE to Ce of propofol. The overall performance of PLE and BIS during propofol anaesthesia seemed to be similar despite major differences in their algorithms.

5646
Opioid sensitivity index estimated by vascular stiffness is highly correlated with blood pressure changes after skin incision

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Background and Goal of Study: Our research group previously introduced a vascular stiffness index «K» by fitting a Lissajous curve between plethysmography (PLS) and invasive arterial pressure waveforms with a mechanical impedance model [1]. The rate of change of K for invasive stimulation demonstrated a rough inverse correlation with opioid dose; however, the degree of correlation considerably varied among subjects [2]. We confirmed that the threshold of stimulus intensity at which K changes based on opioid use, called minimal evoking current of K (MECK), is a more accurate index of opioid sensitivity than the rate of change of K. Here, we compared the correlation between blood pressure fluctuation after skin incision under opioid administration and MECS to demonstrate the superiority of MECK as an opioid sensitivity index.

Materials and Methods: Following IRB approval, we recruited patients aged 20 years scheduled for laparotomy. After anaesthesia, remifentanil was administered at a rate to ensure an effect-site concentration of pharmacokinetic simulation of 2 ng/mL. Consequently, 50 Hz of tetanic stimulation (10–80 mA) was applied to the patients’ forearms for 5 s. Lowest current to introduce changes in each parameter was defined as the MECC of each parameter. Correlations between each MECC and rate of change of arterial blood pressure (ABP), and of PLS, and the rate of change in SBP after skin incision were compared, respectively. Statistical analysis was performed by Pearson’s correlation analysis (p<0.05).

Results and Discussion: We included 30 patients (15 men, 15 women, age=64.5 ± 13.7 years) in this study. MECC, MECHR, MECSBP, and MECSPLS were 49.7±22.8 mA, 60.7±23.6 mA, 43.3±19.4 mA, and 45.7±23.1 mA, respectively. The SBP was 78 ± 14 mmHg and 91±17 mmHg, before and after skin incision, respectively. The correlation coefficient of MECC and the rate of change of SBP after skin incision was 0.62, 0.35, 0.49, and 0.35 (p=0.0002, 0.06, 0.006, and 0.06) for K, HR, SBP, and PLS, respectively.

Conclusion: Compared with other MECS, MECK was highly correlated with an increased rate of blood pressure due to a skin incision, indicating that arterial stiffness index «K» proposed by us, was a superior index to evaluate opioid sensitivity.

References:

5738
Acceleromyographic monitoring at the trapezius muscle requires higher dose of rocuronium for maintaining moderate neuromuscular blockade, thereby providing better surgical conditions compared to the monitoring at the adductor pollicis muscle: a prospective randomised controlled trial

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Background and Goal of Study: The adductor pollicis muscle is most commonly used to assess degree of neuromuscular blockade (NMB) during general anaesthesia. However, positioning for surgery can disturb access to the patient’s hand, thereby compromising the acceleromyographic response at the adductor pollicis muscle. Therefore, we aimed to investigate feasibility and characteristics of acceleromyographic monitoring at the trapezius muscle using stimulation of the accessory nerve by assessing operating conditions and total dose of rocuronium.
administered for providing moderate NMB during lumbar spine surgery in which NMB monitoring could be compromised by the prone position.

Materials and Methods: Fifty adult patients with ASA class 1–2 undergoing elective lumbar spine surgery were randomised to maintain train-of-four count 1–3 using acceleromyography applied in the adductor pollicis muscle (group A;n=25), or the trapezius muscle (group T;n=25). Total rocuronium dose administered during surgery, time to maximum block for an intubating dose of rocuronium 0.5mg kg\(^{-1}\), intubating conditions, lumbar retractor pressure, degree of lumbar muscle tone (good/moderate/hard), and overall surgical satisfaction score (1–10) were compared. Pain score and rescue opioid consumption in postanaesthesia care unit (PACU) and postoperative patient-controlled analgesia (PCA) consumption were also measured. A P value<0.05 was considered statistically significant.

Results and Discussion: Total rocuronium dose administered during surgery was significantly higher in group T than in group A. Lumbar retractor pressure and degree of lumbar muscle tone in group T were significantly lower than those in group A. Overall surgical satisfaction score in group T was superior to that in group A. The time to maximum block for an intubating dose of rocuronium was significantly shorter in group T than in group A. However, intubating conditions, pain score and rescue opioid consumption in PACU, and postoperative PCA consumption were not different between the two groups. It could be said that the deeper NMB due to higher dose of total rocuronium in group T enabled to make the better surgical environments.

Conclusion: Acceleromyographic monitoring at the trapezius muscle required higher dose of rocuronium for maintaining moderate NMB, thereby providing better surgical conditions compared to the monitoring at the adductor pollicis muscle during lumbar spine surgery under general anaesthesia.

Does thumb preload and arm stabilization affect NMT measurements with electromyography? A pilot study

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dolive J.1, Silva Gil L.1, Julían González S.1, Callicó Ros F.1, Juanola Galcerán A.1, Ramirez Paesano C.1
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Background and Goal of Study: An accurate monitorization of neuromuscular transmission (NMT) is necessary to ensure optimal intraoperative neuromuscular blockade and avoid residual paralysis. When monitoring NMT with electromyography (EMG) the most common nerve–muscle unit used is the ulnar nerve–adductor pollicis muscle. It is commonly assumed that hand position does not affect EMG measurements. In other methods such as mechanomyography (MMG) and acceleromyography (AMG) it is well known that apply a preload or stretch is required to guarantee NMT reliable measures. Our study is aimed at identifying any changes in EMG monitoring when applying a preload or stretch on thumb.

Materials and Methods: Two GE monitors were used for EMG NMT monitoring over the ulnar nerve-adductor pollicis muscle. Measurements within two group (20 patients, N=40 each AS A I-II) were analyzed. Group A had monitoring both arms with standard EMG setup. On Group B both hands had standard EMG setup but on left hand a thumb preload and arm stabilization was applied using a splint. Measurements were programed bilaterally and independently every 20 seconds using a 70mA current, and were automatically recorded. TOF Ratoes (TOFR) were compared between hands with Bland Altman for statistical significance.

Results and Discussion: After the automatically recording of data, 400 pairs of measurements were randomly selected (20 pairs per patient) during induction and recovery. Group A showed no statistically relevant difference between both hands with a mean difference of -0.02 (0.11 to -0.15 95%CI). Mean difference on Group B was -0.15 (0.08 to -0.38 95%CI). Differences up to 30% of TOFR were observed during recovery phase. Analysis showed a tendency for faster changes in TOFR values in time on the splint arm that was congruent with subsequent changes on the arm with free movement.

Conclusions: Preload has been advocated as a measure of stabilization of NMT signal during quantitative monitoring by the Stockholm group, classically applied only to MMG and AMG. When analysing our EMG measurements, significant differences appear applying a thumb preload compared to the conventional set up. This prior results make us deliver if the EMG should incorporate as standard a thumb preload and an arm stabilization in order to obtain reliable NMT results. Further studies focusing on EMG with preload are needed before any definite conclusion can be given on its practical implications.

Effect of ACEI on cardiopulmonary bypass mean blood pressure and blood lactic acid level of hypertension atients receiving CAGB

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Background and Goal of Study: Debate has arisen on the omission of angiotensin-converting enzyme inhibitor(ACEI) type antihypertension drugs on operation day morning. Several Randomized Controlled Trials have shown that continue preoperative ACEI treatment increased the risk of hypotension, postoperative myocardial infarction and postoperative renal dysfunction on coronary artery bypass graft(CABG) patients. But the effect of ACEI compared with other antihypertension drugs or no drugs on the CPB Blood Pressure and Blood Lactic Acid(Lac) level of hypertension patients receiving CABG surgery is unkown.

Materials and Methods: We retrospectively collected 466 hypertension patients receiving isolated CABG surgery in Fuwai Hospital which were separating into 2 groups, ACEI group and no ACEI group(n=106 and 350). Statistical analysis was did by student t test, Chi square analysis, simple Linear Regression and Multiple Linear Regression with SPSS.

Results and Discussion: There’s no significant difference between ACEI and no ACEI group on CPB mean Blood Pressure (60.09±8.33±60.75±11.77, p=0.799), level of Lac (1.3±0.53±1.24±0.45, p=0.277), intraoperative use of Noradrenaline or Dobutamine, Ventilation Time, ICU stay and postoperative hospital Stay.
Cerebral State Index (CSI), depth of anesthesia and Ramsey Score during plastic and ophthalmic surgery: is there a correlation?
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Background: The purpose of this study was to evaluate the correlation between cerebral state index (CSI) and Ramsey score in determining the level of sedation in patients undergoing minor plastic surgery (1).

Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 46 patients, aged between 22 and 63 years, ASA I - II, undergoing plastic and ophthalmic surgery were treated. The anesthetic management, after the execution of regional anesthesia with levobupivacaine 0.5% was conducted with midazolam 0.01-0.02 mg/kg i.v. following to a bolus injection of propofol 1-1.5 mg/kg, up to a level of Ramsey Sedation score of 5-6 and a CIS value between 60 and 50. During the procedure were administered additional doses of 4-6 mg propofol to maintain the level of sedation. The respiratory assistance was performed with a facial mask, by administering a mixture of air/O2 (50%). The mean duration of surgical procedures was 68 ± 4.4 min. Additional drugs, side effects, the answer to surgical stimulation and the time of awakening were all recorded. The level of sedation was based on Ramsey Score with the values detected by continuous monitoring of the CIS.

Results: The mean CSI value detected 2 min after induction was 57 ± 4. At the maximum surgical stimulation CSI showed an increase of mean value of 60 ± 2. A significant correlation was observed between CSI values and Ramsey Score 5-6 (p <0.001). For values of Ramsey score of 2-3 was not observed correlation with CSI values (p = 0.3) (Fig.1)

Discussion: Monitoring the state of consciousness is important to avoid excessive or inadequate sedation. The significant correlation between the assessment objective state of sedation using the CSI and the evaluation performed with the Ramsey Score allows an optimal adaptation of sedation.

Conclusions: The CSI technology, provides a simple way to monitoring the level of sedation especially during day surgery in which it is often difficult define the optimal level of sedation.

References:

Transesophageal echocardiography as method to verify the correct ECG central venous catheter insertion
Lambo M. S., Pedrotti D., Galante D.
1Department of Anesthesia and Intensive Care Hospital of Sulmona - Sulmona (Italy), 2Department of Anesthesia and Intensive Care Hospital Santa Chiara - Trento (Italy), 3Department of Anesthesia and Intensive Care Hospital G. Tatarella, Cerignola, Italy - Foggia (Italy)

Background: The aim of the study is to demonstrate the validity of ECG guided CVC insertion. The amplitude of the P wave at ECG increases as we approach the atrio-caval junction (ACJ) and this method is more sensitive than the RX control.

Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 64 adult patients, ASA I-II, mean age 62 ± 8 were enrolled. All CVC were placed into the internal jugular vein (VGI) or subclavian vein (VS) with ultrasound-guided puncture. The CVC 20 cm the maximum length was introduced with Seidlinger technique. The clamp present on the connection cable for intra-cavity ECG derivation kit was connected to the same guide and then connected to the adapter kit for ECG. We observed the amplitude of the P wave at ECG increasing as we approached the atrio-caval junction (ACJ) to confirm the correct positioning of the CVC tip. A transesophageal echocardiogram (TEE) was
performed to obtain a further confirmation of the correct positioning of the CVC between the AVJ and the tip of CVC.

**Results:** 55 CVC were positioned in right IGV while 9 in right SV. All CVC produced an increase in the amplitude of the P wave. Where the amplitude of the P wave has increased by 25% than normal, TEE scanning showed that the CVC tip was 2.4 ± 1.2 cm from the ACJ. Where the amplitude of the P wave has increased by 33%, the TEE scanning showed that the tip of CVC was 1.8 ± 1.0 cm from the ACJ. Where the amplitude of the P wave has increased by 50%, the tip of CVC was 1.2 ± 0.4 cm from the ACJ (Tab. 1). The thoracic RX described only summarily the presence of the catheter in the superior vena cava but not explained the exact position relative to the gap.

**Discussion:** We demonstrated that the increase of the amplitude of the P wave detected by ECG, showed more precision about the correct position of the CVC tip without the need of the RX control.

**References:**

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**6139**

**Variation of thoracic fluid content: a parameter for monitoring surgical stress in major abdominal surgery**

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**Background and Goal:** Pulmonary complications in abdominal surgery may be related to anesthesia, mechanical ventilation, tissue damage secondary to surgical aggression, etc. Our objective was to measure the association, using a bioredactance monitor, of surgical stress and damage to glycoaxal, and its contribution to lung damage.

**Materials and Methods:** A prospective observational study was conducted with 50 patients undergoing scheduled abdominal surgery. These were of different degrees of surgical stress. Monitoring with the non-invasive hemodynamic monitor (Cheetah) was performed prior to anesthetic induction. The fluid therapy was done guided by objectives, using the systolic volume value provided by the monitor. The mechanical ventilation was protective and controlled by volume. TFC (Thoracic Fluid Content) values were collected before and after orotracheal intubation, and at the end of the surgery. Also, surgery data: such as its type and duration, They were analyzed using IBM SPSS Statistics program, and Pearson and ANOVA parametric tests.

**Results and Discussion:** We found no difference between baseline TFC mean values (48.12; SD:22.19) and TFC after intubation (48.37; SD:23.25), while at the end of surgery (TFCd0%) this presented a value of 57.19 (SD:19.81). A longer duration of surgery was correlated with a greater variation of TFCd0% (r=0.47; p=0.001).

![Graph showing the variation of TFCd0% before extubation](Image)

**Table 1.** ECG increased P wave amplitude vs CVC tip distance from ACJ

<table>
<thead>
<tr>
<th>INCREASED P WAVE AMPLITUDE (%)</th>
<th>CVC TIP/ACJ DISTANCE (cm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>2.4±1.2 cm.</td>
</tr>
<tr>
<td>33%</td>
<td>1.8±1.0 cm.</td>
</tr>
<tr>
<td>50%</td>
<td>1.2±0.4 cm.</td>
</tr>
</tbody>
</table>

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**6150**

**Residual neuromuscular blockade and temperature: the impact of perioperative hypothermia**

Fernandes A. L.1, Lopes M.1, Mendonça M.1, Costa D.1, Zenha S.1, Freitas S.1

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**Background and Goal of Study:** Besides being associated with a series of postoperative complications, hypothermia has the potential to influence the pharmacokinetics of multiple drugs used in anaesthetic practice, namely neuromuscular blocking agents. Residual neuromuscular blockade (RNMB) is a known postoperative complication, associated with an increased risk of patient morbidity and mortality. The aim of this study was to evaluate the incidence of RNMB in our post-anaesthesia care unit (PACU) and its association with perioperative hypothermia.

**Materials and Methods:** After approval from the ethics committee, 104 adults who met the inclusion criteria were enrolled in the study. The patients’ temperature was recorded in the preoperative (T1), intraoperative periods (T2) and after admission in the PACU (T3). The train-of-four ratio (TOFr) was recorded in the PACU, and RNMB was considered if TOFr average was lower than 0.9 after 3 measurements. Posterior analysis was done to evaluate the correlation between the variables using the Mann-Whitney test.

**Results and Discussion:** The median pre-operative, intra-operative and PACU temperatures recorded were 36.2°C, 35.9°C and 35.6°C, respectively. In the studied population, RNMB incidence was 16.3%. T2 and T3 were significantly lower in the population with TOFr < 0.9 (35.65°C vs. 36°C, p=0.008 and 35°C vs. 35.7°C, p=0.000, respectively).

**Conclusion:** Temperature plays a key role in the anaesthetic management of patients because of its implications on multiple outcomes, from increased myocardial rate to higher incidence of wound infection I. It also influences the pharmacokinetics of multiple drugs, like neuromuscular blocking agents, delaying its metabolism. In this study, patients with RNMB in the PACU recorded lower temperatures both in the intraoperative and postoperative periods. Since RNMB is potentially responsible for multiple complications in the PACU, temperature monitoring and normothermia must be a crucial anaesthetic concern.

**References:**
SVV-directed fluid therapy improves cardiovascular status for renal failure patients undergoing parathyroidectomy

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Background and Goal of Study: Poorly managed renal failure (RF) and long-term dialysis leads to secondary hyperparathyroidism (SHPT). Parathyroidectomy (PTx) for SHPT has high cardiovascular risk. Fluid therapy strikes a tricky balance. So far there’s no ideal volume response parameter. Stroke volume variation (SVV), applied for fluid therapy in high risk patients, is calculated through arterial pressure waveform influenced by respiration. This study is to evaluate SVV-directed fluid therapy for PTx in patients with RF.

Materials and Methods: A single-center randomized controlled trial enrolled RF patients scheduled for PTx from May 2018 to April 2019 (Clinical Trial Registration Number: ChiCTR1800019009). Patients were randomized into control (CON) group and SVV group. For SVV group, SVV and cardiac output (CO) were obtained by Vigileo/FloTrac monitor. Patients in SVV group were infused 3ml/kg of 0.9% saline in every 5 minutes until SVV≥10%. CON group followed routine fluid restriction. As remideo, pressores were available to maintain SBP≥90mmHg or MAP≥65mmHg, or CI 2.5-4.5(L/min/m²).

Results and Discussion: 121 patients were enrolled (Table 1). Patients in SVV group exhibited better volume status. BP were more stable within 24 hours after surgery, with higher CO, lower serum lactic acid (cLAC), and more patients achieved ΔIVC≥50%. Post-operative complications in 7 days also decreased. There was no significant correlation between SVV and ΔIVC.

Table 1: Vitals parameters during PTx for SHPT patients and peri-operative outcomes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CON</th>
<th>SVV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative complications</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Post-operative complications</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>MAP</td>
<td>90.00±10.0</td>
<td>95.00±15.0</td>
</tr>
<tr>
<td>SBP</td>
<td>130.00±15.0</td>
<td>135.00±20.0</td>
</tr>
<tr>
<td>HR</td>
<td>90.00±10.0</td>
<td>95.00±15.0</td>
</tr>
<tr>
<td>ΔIVC</td>
<td>30.00±10.0</td>
<td>50.00±20.0</td>
</tr>
</tbody>
</table>

Conclusion: It is proposed for the first time, for RF patients undergoing PTx, SVV-directed liquid titration could correct volume-deplete state and reduce postoperative complications, with no known long-term adverse effects.

Automated clinical alert systems can improve anesthesia documentation: a retrospective cohort study

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Background and Goal of Study: Clinical alert systems have been used to analyze deviations from hospital standards in the electronic medical record to identify missing documentations and send alerts to the appropriate providers to increase adherence to required elements. To improve compliance, an alert system for documentation of the Immediate Preoperative Assessment was implemented at our institution in August 2018 with the goal of improving documentation compliance rates. We hypothesized that implementation of this alert system would increase the compliance of on-time documentation of the IPOA.

Materials and Methods: An initial data query in our institutional data warehouse was made for all patients who had a completed anesthetic during our study period. This date range corresponded to 6 months before and after August 2nd, 2018, the date when the IPOA alert was implemented and the anesthesiology department.

The following analyses were performed: testing the proportion of cases compliant with on-time documentation of the IPOA pre- versus post-implementation for the full cohort and among subgroups of interest, testing the time when the IPOA was completed relative to anesthesia end, and testing whether time of day of surgery occurred had an impact on the time when the IPOA was completed relative to the drapes off/IPOA alert sent time. The proportion of compliance for pre- versus post-implementation was tested by Chi-square test.

Results and Discussion: Through retrospective chart review of electronic patient records, 47,417 cases matched our inclusion criteria of patients that had a completed anesthetic between February 2nd, 2018 to February 2nd, 2019. In total, we excluded 5,132 cases. The compliance rate of IPOA completion increased from 76% to 88% (P < 0.001) before and after the alert implementation date. In the initial month following alert implementation, the compliance rate immediately increased to 83% and stayed in the high 80’s for the balance of the study period.

Conclusion: We demonstrate that automated Clinical Alert Systems operating via a single page notification can improve the compliance rate for documentation of key anesthesia events and that this observation is sustained six months after the implementation date. Improvement in compliance is higher in shorter cases and cases that occur early in the day.

Under-representation of women in leadership roles: An overview of the Spanish gender imbalance

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Background and Goal of Study: Publications of diverse medical specialties confirm that women are under-represented in leadership positions in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.


Results and Discussion: Completed surveys were received from 1,619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). When asking about having ever been in a leadership position, 46.2% of men answered affirmatively compared to 25.2% of women (P<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.8% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (p<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.8% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (p<0.001). In addition, a greater proportion of men accepted the offered position, 61.5% of men vs 50.5% of women (P>0.05). The results of the survey show that the percentage of men who hold hospital man-agement or leadership positions is significantly higher than that of women. When we compare our results with the numbers from public hospitals given by Spanish Society of Anaesthesiology (SEDAR), the percentages are quite similar. Around 74% of the head of department positions in anaesthesiology are held by men in Spain. In addition, the representation of women in the executive committee of the Spanish Society of Anaesthesia is very low, only one out of seven positions is held by a woman. Further-more, since its foundation in 1953, the president has always been male.

Conclusion: The results of this study show that women are under-represented in leadership positions in Spain.

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Under-representation of women in leadership roles: An overview of the Spanish gender imbalance

Aliño M.1
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Background and Goal of Study: Publications of diverse medical specialties confirm that women are under-represented in leadership positions in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.


Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). When asking about having ever been in a leadership position, 46.2% of men answered affirmatively compared to 25.2% of women (P<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.6% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (p<0.001). In addition, a greater proportion of men accepted the offered position, 61.5% of men vs 50.5% of women (P<0.05). The results of the survey show that the percentage of men who hold hospital management or leadership positions is significantly higher than that of women. When we compare our results with the numbers from public hospitals given by Spanish Society of Anesthesiology (SEDA), the percentages are quite similar. Around 74% of these department positions in anaesthesiology are held by men in Spain. In addition, the representation of women in the executive committees of the Spanish Society of Anaesthesia is very low, only one out of seven positions is held by a woman. Further-more, since its foundation in 1953, the president has always been male.

Conclusion: The results of this study show that women are under-represented in leadership positions in Spain.

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Individual perceptions among Spanish anaesthesiologist regarding gender discrimination at workplace

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Background and Goal of Study: Publications of diverse medical specialties confirm that gender differences still exist in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.


Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). Among women’s perceptions, 36.3% of female respondents believe that they have lost opportunities for promotion because of their gender; 60% of them think that this situation is frustrating. 39.2% of women were afraid that their contract would not be renewed if they become pregnant. In addition, 10% of women suspect that their pregnancy resulted in none renewal of their contract. 33.8% of participants consider that female anaesthetists are treated differently in the workplace: The majority of respondents (85.2%) reported that patients are more polite to male practitioners than females. Almost half of women surveyed (46%) reported that gender discrimination in their workplace exists. Workplace discrimination has been discussed extensively and it is also evident in this study. Both respondents, men and women, have reported perceptions of workplace gender-based discrimination. Female physicians feel that their colleagues, patients, and nursing staff treat them differently. This situation is considered a social problem; it has been linked to the term «unconscious gender bias» which refers to women being treated differently than men, and to having different expectations placed on them without any realization of this bias. Although the analysis of possible solutions to eliminate gender disparity is not the aim of this study, it cannot be overlooked. Certain measures which could help include identifying current barriers for women within the workplace, and subsequently developing and implementing active plans to combat this. These programs could help with women’s leadership development at any level and include workforce support.

Conclusion: The global perception of the respondents of this survey shows that gender differences also exist in the workplace in anaesthesiology in Spain.

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Coffee consumption – do young anaesthesiologists drink as much as rumour has it?

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Background and Goal of Study: Traditionally, anaesthesiologists are considered as avid coffee consumers and this impression, although questioned, continues to be propagated. 1.2 This study investigates coffee consumption among young European anaesthesiologists and attempts to indicate if coffee consumption is related to the doctor’s level of experience, working out-of-hours and reporting not getting enough rest while doing no.

Materials and Methods: A questionnaire was written up and this included questions on the number of coffee cups consumed in one day, the number of years working in anaesthesiology and if the responder is a trainee or a specialist, if they work out-of-hours and if they get enough rest. A young anaesthesiologist was arbitrarily defined as a doctor working in anaesthesiology for 10 years or less. The questionnaire was published on the ESA Trainee Network Facebook page, an online network which connects European trainees in anaesthesiology and intensive care. The post remained active for 24 hours and generated 286 responses. Responses were filtered and the remaining 231 were analysed using R.

Results and Discussion: Coffee consumption in this cohort was a median of 3 cups/day (IQR 1-5). Mean age among responders was 29.8±3.5 years and 34.6% were trainees while 61.0% were specialists. Mean anaesthetic experience was 4.0±2.3 years with 92.6% of participants working out-of-hours. 44.1% “rarely” get enough rest, 40.3% “sometimes” and 8.2% “never”. There was no statistical difference between the number of coffee cups consumed by specialists or trainees (p>0.59), those working out-of-hours or not (p>0.33), those getting rest or not (p>0.72) or with increasing working experience (p>0.11). Coffee consumption in this cohort is similar to that found by Do et al, who discuss how coffee does not alter reported work satisfaction.

Conclusion: Coffee consumption among young European anaesthesiologists appears to be moderate and the factors studied do not seem to be related to it.

References:

4769

Oxidative stress and antioxidant effects in medical residents occupationally exposed to anaesthetics

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Background and Goal of Study: Occupational exposure to waste anaesthetic gases may be associated with toxic effects. Medical residents are a special category of physicians whose occupational and personal well-being are of major concern worldwide. The aim of this study was to monitor oxidative stress in physicians occupationally exposed to anaesthetics during their medical residency. We hypothesized that changes in oxidative/antioxidative markers would occur during the specialization period.

Materials and Methods: The study was approved by the local IRB and all the subjects signed the informed consent. This follow-up study included 23 young physicians who worked in operating rooms and were occupationally exposed to the waste anaesthetics gases (isoflurane, sevoflurane, desflurane and nitrous oxide) during their medical residency in anaesthesiology in a Brazilian university hospital. Fasted blood samples were collected at three time points, as follows: before the start of the medical residency program (before exposure; the residents were their own control), in the first year and in the second year of medical residency. Oxidative stress markers were monitored in these three time points to assess lipid peroxidation (malonaldehyde; MDA) and oxidative DNA damage, in addition to antioxidant capacity, which were evaluated by repeated measures analysis followed by Duncan test. Additionally, the trace concentration of the anaesthetics were measured in the physician's breathing zone by a portable infrared analyzer.

Results and Discussion: All the anaesthetic concentrations were above the recommended limit established by the National Institute for Occupational Safety and Health (NIOSH, USA). The results showed a progressive increase in MDA (p < 0.0001) and oxidized DNA bases (p < 0.001) at the first and second years of exposure. In addition, the antioxidant defense enhanced at the first and second years of exposure (p< 0.001). The findings suggest that high concentrations
of waste anaesthetic gases found in unscreened surgical theatre is related to oxidative stress in young physicians during their specialization.

**Conclusion:** Exposure to inhaled anaesthetics in an inadequate workplace is associated with oxidative stress in physicians during a 2-year period of medical residency. Therefore, this study emphasizes the need to minimize this occupational exposure.

**Acknowledgements:** FAPESP (2018/20143-4).

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### 4800

**Cooperation and anesthesia. Anesthesia in turkana**

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**Goal of Study:** Turkana is a 77000 square kilometres region, located in the northwest of Kenya. The last reports said that it counts with 900000 inhabitants; 60% of the residents are nomads, 35% are semi-nomads and 5% live in urban settlements. Doctor-patient ration is one doctor for each 74000 patients, even though most of them cannot approach one because of its location. The poverty index is 94% due to the isolation, the drought, and its geographical location. Those conditions made them being exposed to different emergency situations. The main situations of need of anesthetics were the most common pathology between the kids with 15 children having there anaesthesia in the same time. There were 54 patients under the age of 10, 28 of them under 3 years. Clefts of lip and palate were the most common pathology between the kids with 15 children having there anaesthesia in the same time. There were 54 patients under the age of 10, 28 of them under 3 years. Clefts of lip and palate were the most common pathology between the kids with 15 children having there anaesthesia in the same time. There were 54 patients under the age of 10, 28 of them under 3 years.

**Results:** There were 127 anesthesia procedures: 55,9% were general anesthesias, 33,6% were regional, 7,9% were local; 4,4% needed coadyuvant drugs we had to use to sedate the patients or to administer some extra analgesia. Surgeries were 52% done by general surgeons, 18,9% by traumatologists, 11,8% by maxillofacial surgeons, 17,3% by gynecologist including some urgent cesarean sections. This past year there were 54 patients under the age of 10, 28 of them under 3 years. Clefts were the most common pathology between the kids with 15 children having there anaesthesia in the same time. We also recorded the type of anesthesia, the surgical procedure and specialty that performed it, the dosage in case it was regional anesthesia and the coadyuvant drugs we had to use to sedate the patients or to administer some extra analgesia.

**Materials and Methods:** We recorded all the patients coming to the surgery room. Of those who underwent some type of anesthesia we wrote down the demographical data (56,7% of men and a median of 13 years old), along with the estimated height and weight. We also recorded the type of anesthesia, the surgical procedure and specialty that performed it, the dosage in case it was regional anesthesia and the coadyuvant drugs we had to use to sedate the patients or to administer some extra analgesia.

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### 5497

**Practice of documenting pre-anesthesia assessment chart in regional teaching hospital. A concern for patient safety**

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**Background and Goal of Study:** Detailed pre-anesthetic evaluation, proper and detailed documentation, record keeping for easy access is prime responsibility of every anaesthesiologist. Proper and complete documentation is extremely essential for improving patient’s outcome and for medico-legal aspects. It is also a marker of provision of quality care.

**Objective:** To identify the quality of preoperative assessment and documentation of patients coming for elective or emergency surgery. The required information including history, examination and investigations and other applicable information. Materials and Methods: Design, setting and participants: Prospective audit of medical records of 100 patients following all kinds of surgical procedures in our hospital during period of one month, data collected by all authors in their own area of work daily.

**Results and Discussion:** During the study period total of 100 patients’ charts were reviewed, no chart was found completely filled. The most (>90%) completed documentation was of the information addressogram, allergies (even with not any), airway examination and ASA classification. Major (<50%) lack of information was found of pre-operative vital signs, timings of empty stomach pre-operatively, BMI, lab investigations and name of the surgeon. The variables like radiology examination, ECG, weight, procedure to be done, past medical or surgical history and ongoing medications were not reported in between percentages of 22-48%. There was no significant difference between the trends for elective or emergency surgeries irrespective of daytime or out of hours surgeries.

**Conclusion:** Main recommendations: The pre-operative assessment and documentation of the patient’s general health and previous conditions are of utmost importance for anaesthetist, not only for planning and provision of safe conduct of anesthesia and post-operative management, also for medico-legal matters. More emphasis on comprehensive documentation of all information and refreshing the importance of documentation achieved is highly recommended.

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### 5148

**Gender equity in departmental leadership, research opportunities, and clinical work attitudes: perceptions from German-speaking anaesthesiologists**

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**Background and Goal of Study:** There is a paucity of data available on gender differences in promotion of anaesthesiologists in Europe.1. We aimed to define the perception of gender equity among German-speaking anaesthesiologists in the areas of departmental leadership, research, and attitudes in the clinical workplace.

**Materials and Methods:** We performed an internet-based survey to investigate career opportunities in leadership and research among anaesthesiologists. The survey instrument was piloted and uploaded to the SurveyMonkey® platform. Participant consent and ethical approval were obtained. Quantitative analysis was done with Chi-square and Cramer’s V as a measure of the strength of associations (p significant when <0.05).

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### Results and Discussion:

There were 818 respondents from Austria, Germany and Switzerland. The mean age of respondents was 42 ± 10 years and 47% of respondents were female. Overall, women anaesthesiologists in these countries represent 48% ± 15% of the departmental workforce. Women were evenly driven to take any leadership position and do research at their departments. However, gender was self-reported as a disadvantage for leadership (P=0.001, Cramer’s V: 0.63) and research (P=0.001, Cramer’s V: 0.51). The current head of the department was reported to be a female in 5.6% and the immediate past head was a female in 9.9%. Similarly, 4.4% of female respondents reported being a current or past head of the department compared to 17.1% of male respondents. Females were also more likely to be mistreated in the workplace (OR 9.2, 95% CI 6.0-14; P<0.001), most commonly by surgeons. Women spent somewhat less time investing in their career (P<0.001, Cramer’s V: 0.29).

**Conclusion:** We characterised current gender inequity perceptions among German-speaking anaesthesiologists. Women still feel harmed in the promotion of leadership positions and research possibilities within our speciality. There is a high proportion of women who reported having been mistreated at work.

**References:**
Postanaesthetic visits recording: benefits and obstacles

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Background and Goal of Study: Postanaesthetic visits (PAVs) allow detection of anaesthesia related complications and increase patient satisfaction. However, limited information is available regarding current practice of PAVs. Goal of our study was to record and evaluate PAVs.

Materials and Methods: A PAV service was initiated in our department in January 2018. Anaesthesiologists should record in the PAV book any performed surgical anaesthesia by date, patient’s name and age, type of surgery, anaesthetic technique, anesthesiologist’s and surgeon’s name. PAV should be performed within 24 h recording pain, PONV, sensory/motor block and other potential complication.

Results and Discussion: During the study period total of 100 patients’ charts were analyzed. In the formal archive, PAV was performed only to 421 patients (55%). From our data analysis it occurred that regarding anesthesia technique, general anesthesia (GA) and epidural were the most (50%) and least (28%) used techniques. Considering the type of surgery, cephalic extirpation and cesarean sections were the most (33%) and least (12%) performed procedures, respectively. Besides, the relative number of performed PAVs were the following: 1 after 50% of cases, 2 after 25% of cases and 3 after 25% of cases (12%).

Conclusion: Main recommendations: The pre-operative assessment and documentation of the patient’s general health and previous conditions are of utmost importance for anesthetist, not only for planning and provision of safe conduct of anaesthesia and post-operative management, also for medico-legal matters. More importance for anaesthetist, not only for planning and provision of safe conduct of anaesthesia and post-operative management, also for medico-legal matters. More emphasis on comprehensive documentation of all information and refreshing the importance of documentation achieved is highly recommended.

Incidence of Postoperative Residual Neuromuscular Blockade - A Multicenter, Observational Study in Portugal (INSPIRE 2)

Esteses S.1, Correia De Barros F.1, Nunes C. S.2, on behalf of INSPIRE² Group - Andreia Puga; Blandina Gomes; Catarina S Nunes; Fernando Abelha; Filinto Correia de Barros; Humberto Machado; Milene Silva; Nuno Fernandes; Paula Vitor, Sandra Pereira; Simao Esteves; Teresa Lapa; Vitor Pinho-Oliveira
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Background: Residual neuromuscular blockade (RNMB) is a widely recognized complication associated with the use of neuromuscular blocking agents (NMBAs). RNMB can result in significant clinical consequences that may increase postoperative morbidity and mortality. A study in 2010 reporting an incidence of 26% of TOFratio<0.9 (TOF ratio) at post anaesthesia care unit (PACU) arrival highlighted the dimension of this complication in Portugal. Awareness of this problem and sugammadex widespread use since then, may have changed this reality. The primary objective of this study was to determine the current incidence of RNMB defined by a TOF ratio<0.9 at PACU arrival. Secondary objectives were the possible association of RNMB with the use of reversal agents and intraoperative monitoring of neuromuscular blockade (NMB).

Materials and Methods: Multicentre, observational prospective study involving adult patients undergoing elective surgical procedures requiring general anaesthesia with NMBA (from 07/13 to 06/19). 366 patients were included from 10 Portuguese hospitals. After patient arrival in PACU, an investigator not involved in anaesthesia care, applied 3 consecutive TOF stimulations with 15 seconds interval
Sugammadex Associated Hypotension, Bradycardia, Asystole and Death: A Case Report

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Background: Sugammadex, introduced in Europe in 2008, is a well tolerated drug. There are several recent reported events in literature of hypotension, bradycardia and asystole immediately after its administration. In 2015 FDA approved sugammadex, a first and unique selective (ND5MR) binding agent with a greater affinity for rocuronium and vecuronium, as a reversal agent.

Case Report: A 68 kg, 82-year male, 150 pack-year smoker, COPD and lung cancer post surgery and radiation. No significant cardiovascular history. January of 2019, a case of sudden bradycardia (has not been encountered in the literature) developed after sugammadex. It has occurred immediately post intubation. The patient developed hypotension, bradycardia, asystole and death. The patient had normal sinus rhythm with normal laboratory values in the preoperative and intraoperative period, and sudden onset of atrial fibrillation and the patient was sended to the burn center after waking up without any problem.

Discussion: Aside from a functional arterial line it took twelve minutes before hypotension most likely caused by sugammadex administration was recognized and documented. Despite a functional arterial line it took twelve minutes before blood pressure despite a norepinephrine infusion.

Conclusion: A significant reduction in RNMB has been achieved in the last 8 years in Portugal but we believe that an improvement is still possible towards making RNMB a “never event.”

References:
been interpreted by us as a side effect of this agent, which had previously been known to source of arrhythmia (especially bradycardia and asystole in the current publications). In addition to other common causes, it should be kept in mind that this agent may also have an arrhythmogenic effect. It is the fact that appropriate anti-arrhythmic treatment can prevent the possible worse outcomes in a short time. As a conclusion, we think that sugammadex should not be administered centrally and slow infusion under monitored condition is more appropriate.

**Learning points:** sugammadexes induced arrhythmia.

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**5044**

**Mechanisms of depressed recovery from rocuronium-induced paralysis after insufficient sugammadex administration: possible contributions of pre and postsynaptic neuromuscular junction**

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**Background:** We previously reported that recovery speed of train of four ratio (TOFR) from rocuronium (Rb)-induced paralysis with insufficient sugammadex (SGX) is slower and recurarization occurs more frequently in elderly patients (Muramatsu T. et al., Anesthesiology 2019). Changes of TOFR can be resulted from changes of muscle contraction either at T1 and T4. Within the neuromuscular (NM) junction, acetylcholine receptors locate both at pre and postsynaptic regions, and the T1 and T4 are generally believed to reflect post and presynaptic NM junction function, respectively. More importantly, T1 and T4 reflect strength and endurance of muscle contraction. Detailed analysis of the patterns of T1 and T4 changes during insufficient SGX-induced recovery from Rb paralysis may reveal mechanisms of recurarization in elderly patients. We took an advantage to test a hypothesis that T1 and T4 differently respond to insufficient SGX administration with using the previously-reported data.

**Materials and Methods:** Acceleromyograph NM monitoring data and background variables obtained from forty patients (24-85ys) anaesthetized with TIVA participating in the previous study were used for this secondary analyses. Recovery speeds of T1, T4, and TOFR were measured as slopes of the corresponding acceleromyograph tracings. We specifically focused on occurrence of acceleration or deceleration determined by ratio of early and late phases' slope (TX-AR = late-TXslope/early-TXslope).

**Results and Discussion:** Both T1- and T4-AR were less than 1.0 in majority (98%, 95%, respectively). T1-AR (0.13 ± 0.12) was significantly less than T4-AR (0.29 ± 0.25) (P<0.001). Systematic dissociation between them at higher value range indicated by their linear relationship, T4-AR = -0.03+(2.4*T1-AR), r=0.85, p=0.005) implies greater T4-AR reduction than T1-AR possibly leading to TOFR reduction, i.e., recurarization. These suggest stronger deceleration on T1 resulting in muscle weakness, and faster deceleration at T4 possibly resulting in recurarization. T1-AR was independently explained by BMI (p=0.005) and GFR (p=0.014), and T4-AR by BMI (p=0.005) and GFR (p=0.01) whereas lower GFR (p=0.01) was a sole independent risk factor for TOFR-AR (0.12 ± 0.13).

**Conclusions:** Insufficient SGX administration significantly decelerates recovery of both T1 and T4 whereas postsynaptic deceleration is more severe possibly leading to symptomatic muscle weakness and faster presynaptic response may result in recurarization.

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**5058**

**Sugammadex dosing: anaesthesiologist's clinical perception versus quantitative monitoring**

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**Background and Goal of Study:** The use of neuromuscular block (NMB) monitoring with one of the currently available quantitative methods is a class IA recommendation. Yet, despite limitations, most clinicians continue to rely on subjective evaluation in making decisions about the adequacy of neuromuscular function before tracheal extubation rather than using quantitative TOFscan monitoring. The aim is to compare the sugammadex dose suggested by the Anaesthesiologist based on his clinical experience versus the dose determined by quantitative monitoring to determine if the subjective dose is appropriate.

**Materials and Methods:** This was a prospective, 3-month study in patients 18-75 years who underwent general anesthesia with rocuronium and reversal with sugammadex. At the time of pharmacologic reversal of NMB, both the sugammadex dose proposed by the Anaesthesiologist and the dose suggested by a TOFscan, according to Portuguese guidelines on the management of the NMB, were recorded. Then the TOFscan suggested dose was administered. The subjective dose was considered appropriate if it was within 10% of the recommended dose for the depth of NMB. The results were analysed descriptively.

**Results and Discussion:** Of 66 patients evaluated, in 16% the subjective dose would have been >10% below the recommended dose (range for the difference to the recommended dose was -56 to -232 mg), and the median time between the last Rocuronium administration and pharmacological reversal was 35 min (range: 10-60min). In 40% of patients the subjective dose would have been >10% above the recommended dose (range for the difference to the recommended dose was +28 to +200 mg) and the median time to pharmacological reversal was 45 min (range: 15-220 min). In 44% of patients the subjective dose would have been within 10% of the recommended dose and the mean time to pharmacological reversal was 40 min (range: 15-160 min). The empiric decision would have resulted in sugammadex under-dosing or over-dosing in 56% of patients. While under-dosing can result in residual NMB and associated post-operative complications or increased risk of recurrence after initial transient reversal, over-dosing may increase the hypotensive reactions and economic burden.

**Conclusion:** Given these risks and the interindividual variability, these data show that the sugammadex dose should be determined using quantitative monitoring, as it is the only way to ensure an appropriate dose is given.
Economic Impact of Expanding the Use of Sugammadex for the Reversal of Neuromuscular Blockade in Adults Undergoing Surgery in Spain

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Background and Goal of Study: Neuromuscular blocking agents (NMBAs) are often administered to prevent patient movement during surgical procedures requiring use of general anesthetics with intubation. Patients extubated with incomplete neuromuscular reversal may experience residual neuromuscular paralysis, potentially leading to post-operative complications. The aim of this study was to analyze the clinical and economic impact of expanding the use of sugammadex in 226,119 procedures, displacing neostigmine or no reversal agent.

Materials and Methods: A randomized controlled trial was conducted in 148 hospitals in Spain in 2015, 73.3% of them using a NMBA. The model estimated the annual net budget impact of substituting sugammadex for no reversal agent in 50% of the patients administered with rocuronium and no reversal agent. The risk of the composite endpoint, PPC (post-operative pulmonary complications), was based on a study of the Multicenter Perioperative Outcomes Group (MPOG) centralized research registry. The analysis was conducted from payers' perspective, considering only the direct costs associated with PPC management (€6,990.01 per episode) and pharmacy costs of the NMBAs. Deterministic sensitivity analyses (DSA) were carried out by varying key parameters included in the model within a range of ±25%.

Results and Discussion: The estimated budget impact of expanding the use of sugammadex in 226,119 procedures, displacing neostigmine or no reversal agent, in the routine reversal of NMB with rocuronium in Spain. NMB induced by cisatracurium and others are included in the analysis with caveat that patients are switched to rocuronium first.

Materials and Methods: A budget impact analysis was developed based on a decision analytic model that followed 733,876 hospital procedures carried out in Spain in 2015, 73.3% of them using a NMBA. The model estimated the annual net budget impact of substituting sugammadex for no reversal agent in 50% of the patients administered with rocuronium and no reversal agent. The risk of the composite endpoint, PPC (post-operative pulmonary complications), was based on a study of the Multicenter Perioperative Outcomes Group (MPOG) centralized research registry. The analysis was conducted from payers' perspective, considering only the direct costs associated with PPC management (€6,990.01 per episode) and pharmacy costs of the NMBAs. Deterministic sensitivity analyses (DSA) were carried out by varying key parameters included in the model within a range of ±25%.

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Comparison of the intubation success rate between two techniques using lightwand in patients undergoing spine surgery with difficult airway: conventional vs. face-to-face technique

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Background and Goal of Study: A lightwand device can provide easy and safe intubation, particularly in a patient with anticipated difficult intubation or cervical immobilization. For a successful lightwand intubation, it is essential to locate the tip of lightwand just in front of the vocal cord opening, and some soft tissue injury or technical difficulty can happen during this process. As an alternative technique, the face-to-face lightwand technique provides lightwand insertion in a sitting position, thereby anticipating less soft tissue injury, and not requiring mandible lifting for lightwand insertion. We compared the intubation success rate between conventional lightwand technique and face-to-face lightwand technique.

Materials and Methods: Patients who were undergoing spine surgery were randomly allocated into two groups; Group C using a conventional lightwand technique or group F for using a face-to-face lightwand technique for tracheal intubation. After anesthesia induction, patients in group C were intubated using lightwand with a conventional technique. In group F, patients were sitting in 45 degrees and intubated facing with an anesthesiologist. The primary outcome was the success rate at first attempt.

Results and Discussion: A total of 178 patients were enrolled. The intubation success rate at first attempt was 88.6% in group C and 84.1% in group F, respectively (P=0.381). Intubation time was slightly shorter in group F, but there was no statistical significance. (14.0 vs. 12.0, P=0.704) Intubation related complications, including post-intubation bleeding, sore throat, and hoarseness, were similar between the two groups.

Conclusion: Compared with the conventional technique, the face-to-face lightwand intubation technique showed a similar result. So it may be used as an alternative technique in cervical immobilized patients.

Respiratory distress by airway obstruction in orthognathic surgery during the postoperative period: case report

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Background: A 45 year old female, ASA II, was scheduled for elective orthognathic surgery, under TIVA. In the absence of surgical, anaesthetic complications and Cormack I, the patient was extubated and transferred to the critical care unit (CCU) with intermaxilar suture (IMS). After 4 h, the patient develops nasal bleeding, agitation, respiratory distress and desaturation. The IMS is removed and the patient is intubated and transferred to the operating room (OR) where experienced a new desaturation episode for 15 min and chest asymmetry movement, calling the bronchoscopist who removes a clot in the left main bronchus.

Subsequently, the patient is moved to the ICU, experiencing a neurological status disorder with a MRI and EEG matching with a hypoxic-ischaemic encephalopathy. Case Report: Highlight the early diagnosis of a life threatening situation, as well as the application of a treatment without delay. Unfortunately, the neurological status didn’t improve and the patient needed 3 more surgeries.
The discrepancy of rotation angle of the endotracheal tube tip at the glottis during nasotracheal intubation using fiberscope

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Background and Goal of study: Nasotracheal intubation using fiberscope is a useful technique for patients. In clinical practice, we experience sometimes the difficulty in advancing the tube over the glottis, as the tip of the tube catch on the vocal cord. It may give damage to the vocal cord and lead to postoperative sore throat. Rotation of the tube may easily release this catching. However, when the endotracheal tube is rotated, the tube may be deformed. Therefore, we investigated the discrepancy of the rotation angle between at the tip and at the end side.

Material and Methods: The patients (20-80 yrs) undergoing nasotracheal intubation for oral surgery participated 3 sizes of preformed nasotracheal tubes (Portex; Smiths Medical) were intubated using fiberscope. They were divided into 3 groups; the tube internal diameter (ID) 6.5 mm group (6.5 group), ID 7.0 mm group (7.0 group) and ID 7.5 mm group (7.5 group). The tube was inserted through nasal cavity into the pharynx. After the fiberscope was advanced through the tube into the trachea. At this timing the end side of the tube was rotated by 90° and 180° in both right (clockwise) and left (counterclockwise) together with fiberscope, then the rotation angle at the tip was monitored by Pentax Airwayscope.

Results and discussion: A total of 39 patients were included. When the tip was rotated right by 90° at the end side, in 6.5 group (n=13), the tip rotated by 47.8 ± 17.3°. In 7.0 group (n=13), the tip rotated by 40.2 ± 13.7°. In 7.5 group (n=13), the tip rotated by 35.1 ± 21°. When the tip was rotated right by 180°, in 6.5 group, the tip rotated by 128.1 ± 37.7°. In 7.0 group, the tip rotated by 122.0 ± 48.8°. In 7.5 group, the tip rotated by 116.8 ± 29.9°. All rotation angles were significantly less than that at the end side (p<0.001). In left rotation, similar results were obtained. These discrepancies of the rotation angles might be caused by resistance against the rotation in the nasal cavity and softness of the tube materials. Therefore, overrotation is important to release the catching of the tube tip.

Conclusion: When the tube is rotated to release the tip catching on the vocal cord during nasotracheal intubation using fiberscope, rotation angle at the tip is significantly less than the rotation angle at the end side of the tube. Therefore, overrotation should be considered.

References:
Learning points: Insertion of different types of SAD causes different deformities of the larynx that affect the view of the glottis and the arytenoids during ML.

Endoscopic closure of a tracheoesophageal fistula using an Amplatz device. Potential new indication

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Background: Tracheoesophageal fistulas (TEF) are a rare condition with a high morbidity and mortality rate. Treatment includes primary repair and endoscopic closure. We present a successfully endoscopic closure of TEF using an Amplatz septal occluder (ASO), a device originally designed to treat atrial septal defects.

Case Report: The patient is a 23-year-old man with VACTERL syndrome. Secondary, he presents an 8mm TEF which lead to bronchoesopahagoscopy episodes, chronic bronchopneumopathy and malnutrition. The TEF was treated several times by endoscopic techniques (clip and oesophageal endoprosthesis) without success. Surgeons dismissed surgery due to its high risk and complexity. Then, endoscopic closure with an ASO was performed under general anesthesia: 100mcg of fentanyl, 20mg of etomidate and 40mg of rocuronium were administered as induction; endotracheal intubation was achieved easily with an n° 5.5 tube. Anaesthesia was maintained with sevofluorane and remifentanil (0.1mcg/kg/min).

A 16mm ASO was placed successfully at the end of the procedure and the patient was discharged the following day.

Discussion: The main treatment of TEF is primary repair but the patient’s clinical condition does not often allow it, so several endoscopic treatments have been described (stent, clips, etc). Recently, ASO has been proposed as a new option. It is a disk made of nitinol with superelastic properties and memory foam and it was created to treat cardiac defects. Our patient was dismissed surgery, so the medical team thought of endoscopic closure with an ASO as his last curative chance. We chose general anaesthesia instead of sedation as we expected the procedure to last long. A small otracheal tube (n° 5.5) was placed because bronchosocst found it easier to handle the fibroscope from outside the tube than through it. The procedure was uneventful and the patient was discharged the following day.

References:

Learning points: ASO was created to treat atrial septal defects, but it seems to be an effective, non-invasive way to close TEF in non-surgical patients, so it may become a new indication for this device. Anaesthetic management depends on the expected duration of the procedure and each patient’s comorbidities.
We believe that the more curvature and rigid structure of LMA Protector compared to intubation through SAD because the hemodynamic parameters were stable during and by improving anatomic visualization. In the current study, it was demonstrated respectively. The difference was statistically significant (p<0.05). The most common effects of two different videolaryngoscopes in terms of success of intubation and postoperative early complications.

Materials and Methods: The current retrospective study included 123 ASA I-III patients aged 18-65, undergoing elective surgery and requiring endotracheal intubation. Preoperative demographical variables, thyromental distance, stertomal distance, upper lip bite test and Mallampati classification scores were recorded. The patients intubated with McGrath(n=63) and Truview videolaryngoscope(n=60) were included to Group MG and Group TW, respectively. All patients included to the study had standard protocol for premedication, sedation and anesthesia induction. The number of intubation trials and duration of intubation (standardized as the time between laryngoscope entrance to mouth and demonstration of end-tidal carbondioxide graphy), Cormack Lehane scores and intubation (standardized as the time between laryngoscope entrance to mouth and tracheal intubation time, fiberoptic laryngeal appearance catheter insertion time and tracheal intubation time, fiberoptic laryngeal appearance), Aintree and an initial and backup strategies must be considered in order to guarantee a safe anesthetic induction with total intravenous anesthesia (TIVA) and neuromuscular relaxation. After three failed attempts at intubation using a videolaryngoscope the patient had to be rescued with a second generation supraglottic airway device (I-gel), and the airway secured using a fibrobronchoscope through said supraglottic airway device to advance an endotracheal tube.

Discussion: The adoption of strategies while managing a difficult airway improves the rate of success. The supraglottic airway devices, one of the stepping stones in the management of the difficult airway algorithm allow intubation even using a fibrobronchoscope which we consider to be a safe alternative in the management of these types of patients.

References:

Learning points: There is not one unique way to face the patient with difficult airway and an initial and backup strategies must be considered in order to guarantee a safe anesthetic induction. The supraglottic airway device must always be considered in the scenario of a difficult airway in order to rescue it and then secure it via other method, including the use of a fibrobronchoscope.

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Unexpected ventricular fibrillation after removal of Laryngeal Mask in a young healthy patient

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Background: Major cardiac complications such as ventricular fibrillation can occur unexpectedly in patients without risk factors.

Case Report: A 44-year-old patient without any coexisting disease was scheduled for elective vitrectomy. After induction with 2mg/kg propofol and 1 mcg/kg fentanyl, anesthesia was maintained with 2–3% sevoflurane in 50% O2-air via a laryngeal mask airway (LMA). The operation lasted 70 minutes and the LMA was removed when the patient had sufficient spontaneous ventilation. Immediately after removing of the LMA ventricular fibrillation was seen on the monitor. Also, SPO2 disappeared and the patient stopped breathing. Help was called, chest compressions started and the patient was intubated. When the defibrillator arrived in about 90 seconds, the first shock was given with 150 J and 2 minutes CPR was continued according to the ERC guidelines. Sinus rhythm with ST elevations was seen on the monitor at rhythm check after 2 minutes and the return of spontaneous circulation was confirmed. On the ECG has taken in the OR no ST elevation could be seen anymore. The patient was transferred to the Post-anaesthesia care unit (PACU) for further evaluation. Electrocardiography(ECHO) was performed by the cardiologist at the bedside. The patient was taken over to the coronary angiography unit, and a diagnostic angiography revealed %60 stenosis in the Left Anterior Descending(LAD) and Circumflex-artery(CX), as well as %30 in the right coronary artery(RCA). Consultations between cardiologists and cardiovascular surgeons ended in the decision of coronary artery bypass graft(CABG). After CABG the patient could be discharged uneventfully.

Discussion: The incidence rate of cardiac arrest during general anesthesia is 1.1–25.5/10,000. The mortality rate in non-cardiac surgery is 1.5%, and 42% of cases are associated with cardiac complications.
Comparison between Opioid-Free Anesthesia (OFA) and Opioid-Reduced Anesthesia (ORA) during open hepatectomy: a retrospective study

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Background and Goal of Study: Open hepatectomy is a painful procedure. Opioids consumption could slow the postoperative rehabilitation. They induce hypalgesia and could increase the risk of recurrence and metastasis in cancer surgery. Because OFA has become a common practice in our institution, we retrospectively compared OFA to ORA protocols on the postoperative consumption of opioids.

Materials and Methods: In ORA protocol, patients received a multimodal analgesia: lidocaine, ketamine, dexamethasone and opioids (sufentanil or remifentanil). In OFA protocol, patients received similar multimodal treatment but opioids have been replaced by dexmedetomidine. The choice of the protocol was left to the discretion of the anesthesiologist. The primary outcome was the morphine consumption in Postoperative Hepatocellular Care Unit (PACU). Secondary outcomes were pain evaluation using standard Numeric Rating Scale (maxNRS) in PACU, opioids consumption and measurement of D1 and D2, as well as treatment of PostOperative Nausea and Vomiting (PONV). Statistical evaluation was performed with univariate and multivariate analysis.

Results and Discussion: From January to December 2018, 90 patients received OFA and 57 received ORA protocols. There was no significant difference in patient’s and surgical characteristics. In PACU, morphine titration was significantly lower in the OFA group (2.5±3.5 mg Vs. 6.4±5.5 mg, respectively in OFA and ORA groups; p>0.001) (Fig.1). Pain was significantly reduced (2.4±2.7 Vs. 5.8±2.9; p<0.0001) (Fig.2). At D1 there is a trend, but not significant difference in morphine consumption: (4.8±5.2 mg of equivalent IV morphine (MEIV) Vs. 8.4±9.5; p=0.16). In terms of level of pain, no difference was recorded (max. NRS=5±4±1.9 Vs. 5.3±1.7; p>0.7). At D2, the morphine consumption wasn’t significantly different (1.7±4.3 Vs. 3.1±7.5; p=0.16) but the pain was significantly lower in OFA group (3.5±2.1 Vs 4.9±1.9; p<0.0001) (Fig.2). The treatment of PONV was significantly less important in OFA group (18% Vs. 33%; p=0.031).

Conclusion: Compared to the multimodal approach in ORA protocol, OFA protocol could reduce the morphine consumption in PACU, and the total postoperative opioid consumption after open liver surgery. It isn’t surprising to find a lower level of PONV in the OFA group.

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Opioid sensitivity estimated by vascular stiffness predicts blood pressure after a skin incision

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Background and Goal of Study: Previously, we quantified the degree of vasoconstriction as the vascular stiffness value (K) by fitting the Lissajous curve from plethysmography and invasive arterial pressure waveforms to a mechanical impedance model [1], and reported that the rate of change of K (KR) increased with noxious stimuli and decreased with opioid dosage [2]. However, the KR value may not be suitable for individual comparison as it varies widely among individuals. We hypothesized that the minimum noxious (tetanus) stimuli intensity to evoke the increase in K (MECK) Minimal evoking critical value of K more accurately represents individual opioid sensitivity and blood pressure changes after a skin incision than KR.

Materials and Methods: After obtaining local IRB approval, the patients older than 19 years scheduled for a laparotomy were enrolled. After anesthesia induction, when remifentanil was maintained with an effect-site concentration of 2 ng/mL, sequential tetanus stimuli (10 to 50 mA) were loaded. KR at 80% KR (KR80) and the current value at which K began to rise (MECK) were measured. The correlation between KR80, MECK, and systolic blood pressure (sBP) changes after the skin incision were analyzed. The formula predicting the sBP after the skin incision was made from MECK, and the accuracy between the predicted and measured sBPs were examined. Pearson's correlation coefficient and the Bland-Altman method were used for our statistical comparisons.

Results and Discussion: There were 30 patients (15 males, 15 females), with an average age of 64.5±13 years. KR80 was 167±480 %, and MECK was 49.7±22.8 mA. The sBP before and after the skin incision were 78±14 mmHg, and 91±17 mmHg, respectively. The correlation coefficient between KR80, MECK, and the changes in sBP after the skin incision was KR80: r = 0.167, MECK: r = 0.62. A Bland-Altman plot compared the measured and predicted sBPs (Bias: -0.26±0.00 mmHg, Precision: 13.46±0.00 mmHg). The increase in sBP after the skin incision was accurately estimated.

Conclusion: MECK is superior to KR80 as an opioid sensitivity index. MECK may predict individual opioid requirements for suppressing blood pressure increases from a skin incision.

References:

5308

Total intravenous anesthesia for laparoscopic cholecystectomy in Duchenne muscular dystrophy patient. With or without opioids: an opioid free anesthesia case report

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Background: Duchenne muscular dystrophy (DMD) patient is always challenging either to respiratory and cardiovascular comorbidity or the anesthetics trigger life-threatening reactions.

Case Report: A DMD 34-year-old patient with absence mobility in lower extremities, domiciliary bi-level positive airway pressure (BIPAP) and multiple admissions due to aspiration, cardiac systolic dysfunction with global hypokinesis, in addition to 95 Kg obesity, scoliosis and difficult airway predictors. From acute cholecystitis multidisciplinary evaluation, percutaneous cholecystostomy and antibiotic started prior surgery scheduled under total intravenous opioid free anesthesia (TIVOF) with difficult airway and rescue planification. Preoxygenation and recruitment promoted during loading perfusions 1.00 µg/kg Dexmedetomidine, 0.25 µg/kg Ketamine and 1.25µg/kg Lidocaine. Anesthesia induction 3 µg/mL effect-site concentration (Ce) Propofol according Marsh program and 1mg/kg Rocuronium bolus achieves Cormack-Lehane I score with tracheal intubulation followed protective pulmonary ventrator strategy. Maintenance with Propofol Ce (2.0-2.5 µg/mL) to bispectral index (BIS® 40-60), Dexmedetomidine (0.20-0.60 µg/Kgh), Ketamine (0.12-0.25 mg/Kgh), Lidocaine (0.20-0.60 µg/Kgh) according to hemodynamic parameters and Rocuronium (0.6 mg/Kg) bolus to Post Tetanic Count (PTC ≤4) measure by Dragger-TOFscan®. Intraoperative treatment with 50mg Desketoprofen and 8mg Dexamethasone. Laparoscopic cholecystectomy achieved with hemodynamic stability without opioid requirement. Perfuasions withdrawal and 2mg/Kg Sugammadex neuromuscular reversal allowed successful extubating to domiciliary nasal BIPAP. At 12h intensive care unit and 72h hospital staying patient was discharge without opioid analgesic postoperative requirement.

Discussion: Short anesthesia in DMD such as propofol and remifentanil are preferable, succinylcholine must be avoided, volatile anesthetics are considered at high risk for life-threatening complications and anticholinesterase drugs are not recommended.1 Pubmed database search founded 143 results for (“Anesthesia” AND “Duchenne”) and 5 results for (“Dexmedetomidine” AND “Duchenne”) in sedation strategies.

References:

Learning points: Regarding respiratory concerns and risk of aspiration in DMD patient, TIVOF is an excellent option allowing hemodynamic stability and postoperative analgesia with less nausea and vomit.
Impact of opioid free anaesthesia (OFA) versus opioid anaesthesia (OA) on oxygenation after bariatric surgery: a prospective observational study

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Background and Goal of Study: Opioids are frequently needed after bariatric surgery because they depress breathing. Oxygen (O2) is therefore routinely given postoperative but masks hypoventilation. The primary objective was to compare O2 saturation without O2 therapy at the post anesthesia care unit (PACU) on admission, at discharge and after an opioid dose was given in patients receiving OFA versus OA.

Materials and Methods: In a observational study 64 patients who underwent bariatric surgery from August till October 2019 were included. The study is recorded on NCT 03660306 and approved by the hospital ethical committee. All patients provided consent to allow anonymized data analysis. Depending on the experience of the attending anaesthesiologist an OFA using dexmedetomidine, lidocaine, ketamine and magnesium or an OA using sufentanil was given. Since 2019 laparoscopic bariatric cases are requested to be ventilated using a lung protective 1 strategy to keep the lungs open until extubation. Fluid loading is restricted to 100 ml/h and deep neuromuscular blockade (PTC<2) is provided until the end of surgery followed by sugammadex to reach full reversal. At the PACU 5 mg of pritraimide was given intravenously when VAS for pain was above 5. If saturation drops below 94% an oxygen mask is given. CH2 and linear regression are used with p<0.05.

Results and Discussion: 34 patients were included in the OFA group and 30 in the OA group. There was no difference between the groups in age, gender and BMI. We found a lower saturation value before induction with OFA due to the dexmedetomidine loading dose of 0.2 mcg/kg LBW. Less oxygen masks at the PACU were needed after OFA (13% vs 53% p=0.001). The average opioid dose required postoperative was 4.8 mg in OFA versus 13.4 mg in OA (p < 0.001). An opioid given in the PACU after OFA or OA gave a significant reduction in oxygen saturation from 97.4% to 94.8% (p=0.001). Oxygen saturation on admission at the PACU was found to be associated with older patients, higher BMI or opioid anaesthesia. The drop in saturation after an opioid bolus was associated with older patients, OA and the dose of opioids given postoperative.

Conclusion: OA reduces oxygen saturation post bariatric surgery. Postoperative opioids (after OA/OFA) reduce oxygen saturation in a dose related manner.

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Comparison of early recovery after manual and target control infusion of remifentanil in obese patients

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Background and Objective of Study: Early recovery characteristics are important for patients’ safety and operating room turnover. Our aim was to compare fundamental methods for dosing remifentanil during morbid obesity surgeries: a manual infusion (MI) and a target-controlled infusion (TCI). Throughout study, patient’s recovery time was tracked and compared between the groups.

Materials and Methods: 31 patients were evaluated who underwent bariatric surgery in HLUHS. All of them had received sevoflurane/remifentanil anaesthesia. Remifentanil infusion was randomly assigned to a MI (control group) or to a TCI (TCI group) method. We had evaluated patients’ hemodynamics (arterial blood pressure (BP), heart rate, saturation), spontaneous breathing and airway reflexes recovery, time of extubation, eye opening, recovery of orientation and start of the following oral command. Also we had registered concentrations of remifentanil in the blood (according to automatic infusion pump) while using TCI method.

Results: Groups were similar in demographic data (fig. 1), remifentanil infusion duration (control - median 1.21 h (1,1.1,4), TCI - median 1.26 h (1,3;1,7), p=0.05) and differed according to BMI (fig. 1). We found that remifentanil consumption in the TCI group was higher (median 1.0 mg (1,1,5), p=0,02). We counted a difference of systolic BP (in percent) before and after anesthesia and compared it in each group – L did’t differ (control – median 13.0 (5,7,17), TCI group – median 12.0 (1,1,15)). 9 patients were on antihypertensive treatment preoperatively, there wasn’t any statistically significant difference in arterial BP comparing with those 22 who didn’t use it. The TCI group demonstrated longer recovery time (median 14 min (12.3;15,7) compared to median 10 min (8,8;11,2), p<0.001).

Conclusions: We found that comparing TCI method with MI, manual infusion showed better results in patients’ recovery after surgery. Moreover, higher doses of remifentanil were consumed using MI. In conclusion, decision of highly qualified anesthesiologist is more convenient for morbid obesity patients in comparison with TCI method.

References:
6405

Comparison between opioid based anaesthesia technique and opioid free anaesthesia technique in patients undergoing laparotomy for gynaecological malignancy: a randomized controlled trial

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Background and Goal of Study: Opioid Free Anaesthesia (OFA) was used in bariatric surgery, breast cancer surgery 1, gynaecological laparoscopy 2, which yielded better recovery profile, reduced opioid consumption & related side effects. However, literature search did not reveal the use of OFA in gynaecological oncology surgeries(GOS). Our hypothesis is that OFA technique will provide early recovery compared to Opioid Based Anaesthesia (OBA) technique with the primary outcome being extubation time & PACU discharge time.

Materials and Methods: This was a prospective, randomized, double blinded trial, of 50 patients (25 in each group), aged 18-65 years, posted for GOS, in which the post-op recovery profile of OBA group - receiving fentanyl & OPA group - receiving dexmedetomidine & ketamine at analgesic doses (at induction & rescue analgesia) were compared. Both the groups received rectus sheath block for analgesia & were maintained with isoflurane. The time to eye opening, time to extubation & the time to shift to the PACU were noted. Post-operatively in the PACU, they were connected to a PCA pump delivering morphine. Pain was assessed with the help of a 0 – 10 cm VAS scale. The time to first analgesic use was recorded. The time to attain the PACU discharge criteria was assessed every 10 minutes. PONV was assessed and treated accordingly. Total analgesic consumption in 24 hours was noted. Data was analysed using Stata software, using standard statistical tests.

Results and Discussion: Demographic data was comparable. The time to attain the PACU discharge criteria was 99.6 ± 16.17 min in OBA group & 101.8 ± 13.68 min in OFA group which were comparable. The time to extubation & time to shift to the PACU was 15.76 ± 3.83 min & 18.44 ± 4.25 min in the OBA group, 17.36 ± 4.367 min & 20.52 ± 4.528 min in the OFA group which were significantly different (p=0.043, p=0.046). The time to first analgesic request in PACU, PONV till 24 hours and post-operative analgesic consumption for 24 hours were comparable. Anesthesia recovery.

Conclusion: OFA technique showed similar time to attain PACU discharge criteria compared to OBA technique with a slightly delayed time to extubation.

References:
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Perioperative care for transoral endoscopic thyroidectomy via vestibular approach (TOETVA)

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Background and Goal of Study: Transoral endoscopic thyroidectomy vestibular approach (TOETVA) has been developed to improve aesthetic outcome in thyroid surgery. Acquiring new surgical approach necessitate the cooperation of surgeon and anaesthesiologist. We used the cumulative sum (CUSUM) method to analyze the preoperative preparation time and surgical duration to know the maturation time needed for the team. We also analyzed the the outcomes in recovery and exam our anesthetic protocols for TOETVA.

Materials and Methods: We collected medical records for TOETVA patients from Dec, 2016 through Jul, 2019 in National Taiwan University Hospital. Patients were all intubated after general anesthesia with nasotracheal tube, and confirmed with Glidescope. All patients were premedicated with dexmedetomidine and ondansetron to avoid post-operative nausea and vomiting. Ketoroloc was given in advance if no allergy and peptic ulcer is identified. We kept Train-Of-Four (TOF Watch SX®) at 40% by cistracurium titration. Intraoperative neural integrity was monitored by Medtronic NIM 3.0 or Inomed ISIS IOM System. We used remifentanil infusion and desflurane for maintenance. All the patients were extubated in the operation theater after patients could spontaneously open their eyes by anesthesiologist. We used the cumulative sum (CUSUM) method to analyze the learning curve for monitored TOETVA.

Results and Discussion: 119 patients had TOETVA during our observation, of them 107 were female. Our patient had mean age of 44.7 years. The average preparation time was 37.5 ± 11.7 min. The average operation time is 123.0 ± 39.6 min. There was an obvious slope in time decreasing during the initial cases. Based on competency, the first 35 cases were included in Phase 1 and the following 84 cases in Phase 2. Thyroidectomy related complications, such as hypocalcemia, transient recurrent laryngeal nerve palsy, showed no significant difference between Phase 1 and Phase 2, respectively. However, the TOETVA procedure related complications, such as focal infection, chin numbness, facial indentations, corena erosions, decreased in Phase 2 significantly. Extubation time is significantly shorter in phase 2. All the patients were discharged on the postoperative day 2 without reoperation.

Conclusion: The learning curve for monitored TOETVA was about 35 cases for surgical team.

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The comparison of dexmedetomidine and remifentanil on perioperative hemodynamics and recovery profile for laryngeal microsurgery; prospective randomized double blinded study

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Background and Goal of Study: Laryngeal microsurgery (LMS) causes hemodynamic instability and postoperative agitation, cough, pain, nausea and vomiting. Moreover, short operation time makes anesthesiologist challenging. The aim of this study is comparing the feasibility between continuous administration of dexmedetomidine and remifentanil during general anesthesia in LMS.

Materials and Methods: The patients were randomly assigned to dexmedetomidine (group D) or remifentanil (group R). Before 5min of induction of anesthesia, dexmedetomidine 1.0 mg/kg bolus (group D) and 0.5mg/kg/hr, remifentanil 0.5mcg/kg bolus and 0.05microg/kg/min (group R) was administered to each group, keeping mean blood pressure -20~10%. In both groups, administration of propofol 1.5mg / kg and rocuronium 0.5mg/kg for induction and anesthesia was maintained with isoflurane. The time to eye opening, time to extubation & the time to shift to the PACU were noted. Post-operatively in the PACU, they were connected to a PCA pump delivering morphine. Pain was assessed with the help of a 0 – 10 cm VAS scale. The time to first analgesic use was recorded. The time to attain the PACU discharge criteria was assessed every 10 minutes. PONV was assessed and treated accordingly. Total analgesic consumption was assessed.

Results and Discussion: Demographic data was comparable. The time to attain the PACU discharge criteria was 37.5 ± 11.7 min. The average operation time was 123.0 ± 39.6 min. There was an obvious slope in time decreasing during the initial cases. Based on competency, the first 35 cases were included in Phase 1 and the following 84 cases in Phase 2. Thyroidectomy related complications, such as hypocalcemia, transient recurrent laryngeal nerve palsy, showed no significant difference between Phase 1 and Phase 2, respectively. However, the TOETVA procedure related complications, such as focal infection, chin numbness, facial indentations, corena erosions, decreased in Phase 2 significantly. Extubation time is significantly shorter in phase 2. All the patients were discharged on the postoperative day 2 without reoperation.

Conclusion: The learning curve for monitored TOETVA was about 35 cases for surgical team.
Postreperfusion syndrome in liver transplantation: incidence and predictors in patients with piggy-back technique

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Background and Goal of Study: Postreperfusion syndrome (PRS) in patients undergoing liver transplantation, was defined as a decrease in the mean arterial pressure (MAP) 30% during the first 5 minutes after unclamping of the inferior portal vein (IPV). The variety of the risk factors presented in several studies suggest that the PRS occurs in an unpredictable manner. So, the primary aim of this study was to determine the clinical predictors factors of the PRS in our patients.

Materials and Methods: After institutional review board approval, this retrospective study was performed. Preoperative variables (age of recipient and donor, etiology of cirrhosis, recipient pathology, Child-Pugh classification, Model for End-Stage Liver Disease score) were analyzed. Intraoperative variables were recorded at each stage of the surgery (acid-base balance, serum electrolytes, sstolic volume index, pulmonary capillary pressure, MAP, heart rate, systemic vascular resistance index (SVRI)). The times of each surgical phase, duration of cold-warm ischemia, a portocaval shunt and the weights of the liver (donor/recipient) were recorded too. Prior to graft revascularization, MAP and metabolic status of the recipient were optimized. Association between PRS and preoperative and intraoperative (anhepatic stage) data were tested. Statistical analysis was performed with SPSS software (IBM, 2016). Bivariate analysis was performed to analyze the association between two variables. Association of continuous variables with nominal variables was tested with t-Student (2-tailed). Pearson chi-square test was used for nominal dependent variables. P<0.05 was considered threshold for statistical significance.

Results and Discussion: Of the 149 patients included in the study, 34.9% developed PRS. There were significant differences in the variable “donor liver weight/reipient liver weight” (1.15 ± 0.36 in non-PRS group versus 1.35 ± 0.56 in PRS group: p= 0.05); and in the percentage of change in the SVRI, from before clamping of IVC to after clamping (35.6% ± 52.2% increase in the non-PRS group versus 18.39% ± 35.46% (OR 0.44) increase in the PRS group (p=0.045). There were no significant differences between occurrence of PRS and the other preoperative and intraoperative variables analyzed.

Conclusion: In patient undergoing liver transplantation, a low increase in SVRI after clamping of IVC and a greater donor liver weight, are clinical predictors of PRS in our patients.

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Diabetes mellitus aggravates perioperative neurocognitive disorders by inhibiting autophagy via mTOR signaling pathway in rats

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Background and Goal of Study: Perioperative neurocognitive disorders (PND) are commonly observed in diabetes mellitus (DM) patients following surgery and anesthesia, but the exact mechanism has not been fully clarified. It has been reported that the activation of mTOR signaling pathway can inhibit autophagy flux in the progression of PND and DM, respectively. However, the role of autophagy expression and surgery-induced hippocampal neuron apoptosis of DM rats remains elusive. The study was designed to investigate the effects of autophagy on the orthopedic surgery-induced cognitive dysfunction in DM rats.

Materials and Methods: Male SD rats were divided into 8 groups randomly (n = 15): Con, DM, DM+Vehical (DM+V), DM+Rapamycin (DM+Rapa), PND, PND+Rapamycin (PND+Rapa), DM+PND, DM+PND+Rapamycin (DM+PND+Rapa). Cognitive function was assessed by using Morris water-maze (MWM) test. Immunohistochemistry and Western Blot were used to determine the expression of p-mTOR and Aβ and p-tau. The cleaved caspase3, Bax, Bcl-2, Becn1 and LC3 were detected by Western Blot. All data were expressed as means ± SD. P <0.05 was considered statistically significant.

Results and Discussion: The results demonstrated that orthopedic surgery significantly impaired memory performance and inhibit hippocampal neuron autophagy. Similar effects have been found in DM rats. And cognitive function was severely impaired in DM+PND. What’s more, autophagy significantly suppressed in DM+PND compared with PND group, accompanied by the mTOR signaling pathway upregulated. Interestingly, treatment of rapamycin, an autophagy inducer, improved the cognitive deficit observed in the DM rats under orthopedic surgery by improving autophagic flux. Rapamycin treatment led to the inhibition of Aβ and p-tau accumulation, and increased the ratio of LC3-II to LC3-I in hippocampal neurons through inhibiting mTOR signaling pathway. These findings suggest that impaired autophagy in the hippocampal neurons of DM rats after orthopedic surgery contributes to cognitive impairment.

Conclusion: Diabetes mellitus aggravates perioperative neurocognitive disorders by inhibiting autophagy via mTOR signaling pathway in rats.

5272

Evaluating the influence of propofol or sevoflurane on 1-year recurrence free survival by considering pre and postoperative neutrophil-lymphocyte ratio

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Background and Goal of Study: The neutrophil-to-lymphocyte ratio (NLR) has been suggested to reflect inflammation and immunosuppressive conditions. It has been used as an independent prognostic factor in primary breast cancer. When compared with sevoflurane, propofol based total intravenous anaesthesia (TIVA) with regional anaesthesia (RA) has been suggested to suppress cancer recurrence in primary breast cancer. Sevoflurane is suggested to be immunosuppressive while propofol and RA both have anti-inflammatory properties. The monitoring of perioperative NLR may be useful in assessing potential risk of recurrence in breast cancer. Sevoflurane is suggested to be immunosuppressive in primary breast cancer patients receiving sevoflurane or propofol.

Materials and Methods: In this single center, secondary analysis study, we included patients receiving either sevoflurane or propofol for primary breast cancer surgery between 2008 and 2012. Our primary outcome was the association between NLR increase and RFS at 1-year. Recurrence was defined as locoregional recurrence and distant metastasis. Data was compared using paired i-ttests after propensity score matching. Propensity scores were calculated using 7 variables (age, sex, BMI, cancer stage, tumor size, intrinsic subtype, and deviation from standard therapy).

Results and Discussion: Two hundred thirteen patients received sevoflurane and 836 patients received TIVA with propofol. Median follow-up was 59 (interquartile range 44-75) months. Local anesthetic techniques were not used in any cases. After 1:1 propensity-score matching, 224 patients were analyzed in total. There was no significant difference in 1-year RFSs (sevoflurane group: 8.0% [n=9], and propofol group: 7.1% [n=8]) We found no significant change in NLR(sevoflurane group: preoperative 2.45±1.57, postoperative 2.52±1.57, p=0.76, and propofol group: preoperative 2.61±0.96, postoperative 2.7±1.96, p=0.71). We also did not find a no significant difference in NLR of patients with 1-year recurrence. Our result suggests that the anti-inflammatory properties of TIVA without RA may be sufficient for the suppression of cancer recurrence.

Conclusion: There was no significant difference between perioperative NLR during primary breast cancer surgery with either sevoflurane or propofol based TIVA management.
5516
Anesthesia Management and Outcome in Gynecological Oncologic Surgery: Retrospective Analysis of Postoperative Mortality, Morbidity and Complications

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Background and Goal of Study: Multidisciplinary approach to anesthesia management has become more important regarding the outcomes of cancer surgery (1). In terms of both incidence and mortality, gynecological cancers are among the top ten in Turkey. The aim of this study was to evaluate the anesthetic management and its possible effects on postoperative mortality, morbidity and complications in gynecologic oncologic abdominal surgery and to determine the related risk factors.

Materials and Methods: The data of the patients, who underwent elective gynecological oncologic surgery between 2010 and 2017, were obtained from the electronic hospital records for this retrospective study. Demographic data, comorbidities, preoperative anemia, Charlson Comorbidity Index, anesthesia management, complications, duration of postoperative hospitalization and morbidity were evaluated in four subgroups of different cancers. (Ethics committee approval was obtained. Approval Number: 2017/21-32).

Results and Discussion: Four hundred and sixty six (466) patients were evaluated. At the time of analysis, 330 patients were alive and 86 were deceased. Mortality ratio was 20.6%. The mean preoperative serum albumin levels were 3.68 ± 0.69 g/dl, mean volume of intraoperative crystalloid administration was 2500.0 ± 1744.12 mL, mean volume of colloid administration was 500.0 ± 434.53 mL, rate of wound infection was 7%, rate of postoperative blood transfusion was 18% and average length of hospital stay was 9.0 ± 7.3 days. Postoperative chemotherapy ratio, preoperative hypoalbuminemia, intraoperative administered colloid volume, wound infection and need for postoperative blood transfusion were found significantly higher in patients who died. The amount of intraoperative crystalloid administration was significantly higher among the patients, who survived.

Conclusion: Anesthesia management, postoperative mortality, morbidity and complications were investigated in gynecological oncologic surgery. Recently, anesthesia management has become more important in cancer surgery. It requires a multidisciplinary approach for the management of patients perioperatively; especially by the anesthesiologist and the surgeon. This may contribute to reducing the length of hospital stay; rate of morbidity and time for recovery.

Reference:

5854
Perioperative changes due to Using of the tourniquet for a long time in retrospective study

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Background and Goal of Study: In orthopedic surgery, we often use Tourniquet for prolonged bleeding during surgery. The length of time to use Tourniquet could be a produce of side effects on the human, but we don’t know about detailed time and side effects. Therefore, we investigate relationship between used Tourniquet time and a lot of side effects in the retrospective study.

Materials and Methods: From October 2012 to March 2019, patients who were scheduled for total knee replacement at the Kanto Rosai Hospital were examined. The primary endpoints are serum potassium level, serum lactic concentration, and the occurrence of fatal arrhythmia. Secondary endpoints are age, sex, ASA-PS classification, operation time, anesthesia time, bleeding volume, urine volume, infusion volume, wound volume, blood gas value, serum electrolyte concentration, and so on.

Results and Discussion: 55 patients were performed total knee replacement, of which 10 (male: 3 and 7 female) patients were inserted intra-arterial line and done a blood test. The periods of use Tourniquet was 121.1±31.23 minutes. In shortly after anesthesia induction, serum potassium level was 3.73±0.24 mEq/dl, and serum potassium level after release of tourniquet was 3.95±0.33 mEq/dl. The lactic acid level increased from 0.9±0.18 mmol/l to 2.2±0.63 mmol/l, and the PH value decreased from 7.42±0.036 to 7.37±0.034. There were significant difference in the serum potassium level and lactic acid level. Also, we could not establish the occurrence of fatal arrhythmia in the perioperative period.

Conclusion: We evaluated elevation in serum potassium level after long-time tourniquet using in total knee replacement.

5903
Effect of dexmedetomidine on postoperative cognitive function in patients undergoing shoulder arthroscopy with beach chair position: a randomized double-blind study

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is one of the most common complications after general anesthesia, especially in elderly patients. Many studies have reported that dexmedetomidine sedation would reduce the incidence of POCD. As the sitting position can decrease the brain perfusion and increase the risk of POCD, the aim of this study was to determine whether intra-operative dexmedetomidine infusion can reduce the incidence of POCD and alleviate the neuro inflammatory response in patients over 60 years of age who underwent shoulder arthroscopic surgery.

Materials and Methods: A total of 80 patients, undergoing arthroscopic rotator cuff repair under beach chair position were randomly allocated to either control group (group C) or dexmedetomidine group (group D). Dexmedetomidine (0.6 µg/kg/hr) or comparable amount of normal saline was infused to each group during the surgery. Hemodynamic variables with cerebral oxygen saturation were recorded (1.) before anesthetic induction (2.) 10 minutes after anesthetic induction (3.) 10 minutes after changing to beach chair position (4.) 10 minutes after returning to supine position. Cognitive tests were assessed on the day before surgery and the day before discharge using the Korean version of Mini-Mental State Examination (MMSE-K). Arterial blood samples were collected for S-100β assay to confirm neuro inflammatory response before anesthetic induction (baseline) and at the end of the surgery.

Results and Discussion: There were no differences in hemodynamic variables and cerebral oxygenation between group C and group D during the measured time points. The results of MMSE-K after surgery were significantly lower compared to the results before surgery in both groups (P < 0.03), however, variables with repeated measures did not show significant time by group interaction. Similarly, although results of S-100β measured at the end of surgery (group C, 68.5 ± 22.7; group D, 75.6 ± 45.9) were significantly higher compared to the baseline (group C, 36.7 ± 13.0; group D, 33.6 ± 12.8, P < 0.001) in both groups, there was no significant differences with time by group interaction.

Conclusion: Unlike the previous in vitro and in vivo reports that dexmedetomidine administration is associated with reduced incidence of POCD, our results suggest that intra-operative dexmedetomidine does not prevent POCD.

General Anaesthesiology
Lamotrigine for Reduction in Psychologic Side-Effect of Perioperative Ketamine: Pilot Randomized Double-blinded Placebo-controlled Trial

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Background: Ketamine, an NMDA receptor antagonist, is an attractive general anesthetic, but the drug’s psychologic side-effects limit widespread use. Limited evidence suggests that lamotrigine, which inhibits glutamate release, may reduce the psychologic side effects of ketamine. We therefore tested the hypothesis that combining 300 mg of lamotrigine with ketamine reduces psychological side-effects.

Methods: We enrolled 46 adults 18-65 years old who were scheduled for non-cardiac surgery with general anesthesia and planned overnight hospital stay. Patients were randomized to placebo or 300 mg oral lamotrigine given 1 hour before induction and continued throughout anesthesia. The primary outcome was combining 300 mg of lamotrigine with ketamine reduces psychological side-effects.

Results: The mean change in psychologic side-effects in the lamotrigine group was 2.56 and 5.35 pg lower on postoperative day three and five, respectively, compared to baseline. Lamotrigine levels did not differ between genders and patients with different underlying diseases. Lamotrigine positively correlated with haemoglobin and transferrin saturation and negatively correlated with CRP. Additionally, lamotrigine levels were significantly lower in iron-deficient anaemic patients compared to non-iron deficient, non-anaemic patients.

Conclusion: Lamotrigine might be an appropriate marker for iron deficiency anaemia pre- and post-operatively and in patients with inflammatory diseases.

Plasma mitochondrial DNA levels and damage correlate with post-transplant renal allograft function in living donor kidney transplantation

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Background and Goal of Study: The definition of an organ’s transplantability and prediction of early graft dysfunction is hindered by the lack of sensitive biomarkers. Mitochondrial DNA (mtDNA) in plasma has been identified as a propagator of tissue injury. However, prediction of early graft dysfunction is hindered by the lack of sensitive biomarkers. Here, we explore the potential of mtDNA plasma level and mtDNA damage as a marker of organ function in a cohort of living donor kidney transplantations, a post-hoc analysis of VIAPOR!

Materials and Methods: Plasma was obtained from 57 donor-recipient couples at various time points. MIDNA levels were measured in donors pre-op and in recipients pre-, intra- and post-operatively, with intraoperative samples being taken from both the renal vein and systemic arterial circulation. mtDNA was measured using polymerase chain reactions for D-loop, ND1 and ND6. MIDNA damage was determined using ND1/Dloop and ND6/Dloop ratios, under the assumption that D-loop is less prone to DNA damage than ND1 and ND6.

Results: mtDNA plasma levels and damage were associated with kidney function parameters and urinary biomarkers KIM-1 and NAG in recipients.

Conclusion: Differential modulations of neuronal excitability in hippocampal CA1 subfield contribute to amnesic effect of isoflurane and hippocampal high frequency activity maybe the predictor of memory during general anaesthesia.


6335

Differential Modulations of Hippocampal CA1 Pyramidal and Interneuron Contribute to Amnesic Effect of Isoflurane

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Background and Goal of Study: Anterograde amnesia is one of the main pharmacological endpoints of volatile anaesthetics, which can prevent distressing memory and intraoperative awareness. Volatile anaesthetics including isoflurane can induce anterograde amnesia starting at sub-anaesthetic concentration. Hippocampal high-frequency ripple is the local field potential (LFP) highly associated with synchronous neural firing in the hippocampal CA1 subfield and support memory consolidation and retrieval. This study was designed to explore the effect of isoflurane on hippocampal network, which may explain amnesic effect of isoflurane.

Materials and Methods: Hippocampal CA1 ripple was measured in mice by LFP with the electrode inserted into CA1 subfield. Effect of isoflurane on mice memory was investigated by fear-potentiated startle. Whole-cell patch clamp recording was performed in acute brain slices to determine the effects of isoflurane on neuronal excitability of hippocampal CA1 pyramidal and fast-spiking interneuron. A simulation model in silico was used to validate the effects of isoflurane on neuronal activity and ripple suppression.

Results and Discussion: Isoflurane at sub-anaesthetic concentration decreased the amplitude, rate and duration of ripple while increased inter-arrival time between ripples. With the same concentration, isoflurane impeded fear-potentiated startle in mice in vivo. In patch clamp recording, isoflurane depressed frequency of action potentials (APs) at sub-anaesthetic concentration in fast-spiking interneuron while slightly enhanced frequency of APs in pyramidal neurons. A simulation model of ripple that based on neuronal excitability of CA1 pyramidal and interneuron was used to validate the effects of isoflurane between neuronal excitability in vitro and ripple in vivo. This study indicates that isoflurane at sub-anaesthetic concentration can suppress hippocampal CA1 high frequency ripple by differentially modulating neuronal excitability of pyramidal and interneuron, which may contribute to the amnesic action of isoflurane.

Conclusion: Differential modulations of neuronal excitability in hippocampal CA1 subfield contribute to amnesic effect of isoflurane and hippocampal high frequency activity maybe the predictor of memory during general anaesthesia.


4542

Plasma mitochondrial DNA levels and damage correlate with post-transplant renal allograft function in living donor kidney transplantation

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Background and Goal of Study: The definition of an organ’s transplantability and prediction of early graft dysfunction is hindered by the lack of sensitive biomarkers. Mitochondrial DNA (mtDNA) in plasma has been identified as a propagator of tissue injury in trauma and sepsis and as a marker predicting progression of AKI. Here, we explore the potential of mtDNA plasma level and mtDNA damage as a marker of organ function in a cohort of living donor kidney transplantations, a post-hoc analysis of VIAPOR!

Materials and Methods: Plasma was obtained from 57 donor-recipient couples at various time points. MIDNA levels were measured in donors pre-op and in recipients pre-, intra- and post-operatively, with intraoperative samples being taken from both the renal vein and systemic arterial circulation. mtDNA was measured using polymerase chain reactions for D-loop, ND1 and ND6. MIDNA damage was determined using ND1/Dloop and ND6/Dloop ratios, under the assumption that D-loop is less prone to DNA damage than ND1 and ND6. MIDNA levels and damage were associated with kidney function parameters and urinary biomarkers KIM-1 and NAG in recipients.

Results: Pre-op mtDNA levels were higher in recipients than donors. Highest levels of mtDNA were measured upon reperfusion in renal vein samples. Recipients showed increased mtDNA levels 5 days post-op compared to pre-op, with recipients receiving a kidney from a related donor having higher levels than those receiving a kidney from an unrelated donor. Recipient’s mtDNA levels 2 h
post-op correlated with creatinine levels at 6 and 24 m. In addition, mtDNA levels at 9 d correlated with KIM-1 at 9 d, creatinine levels at 6 and 24 m and glomerular filtration rate at 6 m. Pre-op mtDNA damage was comparable between donors and recipients, while mtDNA damage increased in recipients throughout 9 d post-op. Recipients with high mtDNA damage directly after reperfusion had significantly higher levels of KIM-1 at 1 and 9 d post-op, but lower creatinine levels at 6 and 24 m post-op compared to recipients with low mtDNA damage. Conversely, patients with the highest mtDNA damage at 9 d post-op had lower KIM-1 and NAG levels.

Conclusion: Levels and damage of plasma mtDNA early after kidney transplantation are associated with momentous kidney biomarkers and a long-term accelerated decline in renal function. Measurement of post-op mtDNA levels may aid to the identification of patients at risk for accelerated kidney dysfunction.

**4564**

Machine-learned discovery of new genes and pathways associated with postoperative nausea and vomiting (PONV)

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Background and Goal of Study: The high interindividual variability infrequency of PONV suggests genetic susceptibility. System biology can be leveraged to integrate genetic level data with biologic processes to generate prioritized candidate gene lists and to understand novel biological pathways. Such data would be key to informing future polygenic studies with targeting genome wide profiling.

Materials and Methods: The literature search by Pubmed (1998-2019) was performed to identify ‘training’ genes set associated with PONV in humans. Candidate genes were identified and prioritized using Topgene suite (topgene.cchmc.org), based on functional enrichment using several gene ontology (GO) annotations. Computationally top-ranked candidate genes and literature curated genes were then included in pathway enrichment analyses. Hierarchical clustering was used to visualize select functional enrichment in patients with PONV phenotype.

Results and Discussion: Literature review identified 20 training genes associated with PONV which jointly enriched (p value < 5x10−11, Benjamini-Hochberg correction) 5 functional activity GO pathways including neurotransmitter binding, G protein-coupled amine receptor activity, neurotransmitter receptor activity, ammonium ion binding and serotonin binding. By prioritizing or ranking with machine-learning algorithm we identified 262 novel candidate genes based on functional similarity to training gene list. The top of candidate genes with the similarity score > 0.85 and combined p < 10-5 comprised 48 genes potentially associated with PONV. Heat map demonstrated significant enrichment of previously reported genes common to PONV phenotype, and several novel GO pathways, topmost being GABA signaling, glutaminergic synapse, adenosine receptors, corticotropin-release pathway, immune processes (chemokine receptors) and tyrosine hydroxylase.

Conclusion: This study demonstrates the utility of functional annotation-based prioritization and enrichment approaches and identifies novel genes and unique shared biological processes involved in PONV.

**4609**

The Effect of Inhaled Anesthetics on Myocardial Contractility in Laparoscopic Cholecystectomy: a Single-center Randomized Trial

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Background: Evaluation of the effect of inhaled anesthetics on hemodynamics during laparoscopic cholecystectomy is traditionally carried out by measuring blood pressure and heart rate (HR), which does not give an idea of the change in central hemodynamics in full. Meanwhile, there are non-invasive algorithms for evaluating the parameters of central hemodynamics based on the principle of volumetric compression oscillimetry, which have proved themselves to be no worse than invasive techniques.

Goal of Study: To evaluate the effect of sevoflurane and desflurane on myocardial contractility and central hemodynamics in patients undergoing laparoscopic cholecystectomy.

Materials and Methods: A single-center randomized study was conducted, including 50 patients of both sexes aged 36 to 68 years who underwent laparoscopic cholecystectomy for gallstone disease. Patients were divided into two groups depending on the inhaled anesthetic used: group 1 (n = 25, 53±9 years) - sevoflurane; group 2 (n = 25, 51±11 years) - desflurane. The duration of anesthesia was 60.4±5 min and 57.3±8 min, respectively. Non-invasive monitoring of central hemodynamics by volume-compression oscillography: BP, HR, cardiac output, CI, stroke volume, stroke index (SI). SRV. The assessment of central hemodynamic parameters and level was carried out at the following stages: I - before induction; II - after induction, intubation and the beginning of the supply of an inhaled anesthetic; III - after application of carboxypermintone; IV - after clipping of the gallbladder; V - suturing.

Results and Discussion: The indicators of BP, HR did not have significant differences throughout at all stages of the study. When assessing hemodynamic profile indicators, statistically significant differences were revealed. Group 1 showed lower values (p <0.05) of BPmean (103.9 ± 17 and 113.3 ± 24, respectively) and SI (31.7 ± 13 and 44.3 ± 6) at stage III of the study, with higher rates of SRV at the same stage in comparison with group 2 (1526 ± 200 and 1449 ± 205). Differences were also recorded in stage II — lower indicators of SV in group 1 — 82 ± 14, in comparison with group 2, where this parameter was — 94.9 ± 15.

Conclusion: Compared with sevoflurane, desflurane has a less effect on myocardial contractility, both at the stage of saturation with an anesthetic and under conditions of carboxypermintone.

**4636**

The cytokine response of different anesthesia regimens in healthy volunteers

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Background and Goal of Study: Anesthesia is assumed to influence patients' immune response. During cancer surgery, a well-functioning immune response is pivotal. The aim of this study was to examine the immunological response of intravenous anesthetics in healthy volunteers without surgical insult.

Materials and Methods: Serum samples of 93 healthy volunteers, from previously published studies, were collected before and eight hours after induction. Thirty-one published studies, were collected before and eight hours after induction. Thirty-one patients, 30 received propofol/remifentanil, 17 received dexmedetomidine and 15 received desflurane/midazolam/remifentanil. The anesthetic regimens were standardized. Serum level of interleukin (IL)-2, IL-4, IL-6, IL-10, IL-17, IL-21, IL-22, IL-23, C-X-C motif ligand 8 (CXCL8), Interferon gamma (IFNγ), E-selectin, L-selectin, Hselectin, MHC class I chain-polypeptide-related sequence (MICA), MICB, Granulocytes A and Granulocytes B (Table 1), were measured by LUMINEX.

Results and Discussion: After anesthesia with propofol alone, IL-4 (p=0.021), IL-6 (p=0.018), IL-21 (p=0.034), IL-22 (p=0.001), CXCL8 (p=0.004), MICA (p=0.040) and Granulocytes A (p=0.045) were significantly increased. Propofol combined with remifentanil; IL-17 (p=0.027), IFNγ (p=0.001) and MICA (p=0.033) were significantly decreased, only L-selectin (p=0.000) was significantly increased. Th1/Th2 ratio was significantly decreased; 0.651 vs 0.434 (p=0.001). After desflurane/propofol alone, IL-18 (p=0.002), L-selectin (p=0.010), E-selectin (p=0.002) and Granulocytes B (p=0.023) decreased significantly. Dexamethasone with remifentanil resulted in no significant changes.
Prospective adequately powered clinical trials.

Dosage and magnitude of the immune response should be further investigated in

Dexmedetomidine might be an ideal combination during cancer surgery, but

shown to have primarily anti-inflammatory properties. Anesthesia with propofol

also in combination with remifentanil, had less immune activation and was

combination with remifentanil the Th1/Th2 ratio decreased. Dexmedetomidine,

alone was associated with pro-and anti-inflammatory immune responses and in

Conclusion:

The investigation of factors associated with postoperative shivering

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Background and Goal of Study: It is well known that the incidence of postoperative

shivering is inversely associated with core body temperature. However, it has been

reported that the threshold of shivering could be affected by peripheral temperature

or anesthetic agents. These reports are dated, though, and anesthesia techniques

have since advanced considerably. Thus, the purpose of this study is to investigate

the factors associated with postoperative shivering in current practice.

Materials and Methods: The institutional clinical research ethics committee of

Kyushu University approved the study protocol (IRB Clinical Research number

2012-233). This retrospective study involved 340 patients who underwent radical

surgery to treat endocervical or uterus cancer under general anesthesia in our

hospital. Anesthesia techniques in our hospital was associated with postoperative core body

temperature, use of acetaminophen and age.

Conclusion: This study indicated that development of shivering under current

anesthesia technique in our hospital was associated with postoperative core body

temperature, use of acetaminophen and age.

Sevoflurane but not dexmedetomidine impairs ipsilateral cerebral blood flow autoregulation in mice after unilateral common carotid artery occlusion

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Background and Goal of Study: Sevoflurane is a widely used general anesthetic.

It was reported that 1 MAC (minimum alveolar concentration) of sevoflurane did

not influence cerebral blood flow (CBF) autoregulation. Yet evidence is lacking in

pathological state with carotid artery disease. Carotid artery disease occurs with a

prevalence rate of 2-3% in patients over 60. And it contributes to approximately 10%

of all ischemic strokes. Mouse model of unilateral common carotid artery

occlusion (UCCAO) mimics its pathogenesis and results in cerebral hyperperfusion

and vascular remodeling. This study aims at investigating the effect of sevoflurane

on CBF autoregulation in mice with right UCCAO.

Materials and Methods: 10w male C57 mice were randomly assigned to Sham

and rUCCAO group. MAC value of sevoflurane in mice were determined before

surgery. MAC was calculated as the average of greatest inspired concentration

that permitted movement in response to tail clamp and the smallest concentration

that prevented movement. Then, using Bruker BioSpec 9.4T animal MRI system and Pseudo-Continuons Arterial Spin Labeling (pCASL) technique, we calculated
cerebral blood flow (CBF) of mice with 1 MAC sevoflurane (SEVO), 100 μg/
kg dexmedetomidine (DEX) (intraperitoneal injection) or in awake state without
anesthetics 7d after surgery.

Results and Discussion: 1 MAC of SEVO for mice was 2.76%±0.19 (n = 6). Global

CBF was not disrupted in awake mice 7d after rUCCAO. Under SEVO anesthesia, but

not in awake state or with DEX, CBF of ipsilateral hemisphere was significantly

lower than contralateral hemisphere 7d after rUCCAO (P < 0.001, n = 6). SEVO

directly affects cerebral blood flow autoregulation. In contrast, DEX does not influence cerebral vasodilation and decreased CBF. Lower CBF of ipsilateral hemisphere might be associated with its paradoxical vasodilatory response to SEVO.
Sevoflurane inhalation enhanced thermogenesis of the flower, Nelumbo nucifera (Lotus)

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Background and Goal of Study: Thermogenesis in plants is rare, but some flowering plants i.e., Nelumbo nucifera (Lotus) shows to generate heat to raise the temperature (Temp). Lotus flowers can actively warm up air or 8% sevoflurane 2 hours, in a cross over manner. The Temp of the receptacle, the leaf surface and the ambient were measured using the non-contact infrared thermometer (AD-5617, AND, Tokyo, Japan). The Temp changes from baseline values corrected by the ambient Temp were statistically analyzed using t-test.

Results and Discussion: Before the inhalation, the Temp of the receptacle and the ambient were 31.0 ± 2.1 and 27.3 ± 1.3 ºC (mean ± SD). The corrected Temp of the receptacle was significantly higher in the sevoflurane group (Figure). The leaf surface Temp significantly rose at the middle point of the anaesthesia. Lotus inspires the air through the stoma on the leaf surface and transfers the air to the rhizome. The prolonged effect of inhalation might be explained by the gas flow. Whereas, the rising of Temp in the leaf surface might be a result of inhibition of evaporation through the stoma.

Conclusion: Although the study was preliminary and trial experiments, there was a possibility that inhalational anaesthesia induce diverse physiological changes not only in animals but also plants.

STAT3 involved in cellular vulnerability to isoflurane

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Background and Goal of Study: Isoflurane causes widespread neuronal apoptosis in the developing brain, whereas the mature brain appears resistance. Signal transducer and activator of transcription-3 (STAT3) is crucial in cell survival during the neural network establishment period. Notably, this period roughly corresponds to the restricted time window of neural vulnerability to isoflurane. The present research used a combination of in vitro and in vivo study to determine whether isoflurane would target STAT3 to deliver its cytotoxicity.

Materials and Methods: Mice at postnatal day 7 or 21, primary cortical neurons cultured for 5 or 14 days and human neuroglioma U251 cells were treated with isoflurane. An anti-sense oligonucleotide and a specific inhibitor of STAT3, a plasmid containing human wild-type STAT3, a proteasome inhibitor MG-132 and a calcineurin inhibitor FK506 were utilized to evaluate the influence of STAT3 levels on isoflurane-induced cytotoxicity.

Results and Discussion: We found that the stage-dependent pro-apoptotic effect of isoflurane was accompanied by a developmental regulation of STAT3. A decrease in calcineurin activity as well as with a decrease in the ability of isoflurane to trigger calcineurin activity was observed in more mature brain or neurons. STAT3 disruption in U251 cells exaggerated isoflurane-induced oxidative stress and apoptosis. Whereas STAT3 overexpression mitigated these cytotoxicities, and its anti-oxidative effect was linked to its canonical activity as a nuclear transcription factor. Finally, our study revealed that inhibiting the activity of calcineurin by FK506 attenuated the isoflurane-induced loss of dendritic spines in primary neurons and isoflurane-induced cognitive dysfunction in mice.

Conclusion: The present study demonstrated that the impaired STAT3 pathway contributed to the cellular vulnerability to isoflurane, and provided a new insight into the molecular mechanisms underlying developmental isoflurane neurotoxicity.

Dexmedetomidine alleviates the long-term impact on the synaptic plasticity and hippocampal neurons induced by neonatal repeated exposure of sevoflurane

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Background and Goal of Study: To investigate the effect of dexmedetomidine (DEX) preconditioning on long-term lesion of synaptic plasticity and neuronal apoptosis in hippocampus induced by neonatal repeated exposure of sevoflurane.

Materials and Methods: 60 rats were randomly assigned into sevoflurane group (S), DEX preconditioning group (D) and control group. Rats in group S and D were intraperitoneally injected with 3ml/kg saline or 20μg/kg Dex in 3ml/kg saline respectively before inhaling 2.6% sevoflurane for 4h at P7, P14 and P21. Rats in group C inhaled carrier gas for 4h after saline injecting. Then, at juvenile and adult stage, spatial learning and memory, hippocampal long-term potentiation (LTP), paired-pulse facilitation (PPF) ratio, neuronal apoptosis and the expression of cleaved-caspase-3 in the hippocampus in all groups were tested.

Results and Discussion: At both juvenile and adult age, rats in group D performed better in escaping latency and showed more times in crossing the target quadrant than those in group S. The increments of field excitatory postsynaptic potential (fEPSP) slope after high frequency stimulation in group S were remarkably lower than group C and D, while PPF ratio of group S was significantly higher than group C and D at multiple stimulus intervals (FIG.1), suggesting that DEX can protect synaptic plasticity from the adverse effect of sevoflurane. In addition, the number of TUNEL positive cells and the expression of cleaved-caspase-3 in group D were remarkably lower than those in group S. The increments of fEPSP slope were positively correlated with PPF ratio (FIG.2), indicating a neuroprotective role of DEX.

Conclusion: Dexmedetomidine can reduce the hippocampus neuronal apoptosis and ameliorate the abnormal changes of synaptic plasticity, and thereby protect the long-term learning and memory ability from repeated neonatal sevoflurane exposure.
Prophylactic use of Anti-emetics. Concern for patient safety and outcome

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is very common unwanted effect of general anaesthetics leading to prolonged post-anesthesia care unit (PACU) stay. Unanticipated delayed discharge from hospital, patient’s dissatisfaction along with significant burden on health care facility. The incidence of PONV is between 30% - 80%. Thus appropriate patient risk stratification, risk documentation and implementation of interventions may reduce the burden of PONV. Both patients and health care system. Aim: Compliance with patient’s risk stratification and documentation with administration of PONV prophylactic agents according to the current recommended given by NHS guidelines.

Materials and Methods: We did prospective audit on 60 patients undergoing general/regional anaesthesia for surgery at Our Lady of Lourdes Hospital, Drogheda, over period of 4 weeks. Patients having Apfel scoring between 0-4 were included after approval from local audit committee. We followed the practice of documenting prophylactic anxiolytic intraoperatively and for postoperative period till recovery.

Results and Discussion: In our audit 10/60 patients were having Apfel score 0 for PONV and same number of patients fell into Apfel score of 3, both groups of patients received same prophylactic anti-emetics. None of the patient fulfilled criteria of Apfel Score 4. While the rest were (40 patients) scored 2 and 3 according to Apfel scoring system and surprisingly received the same treatment as compared to other.

Conclusion: We found that there is gap in risk stratification, documentation and compliance with NHS guidelines according to Apfel scoring system for PONV.

Recommendation: Risk Stratification for PONV should be part of pre-op assessment. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety.

References:
1. Risk Stratification for PONV should be part of pre-op assessment.
2. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety.

Saving the Planet and the NHS - Reducing Desflurane use at Forth Valley Royal Hospital

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Background and Goal of Study: Halogenated inhalational anaesthetic agents contribute to global warming. The 20 year global warming potential (GWP), Carbon dioxide equivalent (CDE20) and atmospheric lifetime is significantly higher for Desflurane (3714; 187,186g; 14 years) in comparison to Sevoflurane (349; 6980g; 1.1 years)[1,2]. To reduce this environmental impact, Forth Valley Royal Hospital has not been established. We therefore encourage others to reduce their use of Desflurane for long-term benefits.

We found that there is gap in risk stratification, documentation and compliance with NHS guidelines according to Apfel scoring system for PONV.

Recommendation: Risk Stratification for PONV should be part of pre-op assessment. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety.

References:
Previously published drug interaction models do not predict patient response well in endoscopic submucosal dissection procedure sedation

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Background and Goal of Study: In recent years, endoscopic submucosal dissection (ESD) was developed to be therapeutic procedures of gastric cancer to enable en bloc lesion resection. Proper sedation is required not only for patient’s comfort but also adequate surgical condition to ensure precisely curative resection and reduce surgical complications. The aim of this study was to validate the accuracy of the previously published response surface model (RSM) during ESD in the clinical setting.

Materials and Methods: Twenty enrolled participants from 30 to 80 years old were sedated by propofol combined alfentanil target controlled infusion. We recorded loss of response (LOR), loss of response to esophageal instrumentation (LREI), and intolerable ventilator desaturation (IVD) pharmacokinetic profiles including plasma and effect-site concentrations by using the TIVA trainer simulation program. The modified model was built by plotting the 5%, 50%, and 95% isoboles to predict propofol-alfentanil effect-site concentrations that produced an equivalent effect (figure1). The model prediction accuracy was determined as calculating the difference of accurate predictions percentage between the true response and the model-predicted probability.

Results and Discussion: Our study is the first one to evaluate the accuracy of three response surface models (LOR, LREI, and IVD) in patients undergoing sedation for ESD procedures. The LOR and LREI model seemed to express the trend of probability; however, the prediction accuracy was still poor. Besides, we noted that the patient actually required alfentanil-propofol dosage might be lower than what the original model predicted. Although the majority of our patients fall below the 50% isobole, the IVD model did not predict the two inadequate ventilation episodes.

Conclusion: The previously reported drug-interaction RSMs for upper gastrointestinal endoscopy can predict LOR but not LREI in ESD procedure. The IVD model didn’t predict desaturation periods well. Further researches are needed to improve the quality of ESD procedure sedation to aid clinical decision making and practice.

Deep neuromuscular blockade with sugammadex reversal for cervical spine surgery may not be less costly than standard clinical practice of rocuronium bolus and neostigmine reversal

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Background and Goal of Study: Deep NMB blockade, now easily feasible due to sugammadex availability, does not have a wide use because current indications are limited mostly to laparoscopic surgery and because of constraints related to the cost of sugammadex. We recently concluded a RCT designed to assess if deep NMB and sugammadex reversal reduced anesthetic requirements in patients subjected to cervical spine surgery. 63 patients were randomized to two groups: 1) rocuronium and sugammadex reversal reduced anesthetic requirements in patients subjected to cervical spine surgery. 63 patients were randomized to two groups: 1) rocuronium (bolus-infusion) to maintain 1 to 2 Post-Tetanic Counts until the end of surgical dressing, with sugammadex (4mg/kg) for reversal; 2) rocuronium bolus for intubation and reversal with neostigmine if TOF<90%. We found that deep NMB reduced propofol, remifentanil and ephedrine consumption as well as the duration of the procedures and the time from end of surgery to extubation. Here, we present a sub-analysis of the trial results that examines how the differences between the two study groups in terms of drugs consumed and OR occupancy could impact on costs.

Materials and Methods: The average difference between groups in the doses of propofol, remifentanil, rocuronium, sugammadex and ephedrine were multiplied by their costs according to the prices applied in our National Health Service. The difference, in €, between the added cost of using a rocuronium infusion and sugammadex (A) and the savings obtained by the reductions in the other drugs (B) was calculated (C). The average difference in OR time, in minutes, between the two groups was obtained (D). The formula X=(60*C)/D was used to obtain the value for the cost per hour of OR occupancy for which the cost of using Deep NMB and sugammadex would be balanced by the savings in drugs used and OR occupancy. The value obtained for X was compared with published values for OR costs at our institution.

Results and Discussion: Average doses (mg) for G1 and G2 were: propofol 715 vs 1082; remifentanil 833 vs 1069; Rocuronium for infusion 55.9 vs 0; Sugammadex 284 vs 0. Ephedrine used in 4 pts in G1 and 11 in G2. Neostigmine used only in 5 patients. Time (min) from end of surgery to extubation was G1 3.9 and G2 7.7. Total procedure time (min) was G1 131 and G2 146. Results were: A 113; B 4.04; C 1096; D 18,3min. Xwas 357,4€. Hourly OR costs at our institution are much lower: 4746 and 9786 without or with personnel.

Conclusion: Deep NMB and sugammadex may be cost effective due to less use of drugs and OR time.

Rocuronium for the prevention of incidental surgical movement without deepening laryngeal mask airway anesthesia

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Background and Goal of the Study: Neuromuscular blocking agents (NMBAs) like rocuronium are historically associated with postoperative complications such as residual neuromuscular blockade and postoperative recurarization. These have decreased drastically since the approval of sugammadex. NMBAs are not formally indicated for general anesthesia with laryngeal mask airway (GA-LMA) nor are necessary for lower limb venous surgery. However, NMBAs improve surgical conditions by abolishing intraoperative involuntary reflex movements (IIRM) without increasing anesthetic depth, associated with postoperative delirium and cognitive dysfunction. Our aim was to assess if deep neuromuscular blockade (DNMB) using rocuronium abolished IIRMs and improved surgical conditions while maintaining an appropriate anesthetic depth in patients scheduled for varicose vein surgery under GA-LMA.

Materials and Methods: We conducted a 2-month observational prospective study in patients scheduled for varicose vein surgery under GA-LMA. After informed consent was obtained, demographic, anthropometric and medical data were collected. Some patients’ anesthetic management included rocuronium administration and DNMB. Our primary outcomes included IIRMs, surgical conditions (as assessed by the surgeon on an ordinal 1-5 scale) and mean bispectral index (BIS) values. Secondary outcomes included mean percent intraoperative time with BIS < 40 and presence/absence of ≥ 1 episode of BIS < 40 for ≥ 5 minutes.

Results: We included 16 patients, aged 57.3 ± 14.5 years. Most were women (81.3%) and American Society of Anaesthesiologists Physical Status (ASA-PS) I or II (93.8%). 7 underwent surgery under no NMBA and 9 under DNMB. Groups had similar demographics, anthropometric values and ASA-PS. When compared, no differences were found in IIRMs (0.14 vs 0 per surgery, p=0.36), surgical conditions as assessed by the surgeon (4.86 vs 5.00, p=0.06) and mean BIS values (43.0 ± 1.68 vs 48.5 ± 7.5, p=0.08). However, patients who underwent surgery under no NMBA were more commonly overanesthetized. All (100%) showed BIS values < 40 during >30% of the intraoperative period (vs 22.2% of patients under DNMB). All (100%) had ≥ 1 episode of BIS < 40 for ≥ 5 minutes (vs 37.5%). At last, mean percent intraoperative time with BIS < 40 was 39.4% (vs 18.5%, p=0.023).

Conclusion: These results suggest that rocuronium and DNMB avoid an increase in anesthetic depth and correlated adverse outcomes in GA-LMA.
Fish bone impaction in distal oesophagus – a multidisciplinary challenge. Case report

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Background: Fish bone are one of the most dangerous foreign bodies to be removed endoscopically from the upper gastrointestinal (GI) tract. A multidisciplinary approach is essential in potentially fatal scenarios.

Case Report: A 81-year-old male was admitted to the emergency department with retrosternal discomfort and dysphagia after swallowing a fish bone. CT-scan showed a linear foreign body (24mm) with transverse orientation, impacted on the distal esophagus with the medial tip adjacent to descending aorta. Considering the risk of aortic laceration requiring emergent endovascular aortic repair during fish bone removal, a multidisciplinary discussion between anaesthesiology, gastroenterology, cardiothoracic, general and vascular surgery decided to do endoscopic removal in angiography room. General balanced anesthesia with invasive arterial pressure was performed. Percutaneous femoral access was primarily done by vascular surgeon. Upper GI endoscopy showed multiple blood clots and abundant blood, which led to fish bone mobilization to the stomach. After initial need of fluid and blood resuscitation to restore intravascular volume, patient gradually became hemodynamically stable. In the end, he was transferred mechanically ventilated to the intensive care unit. He was extubated with no complications 2 days after.

Discussion: Fishbone penetration of the esophagus can cause major vascular trauma, significant hemorrhage or aorto-esophageal fistulas. An integrated, multidisciplinary team approach can help optimize potential life-threatening complications and reduce mortality. This case highlights the importance of careful planning that conducted to a safe, effective and efficient treatment.

References:

Procedural packs: Considering the environmental impact

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Background: The National Health Service committed to reducing waste in the NHS Long Term Plan 2019. Procedural packs have become commonplace: simplifying procurement, improving efficiency and potentially reducing costs. We hypothesise that many items in the procedural pack are not used and this generates unnecessary waste.

Methods: We performed a survey of 42 anaesthetists, in October 2019, at Nottingham University Hospital to establish items not commonly used. Individuals were shown photographs of the local CVC procedural packs that includes 30 separate items (excluding the CVC itself). Respondents were asked to state whether they ‘always’, ‘sometimes’ or ‘never’ used each item.

Results and Discussion: Results indicate there is significant waste of unused items. Of 1260 responses, there were 713 ‘always’, 174 ‘sometimes’ and 373 ‘never’. Only three of the items provided in the pack (guidewire, blade and drape) were used ‘always’ by all respondents. In contrast, the forceps, scratch pad, syringe labels and Luer caps provided were ‘never’ used by the majority of respondents. The metal forceps, scratch pad and metal needle holders are provided with the procedural pack. Items have been included for a specific safety or practical reason. However, there is a clear difference in ‘work as prescribed’ and ‘work as done’. Addressing this by forming a national consensus on items essential for optimal CVC insertion could potentially reduce needlestick injuries, line infections but also waste. In the meantime, we should all consider providing items that are rarely used separately.

Use of Dexmedetomidine in a patient with Takotsubo Syndrome during laparoscopic surgery, a case report

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Background: The recently described Takotsubo syndrome, clinical presentation similar to an acute myocardial infarction and is triggered by an excess of catecholamines in a situation of physical or emotional stress, such as the current ones during the perioperative period, being of interest to us for timely diagnosis, treatment and prevention.

Case Report: 77-year-old female patient with hypertensive hypertrophic cardiomyopathy and Takotsubo syndrome, proposed for laparoscopic Toupet fundoplication. It is premedicated with Midazolam, Dexmedetomidine 50mcg in charge and we start perfusion at 0.6mcg/kg/h. Induction with Lidocaine, Fentanyl, Propofol, Cisatracurium and, Dopamine. Orotracheal intubation, without complications. During surgery, the patient was undergoing adrenalectomy. During the study of an anemia 7 weeks previous to the surgery a cold agglutinin AIHA was diagnosed, as a probable PNS. Despite all the heat measures and the corticosteroids there was a need to transfuse 10 red blood cell units (RBCU) until the surgery. During perioperative period we needed to reserve RBCU; raise the air temperature of the operation room; place forceps: blankets; cover exposed areas with cotton bandage; heat administer fluids and transport containers; monitoring continuously core and peripheral temperature and use non-invasive hemoglobin measure (Rainbow SET®). During the procedure the minimal core temperature was 37,8ºC and hemoglobin ranged from 8.2 g/dL to 5.6 g/dL, after a blood loss of 2L and 2 RBCU. The patient was hemodynamically stable until the laceration of inferior vena cava which dictated the need to start noradrenergic perfusion. She was transferred to the intensive care unit (ICU) sedated, ventilated, with vasoactive support and heating measures. In the ICU they could not reverse the shock, which the cause was not hemorrhagic, despite all the support and she died after 2 days. The result of pathological anatomy revealed diffuse large B-cell lymphoma.

Discussion: In cold agglutinin AIHA all heating measures are very important once it has a high impact in decreasing hemolysis. Plasmapheresis is an option for optimizing these patients before surgery and it could have been helpful. However, we were able to maintain hemoglobin variation between acceptable ranges and we believe that the incomplete exeresis of the mass was the main contribution to the outcome.

References:

Challenges in anesthetic management of cold agglutinin autoimmune hemolytic anemia in a woman undergoing adrenalectomy

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Background: Cold agglutinin autoimmune hemolytic anemia (AIHA) is described as a paraneoplastic syndrome (PNS) mainly associated with lymphoproliferative disorders but also reported in solid tumors. Treatment is difficult once it is highly refractory to corticosteroids and resection surgery of the responsible neoplasia is the best option for remission. Anesthetic management of this patients requires a team work in order to minimize the hemolysis. Our case report illustrates our approach in this case.

Case Report: A 70-year-old woman with an adrenal tumor diagnosed in a routine exam was undergoing adrenalectomy. During the study of an anemia 7 weeks previous to the surgery a cold agglutinin AIHA was diagnosed, as a probable PNS. Despite all the heat measures and the corticosteroids there was a need to transfuse 10 red blood cell units (RBCU) until the surgery. During perioperative period we needed to reserve RBCU; raise the air temperature of the operation room; place forceps: blankets; cover exposed areas with cotton bandage; heat administer fluids and transport containers; monitoring continuously core and peripheral temperature and use non-invasive hemoglobin measure (Rainbow SET®). During the procedure the minimal core temperature was 37,8ºC and hemoglobin ranged from 8.2 g/dL to 5.6 g/dL, after a blood loss of 2L and 2 RBCU. The patient was hemodynamically stable until the laceration of inferior vena cava which dictated the need to start noradrenergic perfusion. She was transferred to the intensive care unit (ICU) sedated, ventilated, with vasoactive support and heating measures. In the ICU they could not reverse the shock, which the cause was not hemorrhagic, despite all the support and she died after 2 days. The result of pathological anatomy revealed diffuse large B-cell lymphoma.

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References:

Learning points: The cold agglutinin AIHA is an example of how simple measures can have a huge importance in order to optimize the patient to the surgery.

Use of Dexmedetomidine in a patient with Takotsubo Syndrome during laparoscopic surgery, a case report

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Background: The recently described Takotsubo syndrome, clinical presentation similar to an acute myocardial infarction and is triggered by an excess of catecholamines in a situation of physical or emotional stress, such as the current ones during the perioperative period, being of interest to us for timely diagnosis, treatment and prevention.

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Presentation of reverse Takotsubo cardiomyopathy during laparoscopic adrenalectomy: a case report

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Background: Takotsubo cardiomyopathy (TTC) is an acute often reversible left ventricular (LV) dysfunction triggered by emotional or physical stress (1). Reverse Takotsubo cardiomyopathy (rTTC) is a rare variant of TTC. This is the case of a patient who developed rTTC intraoperatively, during an elective laparoscopic adrenalectomy.

Case Report: A 46 years old asymptomatic woman with no past medical history was planned to have a laparoscopic adrenalectomy for a non-secretory tumour, according to laboratory findings. Intraoperatively, during surgical manipulation of the tumour, a hypertensive crisis occurred, that lasted 40 minutes despite the administration of high doses of sodium nitropusside, nitrates and remifentanil. After complete surgical excision of the adrenal gland, haemodynamic stability was re-established but a progressive hypoxaemia was noticed, that did not considerably respond to alveolar recruitment manoeuvres, PEEP and O2 inspired fraction increase. A chest X-ray and a transthoracic Echo (TTE) demonstrated pulmonary oedema and rTTC with Left Ventricule Ejection Fraction (LVEF) 25-30%. ECG alterations and troponin increase were also noted when in the Cardiac Care Unit. A week later, TTE showed LVEF35-40%, mid-ventricular and basal akinisia of the LV, along with a small pleural effusion. Histological examination of the tumour confirmed the suspected diagnosis of pheochromocytoma.

Discussion: Undiagnosed and preoperative untreated pheochromocytoma can cause severe intraoperative complications, due to the extreme catecholamine release, secondary to surgical manipulation of the tumour. Pheochromocytoma-associated TTC is reported, though rTTC is a rare variant (2). It is not recognized as readily as traditional TTC, though early recognition and appropriate management are crucial for survival and avoidance of recurrence. It is characterized by basal akinisia associated with apical hyperkinesia, new ECG abnormalities, elevated cardiac markers and is typically seen in young women. It is often complicated by pulmonary edema, pleural effusion and cardiacogenic shock. In this case, hypoxaemia because of pulmonary edema was the first sign of rTTC.

References:

Learning points:
- Hypoxaemia can be the first symptom of rTTC, a rare variant of TTC presented in young women.
- Patients with preoperative untreated pheochromocytoma are at high risk for severe complications during surgery.
- Early recognition and management are crucial for survival and avoidance of recurrence.

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Anesthesia management for adult patient with congenital heart disease for non-cardiac surgery: case report

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Background: Ventricular septal defect (VSD) and atrial septal defect (ASD) are congenital heart diseases (CHD) rarely encountered in adult patients presenting for elective non-cardiac surgery. Adults with CHD demonstrates specific and complex anatomy and physiology (1). Therefore, anesthetic management is very challenging, multimodal and multidisciplinary.

Case Report: We present ASA III, 62 year old women scheduled for right nephrectomy, without cardiac symptomatology, but with systolic murmur on physical exam and ECG bradycarhythmia. Pre-operative investigations revealed signs for pulmonary hypertension, ASD on echocardiography and VSD confirmed with pulmonary angiography. She received combined general and epidural anesthesia. We placed invasive hemodynamic monitoring and started infusion with magnesium sulfate. Due to perioperative hypotension and bradycardia, we started continuous phenylephrine infusion. Intraoperative, the surgeon found thrombus invasion in the inferior vena cava (IVC), an additional factor for complication and possible hemodynamic destabilization. After clamping IVC and evacuation of the thrombus, we continued with radical nephrectomy without significant hemodynamic destabilization. The mean arterial pressure (MAP) was above 80 mm/hg. Patient was extubated in OR and transferred to WARD. The postoperative period was uneventful and she was discharged from the hospital on the fifth postoperative day.

Discussion: Acyanotic CHD may be relatively asymptomatic until later in life, due to balance between systemic and pulmonary circulation. Such patients could be presented in OR for non-cardiac surgery. The main goal is maintaining hemodynamic stability and balance between systemic and pulmonary vascular resistance, avoiding predisposing factors that lead to pulmonary hypertension, excessive airway pressures, use of adrenergic agents and correction of reversible factors.

References:
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Background and Goal of Study: Since the development of postoperative acute kidney injury (AKI) is associated with worse outcomes, it is important to evaluate the risk factors of postoperative AKI. Chronic hypertension (HT) has been recognized as one of the important risk factors. Whereas uncontrolled HT before the induction of anesthesia is often encountered, there are few reports conducting the relationship between HT and postoperative AKI. The aim of this study is to elucidate the relationship between uncontrolled hypertension before the induction of anesthesia and prevalence of postoperative AKI and to identify perioperative risk factors of that.

Materials and Methods: We conducted a retrospective observation study of 213 patients with uncontrolled HT who underwent scheduled non-cardiac surgery with general anesthesia from January 2016 to December 2018. AKI was diagnosed in accordance with the Kidney Disease Improving Global Outcomes (KDIGO) classification within 48hr after the surgery. Patient demography coexistent diseases, anesthetic data, and laboratory data were extracted manually from the patients’ electronic medical records. We investigated the prevalence and significance of postoperative AKI as primary outcome and perioperative risk factors for postoperative AKI as secondary outcome. Perioperative risk factors for postoperative AKI were extracted by using multivariable logistic regression analysis.

Results and Discussion: Twenty-six (12.2%) patients with AKI were found in our patient group, which was higher than that previously reported prevalence of the disease in non-cardiac surgery. Multivariable analysis showed an independent association between postoperative AKI and preoperative low eGFR (59.8±18.1 versus 69.6±18.8, p<0.05) and the high amount of fluids during surgery (1912±1383 versus 1441±1033, p<0.05). Conversely, preoperative chronic HT was not found as an independent risk factor in patients with uncontrolled HT before induction of anesthesia.

Conclusion: Uncontrolled HT before the induction of general anesthesia may be related with higher prevalence of postoperative AKI. In addition, lower eGFR in preoperative term might induce postoperative AKI.

References:
Clevidipine infusion for haemodynamic management during laparoscopic pheochromocytoma resection in a young man

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Background: Pheochromocytoma extirpation poses significant challenges for anaesthetists in blood pressure (BP) control. If undiagnosed, mortality can reach 50% during anaesthetic induction. Correct preoperative pharmacological preparation is necessary to prevent haemodynamic instability. Intraoperative events such as intubation, pneumoperitoneum and surgical manipulation of the tumour often cause massive catecholamine secretion and a peak in BP. Hypotensive episodes may occur after tumour clamping due to rapid decrease of blood circulating catecholamines or to the residual effect of hypotensive drugs.

Case Report: Preoperative alpha and beta blockade was used. Clevidipine 0.45 mcg/Kg/min infusion was started prior to induction in laparoscopic left adrenalectomy of a nineteen year old male. No changes in HR or BP were registered during laryngoscopy and endotracheal intubation. For haemodynamic changes see Fig. 1 below. As pneumoperitoneum was removed clevidipine and esmolol infusion were stopped. There were no hypotensive episodes or evident hemodynamic changes after adrenal vein clamping and tumour removal. The patient was extubated without complications and was transferred to ICU and discharged to the ward 24 hours later.

Discussion: Clevidipine butyrate is a dihydropyridine calcium channel blocker with a two to four minutes onset of action, allowing for rapid titration to control BP. Fast metabolism by plasma and tissue esterases provides a short duration of action, avoiding hypotensive episodes after tumour clamping. It compares well to sodium nitroprusside, but it has a lower risk of excessive hypotensive episodes due to its shorter half-life and greater arterial specificity. Compared to nicardipine, it has a faster offset.

References:

Learning points: Intraoperative clevidipine has better response in patients who are resistant to other antihypertensive drugs, more rapid distribution as well as less hypotension after tumour clamping due to shorter half-life.

Postoperative hypotension as a risk factor for Myocardial Injury in Non-cardiac Surgery (MINS) and Major Adverse Cardiac and Cerebrovascular Events (MACCE) after elective non-cardiac surgery. Preliminary results at 30-day follow-up

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Background and Goal of Study: Intraoperative hypotension (IH) has been associated with MINS but the role of postoperative hypotension (PH) has not been clearly studied. The goal of the study was to evaluate IH and/or PH and their relationship with MINS and MACCE at 30-day postoperative follow-up. Many studies have shown IH as a predictor of MACCE and MINS but there are no studies regarding PH. PH could be a confounding factor to consider.
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Ischemic vascular disease and 8-year mortality in emergency abdominal surgery patients

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Background and aim: Emergency abdominal surgery patients carry a high mortality. Surgery carries a high risk of perioperative cardiac instability. Surgery patients are elderly and often have co-existing diseases. We aimed to examine the association between ischemic vascular disease and long-term mortality.

Methods: We included adult emergency major abdominal surgery patients operated on 13 Danish hospitals between 1st January 2009 and 31st December 2010. Appendectomies were excluded. The surgical procedure codes were retrieved from the National Patient Register (NPR) and linked to the Danish Anesthesia Database (DAD) by the civil registry number. Preoperative ischemic vascular disease status (IVD) was defined as both cardiac vascular disease and extra-cardiac vascular disease and was retrieved from the NPR using ICD-10 diagnostic codes registered five years before the index surgery. The primary outcome, all-cause mortality one year postoperative to eight years postoperative (1-8 years), was retrieved from the Danish Civil Registry System (CRS). We evaluated mortality rates (events/100 person years at risk) and compared patients with IVD to patients without IVD with a cox regression analysis; crude and adjusted for age and sex.

Results: A total of 4864 patients underwent emergency abdominal surgery, mean age 67 (IQR 54 – 78) and 50.7% female. Some, 20.9% (1019/4864) had preoperative IVD. In the IVD-group 72.8% of patients had registered ASA-score at 3 or above compared to 40.3% in the non IVD-group. Surgical characteristics did not vary between groups. Overall-mortality were 18.2% at 30 days, 15.6% at 31-365-days, 32.9% at 1-8-years and cumulative mortality was 53.7%. Mortality rates per 100 person years at risk after surgery for IVD patients where 374.2 at 30 days, 28.37 at 31-365-days and 10.8 at 1-8-years. The corresponding age and sex adjusted hazard ratios (95% CI) comparing IVD patients with non-IVD patients were 1.27 (1.10 - 1.47), 1.31 (1.09 - 1.57), 1.52 (1.33 - 1.74) and cumulative eight year HR 1.37 (1.26 -1.50).

Conclusion: Emergency abdominal surgery patients have a high long-term mortality. Preoperative ischemic vascular disease was associated to increased mortality risk at both short and long-term.

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Measurement of baseline NT-ProBNP and baseline Troponin T as predictors of Myocardial Injury in Non-cardiac Surgery (MINS). Preliminary results

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Background and Goal of Study: MINS is associated with short and long term morbidity and mortality. Measurement of baseline NT-proBNP and Troponin T (TnT) has been proposed as a screening tool to improve preoperative cardiac risk estimation in non-cardiac surgery. Our goal was to evaluate which biomarker would best predict the occurrence of MINS and Major Adverse Cardiovascular and Cerebrovascular Events (MACCE).

Materials and Methods: Prospective single center cohort study (MINSMAR study) recruiting patients from May2017-May2019. Eligible subjects were patients 45 years or older undergoing: 1) high cardiac risk non-cardiac surgery or 2) intermediate cardiac risk non-cardiac surgery with clinical risk factors. All were elective procedures under general and/or neuraxial anaesthesia. Demographic data and factors related to surgery were recorded. Baseline measurements of NT-proBNP and TnT were obtained after anaesthesia induction. Postoperative TnT surveillance was accomplished at 3h, 1st, 2nd and 3rd day. Basal NT-proBNP was classified as <300 or >300 pg/mL and TnT as <30 or >30 ng/L. Defined variables were MINS and MACCE at 30 days after surgery. MINS was defined as at least a TnT value ≥30 ng/L with a rise and/or fall ±20% regarding the baseline. Logistic regression was used to obtain the OR (95% CI) for MINS and MACCE.

Results and Discussion: We recruited 746 patients. MACCE occurred in 78 patients (10.6%) and MINS in 158 patients (21.2%). Global mortality was 2.6%. Table1 shows patients’ clinical characteristics. Baseline NT-proBNP was recorded in 687 patients and TnT in 722, of which 254 (37%) had a basal NT-proBNP≥300pg/mL and 91 (12.6%) a basal TnT>30ng/L respectively. Results are shown in table2.

Conclusion: Baseline NT-proBNP and TnT are both strong predictors of MINS and perioperative MACCE after non-cardiac surgery in our sample of moderate-high risk patients.

5874

Quantification of Metabolic Equivalents (METs) by Means of the MET-REPAIR Questionnaire: A Validation Study

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Background and Goal of Study: We hypothesized that self-reported METs based on a questionnaire used in a large, ongoing study examining self-reported METs and mortality and morbidity (www.met-repair.org) would correlate with measured METs using spiroergometry. Specifically, we hypothesized that Pearson’s r of a linear regression would be > 0.2. We also analogously examined the Duke Activity Status Index (DASI) as well as BNP.

Materials and Methods: It’s a prospective cohort study in adult patients undergoing clinical spiroergometry during ambulatory cardiac rehabilitation following various cardiac events (surgery, hospitalization due to heart failure, etc.) at a single university hospital. The primary endpoint was self-reported METs by the met-repair questionnaire, which we compared to measured METs. METs by the DASI and BNP were secondary endpoints. Questionnaires were completed prior to spiroergometry. An analysis of METs by questionnaire was analysed by two means of rating successive activities with increasing METs: the “first no method” (by which maximal METs were determined by the level of activity just prior to the first activity a patient could no longer perform, and 2) the “last yes method” (by which the activity with the highest MET score was taken as the maximum). We hypothesize a larger then weak positive correlation (H0: r=0.2) between self-reported METs and VO2. We calculated the sample size for the first main objective at 140 patients (H0: r=0.2, H1: r= 0.45, one tailed α=0.05, β=0.05).

Results and Discussion: Of a total of 332 screened patients, 140 returned complete questionnaires. Self-reported METs by the met-repair questionnaire correlated with measured METs by spiroergometry for both the first no and last yes methods (slope 0.45, intercept 2.91, P<0.001, r=0.45 and slope 0.48, intercept 2.77, P<0.001, r=0.48, respectively). Similar values were found for self-reported METs from the DASI again by both methods (slope 0.46, intercept 3.37, P<0.001, r=0.52, and slope 0.52, intercept 2.91, P<0.005, r=0.37, respectively.) NT-proBNP was inversely related with measured METs (slope -0.001 per ng/ml, P=0.037, r= -0.31). Self-reported METs estimate METs measured by spiroergometry in patients with a history of cardiac events to a fairly well.

Conclusion: The preliminary analysis of this study validates the MET-REPAIR Questionnaire, making it an alternative to the DASI or NT-proBNP measurements in select populations.
Takotsubo cardiomyopathy after thyroidectomy – a surprise diagnostic due to atypical presentation

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Background: Takotsubo cardiomyopathy (TTC) is characterized by transient left ventricular dysfunction in patients without coronary artery disease. Clinical presentation includes chest pain or dyspnea with ECG changes and mild elevation of cardiac enzymes[1]. We report a case of TTC with an atypical presentation after a total thyroidectomy.

Case Report: A 59 year-old female, ASA II, was submitted to a total thyroidectomy and had normal preoperative evaluation. Monitoring was according to ASA standards and surgery was performed under general anaesthesia. Surgery and anaesthesia were uneventful, despite an increase in heart rate at the end of the procedure. In Post-Anaesthesia Care Unit, she remained tachycardic and showed low peripheral O2 saturations, without dyspnea, chest pain or other symptoms, lung sounds were normal and there was no response to FiO2 increase. CT angiography showed bilateral pulmonary opacity. We considered the hypothesis of negative pressure pulmonary edema, started non-invasive ventilation with only mild response and she was admitted to ICU. Investigation showed T wave inversion and troponin elevation leading to suspicion of acute myocardial infarction. Echocardiography and cardiac catheterization showed left ventricular dysfunction and changes of contractility, excluding coronary artery disease. TTC was suspected and the patient was managed accordingly. Respiratory dysfunction was solved and analytic cardiac markers normalized. At day 8, left ventricular function was normal and contractility restored. The patient was discharged clinically asymptomatic and oriented to outpatient Cardiology for follow-up.

Discussion: This case satisfied InterTAK Diagnostic Criteria[2]. Although the patient lacked the classical symptoms associated with myocardial infarction, the echocardiographic findings were consistent with TTC. The low PaO2 was due to respiratory failure related to anaesthesia and the tachycardia was a consequence of hypoxia.

References:

Learning points: Although typical signs and symptoms of TTC are mostly present, some cases have an atypical presentation and a high grade of suspicion is needed. Despite increased awareness to TTC, it remains an exclusion diagnosis.

Correlation between intraoperative hypotension and high sensitivity troponin T level in joint replacement surgeries

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Background and Goal of Study: It is hypothesized that myocardial injury demonstrated by changes in high sensitivity troponin T (hsTnT) may be caused by intraoperative hypotension (IOH). The aim was to investigate the association between intraoperative hypotension and postoperative changes in high sensitivity troponin T levels.

Materials and Methods: Totally, 33 orthopedic patients ASA II – III, 8 male, 25 female, with average age 67 ± 8.4 years were included in prospective observational study, 63.3% undergoing knee replacement (n=21) and 36.4% hip replacement (n=12). Demographical data, co–morbidities, routine medications, ECG changes were fixed. All patients presented chronic compensated cardiovascular diseases in their anamnesis. HsTnT was evaluated at two time points: T1 in operating room before the surgery and T2 - on the first postoperative day.

Results: Preliminary results from 33 patients demonstrates that significantly increased levels of hsTnT postoperatively were in 24.2%. One patient had high hsTnT levels 268.9 ng/L at T1 and was excluded from further analyse. The average operation time for hip replacement was 79 ± 23.6 minutes and for knee replacement 84 ± 25.9 minutes without intergroup difference. Major blood loss was not detected during surgeries. Mean hsTnT level at T1 was 9.91 ± 6.13 ng/L and at T2 12.7 ± 9.36 ng/L without significant difference. For 8 patients hsTnT level at T2 increased by 56.7% when compared to T1. The incidence was equal between those who underwent hip and those with knee replacement 4/12 vs. 4/21; p = 0.3. Elevated hsTnT levels postoperatively were demonstrated in 21.4% for those with IOH compared to 26.3% in those without IOH, p = 0.72. There was not found significant correlation between IOH and postoperative hsTnT changes (p = 0.77). In postoperative period any cardiovascular events were not recorded.

Conclusion: HsTnT levels increases after joint replacement surgery and IOH seems significantly not to affect the increment of hsTnT levels. For future results a greater sample size should be analysed.

Takotsubo cardiomyopathy after thyroidectomy – a surprise diagnostic due to atypical presentation

T2 increased by 56.7% when compare to T1. The incidence was equal between those who underwent hip and those with knee replacement 4/12 vs. 4/21; p = 0.3. Elevated hsTnT levels postoperatively were demonstrated in 21.4% for those with IOH compared to 26.3% in those without IOH, p = 0.72. There was not found significant correlation between IOH and postoperative hsTnT changes (p = 0.77). In postoperative period any cardiovascular events were not recorded.

Conclusion: HsTnT levels increases after joint replacement surgery and IOH seems significantly not to affect the increment of hsTnT levels. For future results a greater sample size should be analysed.
Liver transplant...
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Effect of noradrenaline infusion on hepatic and portal pressures: preliminary results of a prospective observational trial

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Background and goal: Noradrenaline is used as treatment for intraoperative hypotension. Animal studies have shown that noradrenaline has minimal effect on hepatic pressures; however, studies are lacking. The aim of the present study was to evaluate the effect of noradrenaline infusion on hepatic and portal pressures.

Materials and Methods: After ethical committee approval and written informed consent, 12 patients scheduled for pancreatectoduodenectomy were included. Anaesthesia consisted of a target-controlled infusion of propofol and remifentanil. Goal-directed haemodynamic therapy was guided by PulsoflexTM. After measurement of baseline haemodynamic variables (T1), noradrenaline infusion was started. Mean arterial pressure (MAP) was titrated to respectively 10 – 20% (T2) and 20 – 30% (T3) of baseline MAP. After reaching target MAP, portal and caval vein pressures were measured using a 25-gauge needle, which was directly placed in the vein and connected to a pressure transducer. To calculate portal vascular resistance (PVR), portal hepatic blood flow (HBF) was measured using ultrasound transit time flow measurements (Medi-Stim AS). Arterial, portal and total hepatic pressures were similar in both groups. Total HBF was significantly lower in group S (14.5% [13.3 – 16.0]) compared to group C (22.6% [19.5 – 24.1]) (p = 0.04). The difference between portal HBF’s (10.6% [8.0 – 11.5]) vs 14.9% [11.1 – 18.2] (p = 0.04) revealed a statistical significant difference between both groups. Arterial HBF’s (4.8% [2.1 – 5.4] vs 5.8% [3.6 – 9.2] (p = 0.21)) were similar in both groups (see figure).

Conclusion: Noradrenaline had no effect on systemic haemodynamic variables but significantly reduced total HBF. The present study suggest that this is related to a reduced portal HBF with somatostatin.

References:

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Intraoperative factors associated with acute kidney injury after a liver transplantation - single centre experience

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Background and Goal of Study: Acute kidney injury (AKI) after liver transplantation (LT) can increase mortality and foster the development of chronic renal dysfunction. In this study, we analysed intraoperative factors associated with AKI in patients who underwent LT.

Materials and Methods: This retrospective study consisted of 191 adult patients who underwent LT during two consecutive years. AKI was determined using KDIGO classification (Kidney Disease Improving Global Outcomes) as an increase in serum creatinine by 26.5 µmol/l within 48 hours or an increase in serum creatinine to 1.5 times baseline after LT. We analysed volume resuscitation (ml) with a red blood cells transfusion (homologous or/and autologous blood); fresh frozen plasma; crystalloids, colloids, albumins and noradrenaline dosage (mcg/min) during LT. Student t-test was used for analysis.

Results and Discussion: The patients were comparable in terms of age, BMI, etiology of liver cirrhosis and comorbidities (diabetes mellitus, chronic kidney disease, arterial hypertension). The incidence of AKI was 24.6%. MELD-Na was significantly higher in patients with AKI (21.7 ± 8.1 vs 17.2 ± 7.1; p < 0.001) as well as preoperative serum creatinine (116.5±95.4 vs. 84.3±51.45 µmol/l; p < 0.003). Patients with AKI received significantly more intraoperative red blood cells via transfusion (2578±1685 vs. 2076±1441 ml; p = 0.0484) in comparison with non AKI patients, as well as noradrenaline dosage used during LT (11±13 vs. 7.5±9 mcg/min; p=0.0491). Among all other analysed factors, we found no significant differences.

Conclusion: In this study we have shown that almost one quarter of patients developed AKI after a LT. Patients with AKI received more red blood cells via transfusion and higher doses of noradrenaline during LT. The aforementioned is consistent with the knowledge that higher doses of noradrenaline cause vasoconstriction of renal vasculature leading to renal failure.(1)

References:

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Effect of somatostatin on system haemodynamics and hepatic blood flow

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Background and Goal of Study: Previous studies have suggested that somatostatin may affect hepatic blood flow (HBF) in the presence of portal hypertension. The clinical effects of somatostatin administration on HBF however remain ill-defined. In the present study we aimed to assess these effects by comparing HBF in patients with and without intra-operative somatostatin administration.

Materials and Methods: After ethical approval and written informed consent, 22 patients were included. 13 patients scheduled for pancreaticoduodenectomy were included and divided in 2 groups, according to the surgical indication for somatostatin administration. Anaesthesia was provided for all patients using propofol TCI (Schnider model). All patients received goal-directed haemodynamic therapy guided by PulsioflexTM. After measurement of baseline haemodynamic variables (T1), somatostatin infusion was started. Mean arterial pressure (MAP) was titrated to respectively 10 – 20% (T2) and 20 – 30% (T3) of baseline MAP. After reaching target MAP, portal and caval vein pressures were measured using a 25-gauge needle, which was directly placed in the vein and connected to a pressure transducer. To calculate portal vascular resistance (PVR), portal hepatic blood flow (HBF) was measured using ultrasound transit time flow measurements (Medi-Stim AS). Arterial, portal and total HBF, indexed to the cardiac output, were compared using Wilcoxon rank sum-test.

Results and Discussion: A total of 22 patients were included. 13 patients received somatostatin (group S) whereas 9 patients did not (group C). Cardiac output, systemic and portal pressures were similar in both groups. Total HBF was significantly lower in group S (14.5% [13.3 – 16.0]) compared to group C (22.6% [19.5 – 24.1]) (p = 0.04). The difference between portal HBF’s (10.6% [8.0 – 11.5]) vs 14.9% [11.1 – 18.2] (p = 0.04) revealed a statistical significant difference between both groups. Arterial HBF’s (4.8% [2.1 – 5.4] vs 5.8% [3.6 – 9.2] (p = 0.21)) were similar in both groups (see figure).

Conclusion: Somatostatin had no effect on systemic haemodynamic variables but significantly reduced total HBF. The present study suggest that this is related to a reduced portal HBF with somatostatin.

References:
Influence of inhalation anesthetics on liver function of patients with toxic hepatitis during surgical treatment of pulmonary tuberculosis

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Background and Goal of Study: Leading place among 29% of patients with adverse reactions after polychemotherapy (PCT) for treatment of tuberculosis (TB) is occupied by toxic hepatitis (TH). Therefore, 30% of the patients require surgical treatment under general anesthesia, as a result of therapy. However, there is less information about influence of inhalation anesthetics on liver function, in case TH. The aim of this study was to evaluate effects of sevoflurane (SF) and desflurane (DF) on liver function of patients with toxic hepatitis caused by anti-TB PCT during surgical treatment of pulmonary TB.

Materials and Methods: 45 patients with combination of TB and TH were studied for liver function after anesthesia with SF (23 patients) or DF (22 patients). Groups were similar with respect to sex, age, ASA status, forms of TB, duration of anesthesia. Level of aspartate aminotransferase (AST), alanine aminotransferase (ALT), total bilirubin (TBil), alkaline phosphatase (ALP), gamma-glutamyl transpeptidase (GTP), lactate dehydrogenase (LDH), alpha-glutathione S transferase (alphaGST) were measured before, 1, 6, 24 hours, 7, 14 days after surgery. Hemodynamic monitoring with PiCCO technology was carried out during operation to prohibit reduction of hepatic blood flow.

Results and Discussion: ALT level was 4 times higher than normal in both groups at start of the study. In the future, there was a tendency to decrease. It had reached near normal levels by 14 days after surgery. Initially AST level was 2 times above normal and then it was remaining within these limits in both groups throughout the study. Before intervention, level of GTP was twice reference range in both groups. In the group of SF, there was a decrease it to normal values, during 1 hour after the operation, followed by increase after 6 hours and normalisation to 24 hours. In the desflurane group, level of GTP had a steady downward trend. Level of alphaGST was initially comparable in both groups and it was 3 times higher than normal. In desflurane group, level of alphaGST was rising during first hour with subsequent reduction to the norm level after 24 hours. In SF group indicator was descending.

Levels of ALP, LDG, TBil were remaining within reference intervals throughout the study.

Conclusion: SF and DF do not worsen the studied markers of liver function in case of stable hemodynamics during operation in patients with combination of TB and TH both in the early and late postoperative period.

Effect of noradrenaline on hepatic blood flow: preliminary results of a prospective observational trial

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Background and Goal of Study: Noradrenaline is used to maintain adequate blood pressure. Animal studies suggested that noradrenaline has no effect on hepatic blood flow (HBF), however human studies are lacking. The aim of the present study was to evaluate the effect of noradrenaline infusion on HBF.

Materials and Methods: After ethical committee approval and written informed consent, patients scheduled for pancreaticoduodenectomy were included. All patients received target-controlled anaesthesia with propofol (Schnider model) and remifentanil (Minto model). Haemodynamic data were measured, recorded and guided by PulsioflexTM. These data were related to HBFs which were measured using ultrasound transit time flow measurements (Medi-Stim AS). After baseline measurements, noradrenaline infusion was started, and mean arterial pressure (MAP) was titrated to respectively 10 – 20% and 20 – 30% of baseline MAP. Haemodynamic variables and simultaneously measured HBFs were recorded at each time interval. Arterial, portal and total HBF were indexed to cardiac output (CO). The effect on HBF’s related to MAP was analysed using a random effect GAM modeling, a multivariate regression method based on splines. CO was similar at the different times of measurement. Noradrenaline significantly increased MAP but reduced total HBF (p < 0.01). This was due to a concomitant dose-dependent decrease in both portal (p < 0.01) and arterial (p < 0.01) HBF. This effect was linear for portal flow. For arterial HBF however the relationship was non-linear with a more pronounced decreased flow in the lower MAP range (see figure).

Conclusion: Noradrenaline reduced total HBF. This was related to a dose-dependent decrease in both arterial and portal HBF. The underlying mechanisms for the different response pattern between arterial and portal HBF remain to be elucidated.

References:

Transperitoneal versus extraperitoneal robot-assisted laparoscopic radical prostatectomy on the postoperative hepatic and renal function

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Background and Goal of Study: Through retrospective method, we evaluated the hepatic and renal function changes of patients undergoing robotic-assisted laparoscopic radical prostatectomy (RALP) during and after surgery. We also aimed to describe the effects of pneumoperitoneum via transperitoneal (TP-RALP) and extraperitoneal (EP-RALP) approaches on liver and kidney function in patients after operation. To provide clinical data support for anesthesia management of patients with RALP and choose the appropriate surgical scheme for ones with hepatic insufficiency.

Materials and Methods: This study retrospectively collected 159 prostate cancer patients who met the inclusion criteria from 2015 to 2019. By comparing the laboratory tests of hepatic and renal function before and after surgery in patients with different surgical approaches (transperitoneal or extraperitoneal).

Results and Discussion: Postoperative total bilirubin (TB) and bound bilirubin (CB) in the two groups were both significantly higher than before surgery, while total protein (TP), albumin (ALB), and globulin (GLO) were significantly less than before surgery (p <0.05). There were no statistical differences in the preoperative hepatic function between the two groups. But TP, ALB and GLO of the EP-RALP group were significantly higher than TP-RALP group after operation (p <0.05). In TP-RALP group, urea, serum creatinine (Scr) and uric acid were significantly less than before surgery (p<0.05). In EP-RALP group, urea and uric acid were significantly less than before surgery (p<0.05). There were no statistical differences in estimated glomerular filtration rate (eGFR) and Creatinine Clearance (CCR) in the two groups.

There were no statistical differences in the renal function between the two groups whether before or after surgery.

Conclusion: RALP has a significant effect on hepatic function after transperitoneal and extraperitoneal approaches. TP, ALB, and GLO of EP-RALP group were significantly higher than TP-RALP group. It is suggested that different pneumoperitoneal pathways may have different effects on protein consumption in the body. But it may have less effect on renal function.
Post-operative laboratory analysis of patients submitted to orthotopic liver transplantation

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Background and Goal of Study: There is no single laboratory test capable of detecting complications after liver transplantation, however, they can be used to monitor the patient both by their absolute value and by analyzing their trend values.

We evaluated the laboratory profile of patients in the first 30 days after orthotopic liver transplantation (OLT), aiming to analyze their tendency over the days, as well as the moment of return to normality.

Materials and Methods: This is a retrospective study in which laboratory exams were collected from 50 patients from the 1st to the 30th day after transplantation in the Fortaleza General Hospital, from January 2016 to December 2016, of both genders, at 18 years and over, with varied causes of loss of liver function. Included were hemoglobin, hematocrit, platelet count, INR, Partial Thromboplastin Time (PTT), Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), total bilirubin, urea, creatinine, alkaline phosphatase (AF), gamma glutamyl transpeptidase (GGT).

Results and Discussion: In this study, INR and PTT presented normalization on average on the 3rd and 5th days after OLT, respectively, with a significant reduction in their values from the 3rd day. Other studies have shown that the persistence of coagulopathy indicates severe organ dysfunction. Transaminases did not return to normal within 30 days following liver transplantation. However, there was a reduction in the value with statistical significance from the 5th postoperative day for the AST and the 10th day for the ALT. Regarding bilirubins, the mean was not normalized at 30 days postoperatively, however there was a statistically significant reduction from the 12th day. AF and GGT did not have their means normalized during the study period, however they showed an upward trend from the first day after OLT. This study is similar to that observed in other studies, where it was found that AF and GGT are the last to normalize. Elevation of AF, bilirubins, AST, ALT are known to be typical of acute but nonspecific rejection, also occurring in other conditions such as hepatobiliary dysfunctions. Laboratory exams can be used as the moment of return to normality.

Conclusions: In the present study it was possible to follow with statistical significance the variation of the values during the time of most of the evaluated exams (7 from a total of 12). The importance of knowing this patient profile stems from the fact that complications inherent to surgery can be detected early by laboratory tests.

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Successful therapy of an intraoperative lactic acidosis by using high-caloric parenteral nutrition in a patient with MELAS-syndrome

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Background: Mitochondrial encephalomyopathy, lactic acidosis and stroke-like episodes syndrome (MELAS syndrome) is one of the most frequent mitochondrial disorders due to a defect in oxidative phosphorylation, there is an impaired mitochondrial energy production with consecutive metabolic disorders, especially in situations with increased stress, e.g. during an operation. With regard to the anesthesiological management, MELAS syndrome patients therefore represent a challenging cohort. To date, literature concerning the correct treatment of these patients is rare so that this case report is supposed to support decision making for anesthesiologists in the therapy of patients with MELAS syndrome.

Case report: We report the case of a 34-years-old female with known MELAS syndrome who underwent an elective laparoscopy due to endometriosis that changed in a laparotomy in the course of the operation. General anesthesia was induced with Remifentanil, Thiopental and Rocuronium. Arterial and central venous catheters were inserted. General anesthesia was maintained with Desfluran and Remifentanil. The first arterial lactate value at the beginning of the operation was 1.4 mmol/l. In the following two hours, the patient developed a lactic acidosis with increasing lactate levels (arterial lactate concentrations every 30 minutes). Increased risks of anesthesia due to worsening pulmonary function necessitates special care.

Learning points: The application of high-caloric parenteral nutrition seems to be a suitable approach in the therapy of patients with MELAS syndrome and intraoperative lactic acidosis.

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Anesthetic considerations in patients with Gorham’s disease: a case report of three surgeries and postoperative follow-up for 7 years

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Background: Gorham’s disease (vanishing bone disease) is a rare disorder characterized by massive bone resorption. It mostly affects the mandible, ribs, and spine. To date, there are only around 200 cases reported, with little data regarding anesthesia management or long-term postoperative follow-up.

Case presentation: Seven years ago, a 42-year-old Asian male with Gorham’s disease was admitted to our hospital due to persistent low back pain. Image study showed severe kyphosis and bony destruction over the T12-L1 vertebrae and the left lower ribs. The patient then underwent his first surgery, T12-L1 vertebral column resection and TS-L4 posterior fusion with instrumentation. A rescue and revision surgery was arranged a year later due to the loosening of some fixing rods. General anesthesia with endotracheal intubation was performed in these two surgeries. This patient had an uneventful recovery without any neurological sequelae[1]. He was admitted again in October 2019 for cystostomy due to necrotic bladder with compromised urinary tract infection. Because of the worsening pulmonary function from progressive chest wall deformity, only light intravenous sedation with local anesthesia was applied for C-spine protection. Positioning can be difficult during intubation should be applied for C-spine protection. Positioning can be difficult if the patient presents severe kyphosis. Patients with Gorham’s disease often develop restrictive lung disease because of kyphosis and clyothorax. Pressure control mode ventilation with lung protective strategy including low tidal volumes (5-8 kg/mL) and optimal driving pressures is preferred. Multimodal analgesia should be considered, while epidural analgesia can be troublesome due to spine lesions.1

References:

Learning points: Anesthesia for patients with Gorham’s disease can be challenging due to the extensive involvement of the skeletal system, particularly airway management. Increased risks of anesthesia due to worsening pulmonary function necessitates special care.

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Anesthetic management of an insulinoma: a case report

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Background: Insulinoma is a functioning pancreatic neuroendocrine tumor and a rare cause of recurrent hypoglycemia. It’s manifested by recurrent episodes of hypoglycemia and adrenergic symptoms, with low blood glucose levels, correlated with a pancreatic lesion suggestive of insulinoma. She was submitted to laparoscopic enucleation of the lesion following the lesion’s excision.

Case report: A female, 45-years-old, history of morbid obesity and obstructive sleep apnea syndrome. She had frequent episodes of unconsciousness and adrenergic symptoms, with low blood glucose levels, correlated with a pancreatic lesion suggestive of insulinoma. She was submitted to laparoscopic enucleation of the lesion under balanced general anesthesia. Monitored by the ASA standard, blood glucose was measured every 30 minutes until tumor resection and then every 15 minutes. These levels were titrated by crystalloid infusion with 5% glucose. There were no postoperative complications.

Discussion: Pancreatic neuroendocrine tumors are rare and insulinoma is the most common subtype. Laparoscopic resection is the gold-standard treatment. However, the hemodynamic changes caused by pneumoperitoneum lead to the release of...
catecholamines, vasopressin and, indirectly, cortisol, which stimulate endogenous glucose production, whose perioriopitive levels are already uneven.1 Anesthetic evaluation should include documentation of neurological damage resulting from severe hypoglycemic episodes.1 Intraoperatively, the anesthetist should prevent hypoglycemic episodes during tumor management and post-resection hyperglycemia. The most accepted approach is that the patient should start on a 10% glucose solution continuously and that glucose levels should be assessed every 30 minutes to maintain glycemic levels between 100-150 mg/dL.1 Anesthetic technique should include drugs that decrease the cerebral metabolic rate of oxygen, such as propofol or thiopental.

References:

Learning points: Despite its rarity, an insulinoma represents a major challenge, particularly due to the variation of intraoperative blood glucose. Anesthesiology plays a crucial role in these patients' management because, although the ultimate treatment is the surgical removal, proper control of glucose levels can prevent neurological damage, providing a better outcome for the patient.

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**4516**

**Effect of 10 min-prewarming on core body temperature during gynecologic laparoscopic surgery under general anesthesia**

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**Background and Goal of Study:** Previous research has shown beneficial effect of prewarming on preventing inadvertent perioperative hypothermia. Nevertheless, there are not many researches on effects of short period prewarming, especially in gynecologic laparoscopic surgery.

**Materials and Methods:** Fifty-four patients are randomly assigned to 2 groups (Fig.1). Patients in non-prewarming group was warmed only intraoperatively with forced air warming device and for those in prewarming group, warming started 10 min before anesthetic induction. The primary outcome was incidence of intraoperative hypothermia.

**Results and Discussion:** Intraoperative hypothermia was observed in 73.1 percent of non-prewarming group, while it occurred in 24 percent of patients in prewarming group (P <0.001). There were significant differences in changes of core temperature between the non-prewarming group and all the prewarming groups (p < 0.001). Postoperative shivering occurred in 8 out of 26 (30.8%) in non-prewarming group, and in 1 out of 25 (4.0%) in prewarming group (P = 0.024).

**Conclusion:** Forced air warming for 10 min before induction combining with the intraoperative warming is effective method to prevent hypothermia in patients undergoing gynecologic laparoscopic surgery.

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**4520**

**Evaluation of comfort under moderate/deep sedation with dexmedetomidine/propofol during endoscopic ultrasonography: a prospective, randomized, controlled study**

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**Background and Goal of Study:** Endoscopic ultrasonography (EUS) is a more complicated procedure than conventional endoscopy. Dexmedetomidine (DEX) and propofol are common sedatives for endoscopy, both of them have advantages and disadvantages, we chiefly aimed to compare the patients' comfort of dexmedetomidine (moderate sedation) and propofol (deep sedation) undergoing the EUS.

**Materials and Methods:** This is a prospective, randomized and controlled study. patients who underwent the EUS and the EUS-FNA were randomly allocated to received dexmedetomidine (group D) or propofol (group P). Group D received DEX at a loading dose of 1 ug kg-1 lasting for 10 min followed by a maintenance infusion rate of 0.2-0.3ug kg-1 h-1 throughout the whole procedure. When the Modified Observer's Assessment of Alertness/Sedation Scale (MOAA/S) reached 3 to 4, starting the procedure. Patients in the group P were given propofol 1mg kg-1 intravenously, and the practice was started when the MOAA/S reached 1 to 2. A single dose of sufentanil 1 ug kg-1 was administered before the procedure in all patients. The primary endpoint was patients' comfort score based on visual analogue scale (VAS), and the secondary endpoints included postoperative comfort index, sedation related adverse events and endoscopists' satisfaction.

**Results and Discussion:** 60 patients were eventually enrolled each group in the current study. The patients' comfort score was lower in the group D than that in the group P (P <.001). There was no significant difference about postoperative comfort index excepted nausea and vomiting which were more common in patients with DEX after the procedure (p <.05). The incidence of desaturation, hypotension and apnea were significantly higher in patients with propofol (all P <.05), but there were more patients had bradycardia in the group D (P <.05). And the endoscopists' satisfaction score was also significantly lower in the group D (P <.05).

**Conclusion:** Compared with Propofol, DEX provided lower patients' comfort and endoscopists' satisfaction during EUS. But it was relatively safer for patients with DEX undergoing EUS and caused less hemodynamic and respiratory depression.
Anaesthetic management in Irreversible Electroporation (IRE): Four year experience

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Background and Goal of Study: IRE is a non-thermal ablation technology based on the application of electrical energy to the target cells. It is often used as alternative of surgery in unrectsectable, locally advanced malignant disease. The aim of this study was to evaluate perioperative anaesthetic management and safety of this technique.

Materials and Methods: Retrospective review was performed of patients who received IRE by percutaneous or laparotomy approach between July 2015 and November 2019. Anaesthetic management, perioperative complications, stayed in hospital and follow-up was collected. Now, after 4 years, 19 patients over year were analyzed.

Results and Discussion: 19 patients were included: 6 pancreatic, 5 liver, 7 kidney and 1 thyroid cancer. The descriptive analysis showed a mean age of 62.05 (± 9.21 SD) and most patient were ASA III. We evaluated two different groups: percutaneous (8) and laparotomy approach (11). All patients required high doses of opioids and neuromuscular blockade to avoid cardiac arrhythmias and muscle contractions. All patients underwent a Train Of Four ratio and double ECG monitoring, one to synchronize the IRE pulses with the ECG. Most patients in the percutaneous group (kidney and thyroid IRE) had no intraoperative incidences. However, 2 patients had cardiac events related to the electric impulse (arterial hypertension or tachycardia). 3 patients in the laparotomy group (pancreatic and liver IRE) had arterial hypertension too and 2 patients had accidental sections of large vessels adjacent to tumour during surgery. The mean surgical time was 270 min (± 1.05 SD). No patient developed severe complications due to the IRE such as a malignant arrhythmia, rhabdomyolisis or seizures. Incidence of postoperative complications due to surgical technique was similar in both groups (37%). However, the severity of these was higher in the laparotomy group, resulting in a higher mean PACU stay. Overall, one year survival rate was of 73.7%.

Conclusion: The main advantage over other ablative methods is that there isn’t heating or freezing damage surrounding tissues and that the heat sink effect does not occur. It is considered a safe procedure to treat tumours near vital vascular and ductal structures. Given the anatomic location of pancreas and liver, an open technique is indicated, however, the rate of complications increases. The Analgesia Noceception Index (ANI), could be used to measure sympathetic activity during application of electrical impulse.

5020

What’s the best anaesthetic approach in a patient with amyotrophic lateral sclerosis?

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Background: ALS is a rare neurological disorder characterised by degeneration of higher and lower motor neurons with progressive muscle weakness. One should be aware of the risks and benefits of performing any kind of anesthesia in this patients in order to not aggravate or exacerbate their previously condition.

Case report: A 54 year-old male of ASA physical status class 4, with advance ALS and muscular atrophies, was admitted to the hospital for a percutaneous gastrostomy. The patient had dysarthria, dysphagia, restrictive pulmonary disease and liver IRE. A 54 year-old male of ASA physical status class 4, with advance ALS and muscular atrophies, was admitted to the hospital for a percutaneous gastrostomy. The patient had dysarthria, dysphagia, restrictive pulmonary disease and liver IRE. The patient had dysarthria, dysphagia, restrictive pulmonary disease and liver IRE.

Discussion: ALS has multiple anaesthetic concerns that makes the preoperative review of functional status a imperative guide for decision-making in the optimal anaesthetic management of these patients. In this case, we choose a propofol based sedation in order to avoid more serious complications of general anesthesia as life-threatening hyperkalemia if succinylcholine is used or residual muscle weakness that require postoperative mechanical ventilation.1 PEG placement under propofol sedation in patients with ALS is safe and acute respiratory complications are rare.2,3 Also, the use of propofol and 50 mg of ketamine was programmed in the effect-targeting model of propofol and 50 mg of ketamine was programmed in the effect-targeting model.

Conclusion: Takeuchi M.1, Takasaki Y.1, Nishihara T.1, Abe N.1, Sekiya K.1, Yorozuya T.1
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Effect of pretreatment with a low-calorie diet on liver function in obese patients undergoing laparoscopic sleeve gastrectomy

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Background and Goal of Study: Preoperative weight loss facilitates surgery. This retrospective study of laparoscopic sleeve gastrectomy (LSG) investigated the effect of pretreatment with a low-calorie diet on liver function during the perioperative period.

Materials and Methods: We recruited 26 adult obese patients (16 women and 10 men; age, 46 ± 10 years; body mass index, 39.2 ± 6.4 kg/m²) who underwent LSG consecutively from January 1, 2017 to October 31, 2019. Their medical and anesthetic records were retrospectively reviewed and data pertaining to the serum concentrations (IUL) of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were collected as an index of liver function. A low-calorie diet was prescribed individually to approximate 1000 kcal/day for 2 weeks. The serum concentrations of AST and ALT were measured four times on the admission day (baseline value, within 5 days before the surgery (T1)), and on the 1st and 7th postoperative day (T2 and T3). Serial changes in AST and ALT concentrations were analyzed by repeated-measures analysis of variance and followed by a post-hoc test. P < 0.05 was considered statistically significant.

Results and Discussion: Pretreatment with a low-calorie diet yielded a weight loss of 5.2 ± 1.6%. The duration of the surgery was 171 ± 34.9 min. A significant related adverse outcomes is needed to raise awareness and to develop clinical pathways to approach these patients in the best way possible. Sedation in patients with ALS is safe and acute respiratory complications are rare.
difference was observed between ALT concentration at T1 and the baseline value. A subgroup analysis regarding sex and %weight loss revealed that, in men, the mean AST concentration at T1 and T2 (62.2 ± 38.2 and 73.6 ± 35.1) and the mean ALT concentration at T1 (99.0 ± 67.9) were significantly higher than their respective baseline values (42.5 ± 29.0 and 69.4 ± 49.2). In patients with weight loss exceeding 5% (n = 15), the mean AST concentration at T1 and T2 (54.2 ± 39.9 and 64.5 ± 32.9) and the mean ALT concentration at T1 and T2 (72.5 ± 59.0 and 75.5 ± 52.1) were significantly higher than their respective baseline values (41.5 ± 30.9 and 56.6 ± 46.5). The significant preoperative increase in both AST and ALT concentrations did not worsen by surgically associated insults and up to the 7th postoperative day, liver function almost improved.

Conclusion: This study suggests that a low-calorie diet administered preoperatively for 2 weeks may temporally deteriorate liver function, particularly in males and patients with weight loss exceeding 5%.

5014

Evaluation of Effect of Intra Abdominal Pressure to Optic Nerve Sheath Diameter on Total Laparoscopic Hysterectomy

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Background and Goal of Study: Pneumoperitoneum (PP) and the consequent increase in the intraabdominal pressure can have many systemic physiological consequences. There is growing evidence that demonstrates a positive correlation between intra-abdominal pressure (IAP) and intra-cranial pressure(ICP).

Ultrasongraphic evaluation of optic nerve sheath diameter (ONSĐ) has been shown to be especially valid in cases where the ICP> 20mm Hg. The study objective was to evaluate the changes in ICP and correlate those by means of ONSĐ in a controlled model of acute elevation of IAP and in Trendelenburg position (TP) who was undergoing total laparoscopic hysterectomy procedure.

Materials and Methods: Data was prospectively collected from patients who underwent Total Laparoscopic hysterectomy procedure between April and November 2017. The ONSĐ was measured by ultrasound sagittally with a 10-MHz transducer 4 times: T0-immediately after induction of general anesthesia in hemodynamically stable patient in the horizontal position for baseline; T1-3 min. after PP at 20 mm Hg on horizontal position; T2-3 min. after PP at 15 mm Hg on TP;T3-After deflation of PP on horizontal position. And each time measured by three trained anesthesiologists separately. And parallel to these measurements simultaneously were measured mean arterial pressure (MAP), EtCO2 and PaCO2. Statistical analysis was performed using SPSS version 23.0 software. Tests were considered statistically significant if P<0.05.

Results and Discussion: There were 59 female between 22-74 years old , ASA I-II-III patients. Basal value of (T0) ONSĐ measured as 5.63 ± 0.53 mm; After 20 mm Hg PP, there was a statistically significant increase in the horizontal position (T1) (5.97 ± 0.49 mm) and 15 mm Hg PP with TP (T2) (5.95 ± 0.57 mm) (p<0.05). At the end of the operation (T3) when the value of ONSĐ was approached the basal value again (p<0.05). There was no correlation between ONSĐ and MAP, EtCO2 and PaCO2 values (p> 0.05).

Conclusion: In laparoscopic procedures, we showed that both the position and especially the elevated intraabdominal pressure increases ONSĐ and at the end of the operation the ONSĐ values reached the basal values. We believe ultrasound guided measurement of ONSĐ could be used during laparoscopic procedures or clinical follow-up especially in patients at risk for intracranial hypertension.

5622

Oxygenation monitoring using Oxygen Reserve Index (ORI™) in Major Ambulatory Surgery in a humanitarian aid environment

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Background: Oxygenation is fundamental during induction and under general anesthesia. The unique indicator that can evaluate the adequate oxygenation status is end-tidal oxygen concentration (ETO2). More than 90% of ETO2 has been considered as an adequate oxygenation status. Oxygen saturation is the fraction of oxygen-saturated hemoglobin relative to total hemoglobin (unsaturated + saturated) in the blood. At around 90% oxygen saturation increases according to an oxygen-hemoglobin dissociation curve and approaches 100% at partial oxygen pressures of >10 kPa. Pulse oximetry is a method used to estimate the percentage of oxygen bound to hemoglobin in the blood. It is particularly convenient for noninvasive continuous measurement of blood oxygen saturation. This approximation to SaO2 is designated SpO2 (peripheral oxygen saturation). Oxygen reserve index (ORI), is a novel noninvasive indicator of blood oxygenation, measured with an index between 0.00 and 1.00.

Materials and Methods: ORI increases with oxygen administration, but is not a measurement of partial pressure of oxygen (PaO2). We therefore investigated the relationship between Radical-T Pulse Co-Oximeter (Masimo) ORI and SpO2 during oxygenation during surgery. Twenty-seven ASA 1 and 2 patients undergoing herniorrhaphy surgery in humanitarian aid provided in the Hospital of Redentor Love in Danbro, Republic of Benin, were included in analysis. After obtaining surgery informed consent and institutional ethical consent, patients were consented and signed. Patients was managed with ambi aura once disposable laryngeal mask, and normal end-tidal carbon dioxide partial pressure (35-45 mmHg). We measured the time to peak of ORI and time to 90%, determined when the ORI increased by
5615

Monitored anaesthesia care for a patient with a mediastinal mass: may spontaneous breathing be with us

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Background: Anaesthetic management of patients with a mediastinal mass is always challenging. Mediastinal masses entail a high risk of airway obstruction and/or cardiopulmonary collapse during general anaesthesia (GA). Preoperative symptoms can vary widely, but some such as dyspnoea, supine cough or syncope should alert of an increased perioperative risk. In these cases, GA should be avoided whenever possible.

Case Report: A 42-year-old female presenting with acute right lower limb ischemia should alert of an increased perioperative risk. In these cases, GA should be avoided whenever possible.

Discussion: Our aim was to maintain spontaneous breathing avoiding either any airway intervention in case of GA or a cardiovascular collapse due to a neuroaxial technique. That is why we chose ketamine over other drugs. Also, ketamine has a bronchodilator effect, beneficial in this particular situation. It could be discussed that ketamine can increase pulmonary vascular resistances and thus not be the most suitable option. We defend that, at low dose, this effect would not be of that importance and, prioritising its respiratory advantages, led us to a successful outcome.

References:

Learning points: Expiration of CO2 beyond intra -abdominal cavity must be kept in mind during laparoscopy. The anesthesiologist should be aware of the potential of subcutaneous emphysema, which may appear in conjunction with pneumothorax or pneumomediastinum.

5639

Unexpected perioperative desaturation due to subcutaneous emphysema in a patient undergoing laparoscopic cholecystectomy

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Background: Laparoscopic cholecystectomy (LC) has been considered the «gold standard» for the surgical treatment of gallstone disease over the past 25 years. (1) Optimal anesthetic management requires thorough knowledge of the complications generated by the pneumoperitoneum, to manage adverse perioperative effects. (2)

We present the case of a patient who underwent LC, complicated by subcutaneous emphysema, leading to unexpected perioperative desaturation.

Case Report: A 63-year-old, ASA II, female patient was scheduled for LC due to cholecystitis. After uneventful induction of anesthesia and endotracheal intubation, the patient was mechanically ventilated and anesthesia was maintained with desflurane in O2/air mixture. Ten minutes following initiation of pneumoperitoneum (IAP 14 mmHg), pulse oximetry saturation (SpO2) dropped from 100% to 87%, confirmed by blood gas analysis. Inspired O2 concentration was increased to 100%, the airway was checked and the patient was manually ventilated until the end of the 40 minute procedure, improving O2 saturation (92%). During emergence, uncovering of surgical drapes revealed subcutaneous emphysema on the upper part of right hemi–thorax, extending to the neck, while postoperative chest computed tomography was diagnostic of pneumomediastinum. The patient was managed conservatively and was discharged from hospital 7 days post –surgery.

Discussion: This case report aims to alert anesthesiologists towards the possibility of subcutaneous emphysema after LC, which may be complicated by pneumomediastinum or pneumothorax. (3) Along with published preventive measures (3), awareness and prompt recognition of the potential of CO2 extravasation beyond the intrabdominal cavity are crucial to modify anesthetic management, ensuring patient safety during LC.

References:

5644

Supervised deep learning model for predicting postinduction hypotension in diabetic patients

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Background and Goal of Study: Hypotension after induction of general anesthesia is very common. In particular, diabetic patients often have cardiac autonomic neuropathy. Therefore, it is hard to keep proper blood pressure in those patients. Recently, several studies have been attempted to predict patient’s hemodynamic instability through deep-learning methods. In this study, we try to develop a machine-learning model for prediction of postinduction hypotension (PIH) in diabetic patients.

Materials and Methods: We extracted data from the electronic health record of a single tertiary care center from January 2006 to December 2018 for patients over age 18 diagnosed with diabetes that underwent general anesthesia. We designed a deep learning model constituted by feedforward neural networks (FFN) with a multimodal input layer and four hidden layers. Deep learning model was used to predict PIH (mean arterial pressure lower than 20% of baseline or use of vasopressor within 30 minutes of induction) as primary outcome. Severe hypotension was defined as lower than 40% of baseline or need continuous infusion of vasopressor. Preoperative medical history, medication, laboratory and echocardiographic findings, intraoperative factors such as induction agents, vital signs were used as features.

Results and Discussion: Out of 25,055 cases, 15,523 (62.0%) experienced PIH and 4,652 (18.5%) of them were severe hypotension. Area under the receiver operating characteristic curve (AUROC) using FFN model was 0.811 for overall hypotension with specificity of 75.4% and sensitivity of 73.4%. AUROC for severe hypotension was 0.885 with specificity of 81.0% and sensitivity of 79.5%.

Conclusion: We successfully predicted PIH by machine learning model in diabetic patients.
patients. Further study can be performed by external validation of our model in other center to prove feasibility for clinical application.

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**5709**

**A Randomised Trial To Compare Two Different Types Of Anaesthesiaology Methods On Optic Nerve Sheat Diameter And Intracranial Pressure In Elective Laparoscopic Cholecystectomy Surgery**

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**Background and Goal of Study:** We aimed to compare the effects of TIVA and desflurane-maintained general anesthesia on optic nerve sheath diameter (ONSD) and intracranial pressure (ICP) in patients undergoing elective laparoscopic cholecystectomy.

**Materials and Methods:** Following the Ethics Committee approval, written-informed consents were taken from all patients. The data of 80 ASA I-II patients undergoing laparoscopic cholecystectomy were recorded. Patients were randomised into two groups (n=40, each). Anesthesia induction was performed using propofol 2 mg/ kg, fentanyl 1mcg/kg, rocuronium 0.6 mg/kg and lidocain 1 mg/kg iv. After tracheal intubation, mechanical ventilation was initiated in controlled mechanical ventilation (CMV) mode. In Group 1 desflurane (1.0 MAC) and remifentanil (0.05-2 mcg/kg/dk) were used for the maintenance of anesthesia. After induction of CO2 pneumoperitonium was applied, patients were put into reverse-Trendelenburg position in order to provide optimal surgical vision. Electrocardiogram, heart rate, systolic, diastolic and mean blood pressure, SpO2, peak inspiratory pressure (PIP), PEEP, intrabdominal pressure, and BIS values were recorded. Maintenance of anesthesia was adjusted to keep BIS values between 40-65%. Patients' ONSDs were measured using ocular ultrasound before anesthesia induction (T0), following pneumoperitonium (T1), after desufflation (T2) and after the end of anesthesia (T3).

**Results and Discussion:** There was no statistically significant difference in blood pressures, ECO2, PEEP, PIP, SpO2 and ONSD values between groups (p>0.05). In contrast, there was a significant increase in ONSD value from T0 to T1 (p<0.01) in both groups. Furthermore, a statistically significant decrease was observed in ONSD values from T1 to T2 and from T1 to T3 (p<0.01).

**Conclusion:** While there was no significant effect of desflurane and total intravenous anesthesia, intraabdominal insufflation caused a rise in ONSD measurements in both methods. However, in our study this rise did not lead to any significant increase in ICP. This result might be changed in patients with slightly increased ICP during pneumoperitonium. We are in the opinion that studies with larger sample size are required before considering ONSD measurement as a standard procedure in routine monitoring of laparoscopic surgery patients.

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**6059**

**Alveolar recruitment maneuvers during two levels of PEEP**

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**Background:** The authors evaluated the effects of two levels of positive end-expiratory pressure (PEEP) associated with or without alveolar recruitment maneuvers (ARM) on oxygenation and respiratory compliance in patients undergoing surgery for scoliosis and neurosurgery procedures in the prone position (1).

**Materials and methods:** A systematic multicentric and retrospective review of our recorded data were analyzed. Inclusion criteria were: age > 18, ASA-I-II, 54 patients, undergoing surgery for scoliosis and in prone position, were studied in 5 different surgical times: T0 (after intubation), T1 (after placing the patient in the prone position), T2 (after any maneuvers of alveolar recruitment with or without application of PEEP), T3 (after 1 h), T4 (before the extubation). For each time were recorded the static compliance of the total respiratory system (SCtrs), the total resistance (Rtot), with the technique of the interruption of the flow and the hemogasanalysis. Were evaluated the effects of a PEEP of 5 cm H2O and 10 cm H2O, with and without alveolar recruitment maneuvers, obtained by applying sequentially Peak Pressures / PEEP of 45/15, 40/10, 35/5 cm H2O, for 60 seconds versus the baseline (ZEEP). Analysis of the data were processed with Wilcoxon test.

**Results:** The prone position during scoliosis surgery induced a significant deterioration change in SCtrs that regred significantly following the application of PEEP 5 + ARM, PEEP 10 and PEEP 10+ARM (Tab. 1). Rtot had an increasing trend during the prone position that only after applying PEEP10 + ARM showed a significant reduction. The prone position during scoliosis surgery determined also a downward trend of gas exchanges versus baseline which recovered with PEEP 5 ± ARM and PEEP 10 ± ARM without statistical significance (Tab. 1).

**Conclusions:** PEEP 10 ± ARM + PEEP 5 ± ARM (5 cm H2O) showed to improve the SCtrs reduced by the prone position with a recovery trend of gas exchange suggesting a possible strategy for mechanical ventilation during these conditions.
Utility of CPAP in obese patients with Obstructive Sleep Apnea

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Background: The obese patient has a high risk of OSA (Obstructive Sleep Apnea) and would take multiple benefits with the use of preoperative CPAP.

Materials and methods: A retrospective review of our recorded data were analyzed. Were enrolled 24 patients with BMI> 40 kg/m2 started to general anesthesia for abdominal surgery. All patients underwent preoperative respiratory STOP-BANG evaluation. Rx chest, spirometry and EGA were performed. The patients were divided into 2 groups. Group A: It was planned preoperative CPAP therapy if indicated after polysomnographic examination in patients with respiratory pattern disease and the presence of risk factors (sleep apnea, BMI> 35 kg/m2, neck circumference > 40 cm). Group B: In the absence of the criteria previously exposed was not carried preoperative CPAP. It was also evaluated the occurrence of respiratory complications (SpO2 <90% in air, upper airway obstruction, pulmonary edema, bronchospasm, pneumothorax).

Results: According to the above criteria 112 patients were included in Group A and 130 patients in Group B. In Group A 67 patients with pulmonary restrictive pathology, hypoxic chronic respiratory failure, STOP-BANG< 3, underwent a polysomnography (PSG) and perioperative CPAP with diagnosis of OSA; 45 patients with major risk factors to STOP-BANG questionnaire were undergoing a polysomnography (PSG) and perioperative CPAP with diagnosis of OSA; 45 patients were required reintubation and the use of invasive ventilation due to bronchospasm.

Discussion and conclusion: Studies report the benefits of CPAP in the perioperative period: improves SpO2, reduces complications, hospitalization, the need for reintubation, allows to handle the administration of analgesic without complications. In the patient with morbid obesity to be subjected to intervention, it is essential the use of PSG to make diagnosis of OSA and start CPAP therapy or simply clinical judgment and the use of devices APAP (Automatic Positive Airway Pressure, auto-CPAP).

Effects of CO2 pneumoperitoneum during laparoscopic cholecystectomy and appendectomy on the lung dynamic compliance, A prospective study

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Background and Goal of Study: As a minimally-invasive procedure, laparoscopy has clear benefits in the overall patients' treatment. However, the pneumoperitoneum needed to perform the laparoscopy increases the intra-abdominal pressure, which causes some disturbances in the physiology of many systems, mainly the circulatory and respiratory system. The aim of this study was to evaluate the effects of the duration of CO2 pneumoperitoneum during laparoscopic cholecystectomy and appendectomy on the respiratory system.

Materials and Methods: In this study we included 43 patients, both male and female, ASA 1-3, that underwent elective laparoscopic surgery for cholecystectomy (n=33) or appendectomy (n=10). The upper limit of intra-abdominal pressure was set to 12 mmHg. We measured the peak inspiratory pressure (PiP), positive end-expiratory pressure (PEEP), end-tidal CO2 (etCO2), peripheral capillary oxygen saturation (SpO2), tidal volume (VT) and mean arterial pressure (MAP), at the moment of induction, insufflation of CO2, 15-30 minutes after pneumoperitoneum and before extubation. We calculated the dynamic compliance using this formula: Cdyn = VT/PiP-PEEP.

Results and Discussion: There was a decrease in the dynamic compliance that was in correlation with the duration of the pneumoperitoneum. The Pearson correlation coefficient was -0.3149, p<0.05, which meant that there was a statistically significant negative correlation between the pneumoperitoneum duration and the dynamic compliance. There was a positive correlation between the PiP and the duration of the pneumoperitoneum, 0.3813, p<0.05. There was no correlation between the duration and the changes in the MAP. From the time of intubation until 15 – 30 min after CO2 insufflation there was a 17% increase in the etCO2, 28% increase in the PiP and 2.2% decrease in the MAP.

According to the above criteria 112 patients were included in Group A and 130 patients in Group B. In Group A 67 patients with pulmonary restrictive pathology, hypoxic chronic respiratory failure, STOP-BANG< 3, underwent a polysomnography (PSG) and perioperative CPAP with diagnosis of OSA; 45 patients were required reintubation and the use of invasive ventilation due to bronchospasm.

Discussion and conclusion: Studies report the benefits of CPAP in the perioperative period: improves SpO2, reduces complications, hospitalization, the need for reintubation, allows to handle the administration of analgesic without complications. In the patient with morbid obesity to be subjected to intervention, it is essential the use of PSG to make diagnosis of OSA and start CPAP therapy or simply clinical judgment and the use of devices APAP (Automatic Positive Airway Pressure, auto-CPAP).

Expiratory flow-limitation during laparoscopy surgery in Trendelenburg position is associated with increased risk of postoperative pulmonary complications

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Background: Expiratory flow-limitation (EFL) is a pathological condition characterized by a reduction of expiratory flow, associated with small airways instability and pro-inflammatory mechanisms. Patients experiencing EFL after induction of general anesthesia are at increased risk of post-operative pulmonary complications (PPC), while the clinical effects of occurrence of intraoperative EFL are less known. Both laparoscopy and Trendelenburg position can increase the risk of developing EFL through a reduction in FRC. The aim our study is to describe the incidence of EFL during laparoscopic surgery in Trendelenburg position and to analyze its clinical effects.

Methods: Patients undergoing laparoscopic gynecological surgery with expected mechanical ventilation> 2 hours were enrolled. Exclusion criteria were: age < 18, hemodynamic instability, ASA> 3, heart failure, COPD GOLD stage> 2. All patients were ventilated with a tidal volume of 7 ml/kg and a PEEP between 3-5 cmH2O before pneumoperitoneum and 5-7 cmH2O during pneumoperitoneum. The presence of EFL was evaluated with PEEP test, while the V/Q variations with ALPE system. All measurement were taken after anesthesia induction (T1), after pneumoperitoneum with a 30° Trendelenburg (T2) and at the end of surgery in supine position (T3). Spirometry was performed before and after surgery; PPC development was evaluated over 7 post-operative days.

Results: Sixty-six patients were enrolled in the study; 9 (13%) already had EFL at induction while 16 (25%) developed EFL during surgery. Patients with EFL were older (64±10 vs 55±9;p=0.02), had greater BMI (32±9 vs 25±5;p=0.003) and more rate of hypertension (52% vs 19%;p=0.02). The median PEEP value able to reverse EFL was 8±2 cmH2O in the supine position and 13±4 cmH2O in the Trendelenburg position (p=0.001). During surgery, patients with EFL experienced greater V/Q mismatch, had higher driving pressure and lower PaCO2/PO2 ratio (Figure 1.2). In the post-operative period, patients with EFL were more likely to develop hypoxemia (44% vs 17%;p<0.03) and hypercapnia compared to non-EFL patients (80% vs 32%;p<0.001). During the follow-up, patients with EFL showed higher rate of PPC (24% vs 0%;p<0.002).

Conclusion: The development of EFL during laparoscopic surgery was associated with higher incidence of PPC, and worse intra-operative V/Q mismatch. The PEEP value able to reverse intraoperative EFL during laparoscopic surgery in Trendelenburg position is higher than usual.
The effects of Gynaecologic Oncologic Surgery on lung aeration and oxygenation monitored with Lung Ultrasonography

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Background and Goal of Study: Atelectasis formation is considered the major cause of hypoxemia during general anesthesia (GA). Gynaecologic oncologic surgery (GOS) often requires pneumoperitoneum and steep bed angulation that further reduce lung compliance by shifting bowels and diaphragm. The aim of our study was to assess the impact of intraoperative variables on lung aeration using Lung Ultrasound Score (LUS) and their correlation with postoperative oxygenation in women undergoing GOS.

Materials and Methods: 80 patients scheduled for GOS were enrolled. After pre-oxygenation, GA and standard mechanical ventilation (MV) were administered (tidal volume of 8 ml/kg of predicted body weight, FiO2 40%, I:E ratio of 1:2 and PEEP 5 cm H2O). LUS (considering 12 pulmonary areas) and arterial blood gas analysis were performed before GA (T1) and in recovery room (T2).

Results and Discussion: T test for dependent samples for normally distributed data, Wilcoxon and Mann-Whitney tests for non-normally distributed data, and Pearson’s and Spearman’s correlation to correlate changes in LUS (ΔLUS) with the other parameters were used. Linear regression analysis was performed to determine whether Trendelenburg (TR) time was related to ΔLUS. LUS increased significantly between T1 (11.79±2.39) and T2 (11.06±4.40). ΔLUS=8.29±4.10, p<0.05, mostly in basal and posterior areas (fig1A). Changes in LUS correlated significantly with time of MV (r0.245, p<0.05), cumulative time in TR (r0.321, p<0.05) and worsening in oxygenation (ΔPaO2/FiO2, r=-0.260, p<0.05). ΔLUS significantly correlated with colloid infusion. The linear regression analysis showed that TR time can predict ΔLUS (F1.78=8.97, p<0.004). The slope of the regression line was 0.014 (fig1B); for every 71.43-minute increase in TR time ΔLUS increased by 1 point. No correlation was found with pneumoperitoneum, apnoea time at induction and TR angle.

Conclusion: Aeration loss after GOS detected using LUS correlates with TR time, MV time, colloid infusion and worsening in oxygenation.

References:

lutional wall disruption after endotracheal intubation: a case report and literature review

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Background: Tracheal rupture is a rare (1/20000) iatrogenic complication of endotracheal intubation (ETI) more prevalent in women. Clinical manifestations include subcutaneous emphysema, dyspnea, dysphonia, pneumothorax and pneumomediastinum, which usually appear during surgery or in the immediate postoperative period.1,2 We present a case of tracheal rupture after ETI.

Case Report: A 65yo woman with no significant medical history and no risk factor for difficult intubation was planned for frontonal meninjoma resection surgery. After IV induction of anesthesia and rocuronium administration, a single-lumen internal diameter endotracheal tube (ETT) was placed on the 1st attempt using a Macintosh n°3 blade with a Cormack grade 1. The intratracheal pressure wasn’t measured. TIVA was used for maintenance. The patient was extubated after the procedure and transferred to the ICU. 24 hours after extubation, she developed a thoracic and cervical subcutaneous emphysema and nasal voice. CTscan showed a posterior tracheal rupture 36mm long from T1 to T3 with pneumomediastinum. Conservative therapy was applied successfully and the patient was discharged home on postoperative day11.

Discussion: Tracheal rupture after ETI consists most frequently in longitudinal laceration in the posterior pars membranosa. Risk factors may be mechanical causes (multiple forced attempts, intubation with stylet, overinflation of the ETT cuff, double-tumen and oversized ETT, coughing while the patient is intubated) or anatomic factors (tracheal abnormalities, inflammatory lesions).1,2 In this case, tracheal injury was probably induced by overinflation of the ETT cuff. Diagnosis is usually confirmed with bronchoscopy or CTscan. Treatment between conservative or surgical repair is controversial. Conservative management is associated with a better outcome and should be considered in clinically stable patients with small tears and no air leakage on spontaneous breathing.2

References:
1. Warner et al Direct Laryngoscopy and Endotracheal Intubation Complicated by Bronchomalacia in a Hype stimuli patient: a case report and literature review

Learning points: This case serves as a reminder to avoid overinflation of the ETT cuff. A tracheal rupture should be suspected in any patient with subcutaneous emphysema or respiratory distress after extubation.
The Effect of Two Different Ventilation Modes on Lung Aeration in Patients Undergoing Robotic Radical Prostatectomy: An Ultrasonographic Evaluation

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Background and Goal of Study: During laparoscopic procedures under general anesthesia, positioning and pneumoperitonium lead to pulmonary aeration loss. The aim of this study is to compare the effects of pressure and volume controlled ventilation on oxygenation and lung ultrasound (LUS) findings in patients undergoing robot assisted laparoscopic radical prostatectomy (RALRP).

Materials and Methods: In this randomized, prospective, double blind study 74 ASA 1-3 patients, with ages of 18-75, undergoing RALRP surgery were randomly divided into two groups; volume (VCV), (GrupV; N=37) and pressure controlled (PCV), (GrupP; N=37). The operations were performed with 10-12 mmHg intraabdominal pressure and at 30° Trendelenburg position. Lung ultrasonography was performed in 12 quadrants of the thorax at 5 time points; before anesthesia induction (T1), after intubation (T2), at the end of surgery (Trendelenburg position) (T3), at the end of surgery (supine position) (T4), 60 minutes after the surgery (T5). At the same periods hemodynamic, respiratory and mechanical ventilation parameters were recorded. Transverse LUS images were recorded, and evaluated off line by a radiologist, blinded to the time point and patient group.

Results and Discussion: In the statistical analysis of the data, there were significant differences in LUS scores, in both groups when compared T1 to T3 and T4. In the PCV grup there were also significant LUS score increase between T1 to T2 and T5. PaO2/FiO2 values were significantly decreased in Group VCV compared to T1 in all periods except T5 and in Group PCV in all periods (p<0.05). There was no difference between the groups in terms of LUS scores and PaO2/ FiO2 values. Moderate significant correlation was found between LUS score and PaO2/FiO2 values in both groups (r=-0.440 and p<0.0001).

Conclusion: During the operation, oxygenation was impaired in both groups as a result of position and pneumoperitonium, and LUS-detected lung parenchymal changes were correlated with this. It was concluded that ventilation modes were similar in this respect.

Prognostic value of carboxyhemoglobin and methemoglobin in postoperative pulmonary complications

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Background and Goal of Study: COHb and MetHb imped O2 transport and shift the oxygen dissociative curve to the left. Postoperative pulmonary complications (PPC) are still one of the major cause for postoperative morbidity and mortality. Therefor we evaluated the predictive value of COHb and MetHb as prognostic markers for PPC.

Materials and Methods: In this single center observational prospective study 120 consecutive patient from 18 until 60 years of age, ASA II, who denied any known respiratory related medical history, were included. All patient underwent surgical intervention under general endotracheal anesthesia. Levels of COHb and MetHb were analyzed from arterial blood gases with spectrophotometer, at four time points. T0 – preoperative under respiration with room air; T1 - after pre-oxygenation, T2 – intraoperative and T4 in PACU under respiration with room air or oxygen inhalation with or without endotracheal intubation. The outcome were PPC recorded and analyzed for 30 postoperative days (1). We tested the statistical significance with univariate and multivariate logistic analysis.

Results and Discussion: The mean value for COHb was 1.07±0.97SD, and for MetHb 0.34±0.25SD. With univariate binary logistic regression for predicting value of COHb we found ≥1.5% and it was statistically significant. As for MetHb we found value of 0.5% to be statistically significant for PPC. We confirmed all findings with multivariate logistic regression for MetHb p=0.000 and for COHb p=0.024. PPC were noted in 19 patients for the whole period of investigation and the most maintained were pneumonia and persistent cough. Other authors investigated the prognostic values of COHb and MetHb in pulmonary embolism and asthma. They found correlation between COHb/ MetHb and severity of illness in ICU patients.

Conclusion: Our analysis indicated that COHb/ MetHb could serve as markers for PPC. Although our preliminary observations require further validation to clarify the underlying mechanisms of COHb and MetHb as prognostic markers for PPC.

References:

Preliminary study of PEEP setting based on transpulmonary pressure in robot-assisted laparoscopic prostatectomy

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Background and Goal of Study: In the robot-assisted laparoscopic prostatectomy (RALP), formation of atelectasis and reduced functional residual capacity often become anesthetic concerns. PEEP is necessary against steep Trendelenburg position and pneumoperitonium, however, how to set PEEP levels during RALP is not determined. Usefulness of PEEP based on transpulmonary pressure (Ptp: airway pressure + esophageal pressure) has been reported in the ventilatory management of ARDS. The relationship between PEEP and Ptp during RALP is unclear, therefore, we have examined the usefulness and safety of the PEEP setting based on Ptp.

Materials and Methods: We conducted a prospective intervention study on patients in our hospital who were scheduled for RALP from April to September in 2019. Following placing a patient in a steep Trendelenburg lithotomy position with pneumoperitonium, PEEP was stepwisely increased from 0 to 15 cmH2O (in step of 5 cmH2O) at an interval of 30 minutes. Then PEEP levels where end-expiratory Ptp exceed 0 (PpEEP0) were determined. Measurements were performed after 30 minutes at each end of PEEP step. Airway pressure, esophageal pressure, cardiac index, blood gases and cerebral oxygen saturation (rsO2) were measured and Ptp, PaO2/FiO2 (P/F) ratio and thoracic lung compliance (Cst) were calculated. Statistical analysis was performed using the one-way analysis of variance and Dunnett test was performed. A p value <0.05 was considered significant.

Results and Discussion: Fourteen patients were eligible. The esophageal pressure at PEEP0 was 115±7cmH2O. The values of P/F ratio at PEEP0 or more were higher than those of PEEP0. The PEEP levels which showed PEEP0 was 14.6±2.7cmH2O. Cst was significantly higher at PEEP10 or more compared to PEEP0. Cardiac index showed no significant change. Considering oxygenation and compliance, it is desirable to add PEEP of 10 cmH2O or more during RALP:Cst and P/F ratio at such levels was superior without disturbing circulation or cerebral oxygenation.

Conclusion: PEEP setting based on Ptp may be safe and rational. It seems to be worth conducting randomized controlled trial to investigating the usefulness PEEP based on Ptp during RALP.

Effects of lung-protective ventilation combined with Deep Neuromuscular Blockade on postoperative pulmonary complications during low pneumoperitoneum pressure laparoscopic colorectal surgery: a randomized controlled trial

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Background and Goal of Study: Pulmonary complication is one of the most common postoperative complications. This study aimed to estimating the effects of lung-protective ventilation combined with deep neuromuscular blockade on postoperative pulmonary complications during low pneumoperitoneum pressure laparoscopic colorectal surgery (LCRS).

Materials and Methods: 120 patients undergoing LCRS were enrolled and randomized to receive eitherconventional pulmonary ventilation + moderate neuromuscular blockade + conventional pneumoperitoneum pressure (C group) or protective pulmonary ventilation + deep neuromuscular blockade + low pneumoperitoneum pressure (PDL group). The modified Clinical Pulmonary Infection Score (mCPIS) and the visual analogue scale (VAS) Pain Score after surgery were measured. The time of anus exhaust defection after operation, the
length of hospital stays, anesthesia-related complications and so on were also evaluated.

Results and Discussion: The postoperative mCPIS and the serumconcentrations of neutrophil elastase in patients with PDL strategy were significantly lower than that of CMC, especially when performing rectum/sigmoid colon surgery procedures, or patients were older than 70-years. For the patients undergoing transverse/ descending/ascending colon surgical procedures or BMI < 24, PDL strategy provided a better surgical condition. The time of anus exhaust defecation after surgery was also significantly earlier in PDL strategy. Furthermore, PDL strategy reduced postoperative pain and the use of opioids. Conclusion: PDL strategy can effectively provide an optimal surgical condition and enhance postoperative recovery in certain patient subsets.

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Medium- flow oxygenation in a limited-resource setting

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Background and Goal of Study: Preoxygenation and apneic oxygenation have shown to be an essential component of the airway management. Although 15L O2 is available from the mechanical ventilators, regular preoxygenation is performed with 6L facial mask. We hypothesize that medium- flow nasal airway (HFNA) oxygenation with 15L O2, may increase oxygen reserve and extend safe apnea time in resources limited countries.

Materials and Methods: We conducted a prospective randomized evaluation in 22, ASA III healthy patients, undergoing elective surgery. Patients were allocated in two groups. Group I (n=11) was preoxygenated with 6L O2 facial mask and Group II (n=11) was preoxygenated with 15L O2 facial mask. Following general anesthesia induction, nasal airway was inserted and continuous positive airway pressure of 5cmHg was set in all patients. During the apnea period, Group I received 6L of O2 and Group II 15L of O2 via HFNA. All patients were intubated at 91-96% desaturation, or after ten minutes of apnea duration if no desaturation occurred. We measured SpO2 three times: before preoxygenation, after preoxygenation and after intubation. We took arterial blood gas analysis two times: T1- after preoxygenation and T2- after intubation. EtCO2 was noted immediately after intubation. Statistical analysis was made with two-sided t-test at a significance level of α<0.05.

Results and Discussion: Patients do not differ in age, sex, ASA score, BMI, or apnea duration. Patients on 15L O2 flow have an average of 12.04Pa higher PaO2 levels at the end of apnea, than patients on 6L flow. Higher level of O2 in the blood do not affects the SpO2 at the end of apnea, but affects the fall in SpO2 after intubation- in patients on 15L flow is 2% lower. In addition patients on 15L flow have 6.27 mmHg lower EtCO2 levels after intubation, than patients on 6L flow.

Conclusion: The effects of the change in PaO2 and EtCO2 are high between the groups, which would likely give more time for airway manipulation, although patients with 6L flow also have normal range levels.

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Nostril Chosen As Using Trachway Assisted for Nasotracheal Intubation: the Left Better Than The Right

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Background and Goal of Study: To minimize nasal bleeding and mucosa injury during nasotracheal tube passing through the selected nares, the bevel of tube always face on the turbinates to avoid intubating related trauma, and the right-side naris should be selected (1). But, using Trachway assisted nasotracheal intubation has been demonstrated a feasible technique (2). The aim of the study is to investigate whether either nostril is suitable for Trachway assisted nasotracheal intubation.

Materials and Methods: One hundred patients undergoing oro-facial surgery with nasal cavity. There is no statistical difference between groups on intubation related nasal bleeding and mucosa injury. There is no statistical difference between groups on intubation related nasal bleeding and other side effects.

Conclusion: Due to shortening of intubation time spent without increased nasal bleeding and side effects, the left nostril is more suitable for Trachway-tube assembly passing than the right nostril during the procedures of nasotracheal intubation as patients undergoing oro-facial surgery.

References:

5723
Evaluation of the Frequency of Atelectasis by Lung Ultrasound in Patients Undergoing Laparoscopic Bariatric Surgery Under General Anesthesia

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Background and Goal of Study: Nowadays, laparoscopic bariatric surgical methods are used frequently in the treatment of obesity which is the second most common cause of preventable death after smoking. Respiratory physiopathological changes in obese patients predispose to atelectasis. Lung ultrasound (US) is one of the current methods used in the diagnosis of atelectasis, but there is no study in the literature about its use in obese patients yet. In our study, we aimed to demonstrate the frequency of atelectasis in patients undergoing laparoscopic bariatric surgery under general anesthesia by transthoracic lung ultrasound.

Materials and Methods: After ethics committee approval 143 patients between the ages of 18-65, BMI>30, ASA II-III who underwent laparoscopic bariatric surgery between October 2017 and November 2019 at Marmara University Pendik Training and Research Hospital were included in our prospective observational study. According to lung US protocol, both hemithorax (front, side and back areas which are divided into upper and lower zones) were scanned for a total of 12 areas preoperatively and in the postoperative first hour. In the perioperative period, vital parameters, blood gas analysis, and mechanical ventilation parameters were recorded. The images were evaluated blindly by two anesthesiologists experienced in the use of lung USG according to the modified lung ultrasound scoring system (LUS).

Results and Discussion: When the preoperative and postoperative USG scores were compared, we observed an increase in the LUS score in all areas except for both anterior upper areas (p<.001). This increase was more pronounced especially in the posterior and inferior parts of the lungs (Figure 1). We found the frequency of atelectasis to be 81.1% in patients undergoing laparoscopic bariatric surgery. The pCO2 values were increased (p<.001) while the pO2 values were decreased (p<.001) during the pneumoperitoneum and postoperative period as compared to the post-intubation period. During pneumoperitoneum, SpO2 values were increased while compliance values were decreased.

Conclusion: Lung ultrasound can be used in the diagnosis of atelectasis in obese patients. Atelectasis is seen at a high rate in patients undergoing laparoscopic bariatric surgery.
Anaesthetic management of a patient with hypertrophic cardiomyopathy for major pancreatic surgery

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Background: Hypertrophic cardiomyopathy (HCM) is an autosomal dominant disease with asymmetric left ventricular hypertrophy (LVH) and left ventricular outflow tract (LVOT) obstruction. Clinical presentation ranges from asymptomatic to sudden cardiac death. 1-3

Case Report: A 58-year-old male, ASA II, was scheduled for duodenopancreatectomy. He had HCM, paroxysmal atrial fibrillation, hypertension, diabetes mellitus, hyperuricemia and presented an ECG with sinus rhythm and LVH. The echocardiogram was compatible with HCM. He stopped naxipaban according to guidelines and maintained amiodarone and verapamil. After premedication (midazolam), monitoring was initiated with ASA standard, BIS, invasive arterial and central venous pressures. Non-invasive cardiac output monitoring was used (Starling SV). Defibrillating pads and pneumatic compression stockings were placed. A phenylephrine perfusion was initiated. General anesthesia was induced with remifentanil, lidocaine, propofol and rocuronium and maintained with sevoflurane. After reversal of neuromuscular block with sugammadex, the patient was extubated and transferred to the ICU, with no major complications reported.

Discussion: Duodenopancreatectomy has significant morbimortality, especially in patients with comorbidities. In HCM, LVOT obstruction and secondary mitral regurgitation worsen with hypovolemia, vasoconstriction and tachycardia, with risk of hemodynamic collapse and tachyarrhythmias. Preload must be maintained/increased (maintenance of sinus rhythm is crucial) while avoiding hypovolemia and afterload reduction. 1-3 In this setting, hemodynamic monitoring is of vital importance in estimating the response to inotropes, vasopressors and fluid load, thus guiding goal-directed fluid administration.2,3

References:

Learning points: Anaesthetic management in patients with HCM requires understanding hemodynamic changes and prevention of LVOT obstruction. It can be achieved by preoperative examination, optimization with intraoperative hemodynamic monitoring and target-directed therapy, especially in major surgery.

Acute intermittent porphyria (AIP) and general anesthesia. Case report

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Background: Porphyria is a group of diseases related to the heme metabolism. Clinical findings during porphyrias’ crisis (abdominal pain, vomiting, arrhythmias, etc.) are frequently masked by the general anesthesia (1); these could be prevented by a correct perioperative management.

Case report: 39 years old female, active smoker with gastrointestinal intolerance to acetylsalicylic acid and scopolamine. Previous diagnosis of AIP since childhood and several renal colics with nephrolithiasis. In a CT scan, a parathyroid adenoma was shown associated to high levels of parathyroid hormone and hypercalcemia. She is proposed for adenoma resection; 24h before surgery, an IV infusion of 10% glucose (1500 ml) was given. Anesthetic induction with midazolam (1.5 mg), atropine 1 mg, fentanyl 0.2 mg, propofol 120 mg and cisatracurium 12 mg. Intubation was performed with a 7.0 mm orotracheal tube. Maintenance of the anesthesia: sevoflurane and boluses of fentanyl and cisatracurium IV. The surgery lasted 2 h. Pantoprazol 40 mg, metoclopramide 10 mg, paracetamol 1 g and tramadol 100 mg were infused before the end. Neuromuscular blockade reversed with neostigmine (2 mg) and atropine (1 mg), with successfull extubation. 500 ml of glucose 5% and 500 ml of cristaloids were infused during the surgery. In the post-anesthesia care unit (PACU), morphine (2 mg IV) was administered to control pain. No incidences reported.

Discussion: An examination in the preoperative evaluation to denote clinical events of crisis is recommended; also to prevent “stressful events” as pain, infection, dehydration… (1,2). IV fluidotherapy with dextrose or glucose 10% provide the lack of the calories of fasting. Crisis of porphyria have been described with some drugs (barbiturates, sulfonamides, prazolones…), but propofol, fentanyl, tramadol, sevoflurane, paracetamol, neostigmine, atropine, midazolam and cisatracurium are safe. Metoclopramide is unsafe, but we haven’t observed incidences, neither with pantoprazol.

References:

Learning points: Midazolam, propofol, fentanyl, cisatracurium, sevoflurane, neostigmine, atropine, morphine, tramadol, paracetamol and pantoprazol are safe in porphyria diagnosed patients.

Acute intermittent porphyria (AIP) and general anesthesia. Case report

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Background: Porphyria is a group of diseases related to the heme metabolism. Clinical findings during porphyrias’ crisis (abdominal pain, vomiting, arrhythmias, etc.) are frequently masked by the general anesthesia (1); these could be prevented by a correct perioperative management.

Case report: 39 years old female, active smoker with gastrointestinal intolerance to acetylsalicylic acid and scopolamine. Previous diagnosis of AIP since childhood and several renal colics with nephrolithiasis. In a CT scan, a parathyroid adenoma was shown associated to high levels of parathyroid hormone and hypercalcemia. She is proposed for adenoma resection; 24h before surgery, an IV infusion of 10% glucose (1500 ml) was given. Anesthetic induction with midazolam (1.5 mg), atropine 1 mg, fentanyl 0.2 mg, propofol 120 mg and cisatracurium 12 mg. Intubation was performed with a 7.0 mm orotracheal tube. Maintenance of the anesthesia: sevoflurane and boluses of fentanyl and cisatracurium IV. The surgery lasted 2 h. Pantoprazol 40 mg, metoclopramide 10 mg, paracetamol 1 g and tramadol 100 mg were infused before the end. Neuromuscular blockade reversed with neostigmine (2 mg) and atropine (1 mg), with successfull extubation. 500 ml of glucose 5% and 500 ml of cristaloids were infused during the surgery. In the post-anesthesia care unit (PACU), morphine (2 mg IV) was administered to control pain. No incidences reported.

Discussion: An examination in the preoperative evaluation to denote clinical events of crisis is recommended; also to prevent “stressful events” as pain, infection, dehydration… (1,2). IV fluidotherapy with dextrose or glucose 10% provide the lack of the calories of fasting. Crisis of porphyria have been described with some drugs (barbiturates, sulfonamides, prazolones…), but propofol, fentanyl, tramadol, sevoflurane, paracetamol, neostigmine, atropine, midazolam and cisatracurium are safe. Metoclopramide is unsafe, but we haven’t observed incidences, neither with pantoprazol.

References:

Learning points: Midazolam, propofol, fentanyl, cisatracurium, sevoflurane, neostigmine, atropine, morphine, tramadol, paracetamol and pantoprazol are safe in porphyria diagnosed patients.
Anaesthetic management of a GSD type III patient with hip fracture

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Background: Glycogen storage disease type III (GSD III) is a hereditary disease caused by deficiency of the glycogen debranching enzyme and characterized by severe muscle weakness and liver disease. Clinically, patients may present hypoglycaemia from the first year of life. They may also show hepatomegaly, stunted growth and occasional seizures associated with hypoglycaemia. Symptoms may improve with puberty, except in some cases which evolve to myopathy or cirrhosis with liver failure or hepatocellular carcinoma. About 80% of patients have severe fasting hypoglycaemia.

Case Report: 59-year-old woman who started developing muscle weakness at the age of 50, so that she was diagnosed with GSD III. History of surgery for Scheuermann’s disease with general anaesthesia, without incidents. She was admitted to our facility for perrothoracanteric fracture repair. Blood test was irrelevant but presented low platelet count (99,000/ml) secondary to liver disease (ALT 56 U/L, U/L bilirubin 1.25 mg/dl). According to protocol for hypoglycaemia control, once she was nil per os, intravenous 10% dextrose infusion at 110 mL/h started the night before. Firstly, we got a blood glucose measurement (160 mg/dl), followed by 2 mg of midazolam and 25 mcg of IV fentanyl was given. We performed a subarachnoid block with 7 mg 0.5% levobupivacaine and 10 mcg fentanyl. We kept normothermic conditions, hemodynamic constants (MAP 70 mmHg, PR 80 bpm) and strict control of glycaemia. In PACU, according to the protocol, the infusion of dextrose was maintained for up to 4 hours after oral tolerance.

Discussion: Perioperative management of GSD patients is an unknown challenge for anaesthesiologists. We decided to avoid general anaesthesia because of the unpredictable drugs clearance. Spinal puncture provided anaesthesia with hemodynamic stability and optimal postoperative pain control. The dextrose infusion was decisive for hypoglycaemia prevention.

References:

Learning points: Once npo begins, dextrose infusion should not be stopped until 4 hours after the onset of corn-stach tolerance. Stress situations (hemodynamic instability, pain or cold), which can cause blood glucose changes, should be avoided. Avoid if possible hepatic metabolism drugs and succinylcholine in patients with myopathy. If general anaesthesia is given, we recommend TOF monitoring.

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Lamellar Ichthyosis: The importance of anesthetic approach

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Background: Lamellar ichthyosis is a rare, autosomal recessive genodermatosis (incidence 1:300,000) caused by a mutation of the transglutaminase-1 (TGM1) gene, located on chromosome 14 with variable expression. It is part of a group of 5 hereditary types of ichthyosis, characterized by erythrodema, xerodema and excessive skin peeling. Hyperproliferation and hyperkeraatinization of the corneal layer may be present. Typical manifestations of this disease conditions the premedication and adaptation of anesthetic procedures.

Case Report: 10-year-old male patient (42kg) with lamellar ichthyosis as the only relevant personal antecedent, proposed for drainage and excision of the upper eyelid chalazion of the left eye. To mention, extreme peeling from birth without paternal inbreeding or known family history. On observation, peeling was evident on almost total body surface, with particular incidence on the face, limbs and scalp, as well as bilateral ocular ectropion. The mouth opening was limited to about 1.5cm due to the scaling and angular cheilitis with a Mallampatti III. Also the cervical extension was limited by discomfort to the cutaneous stretch. A G22 venous access was established with special care in its fixation using narrow bandages rather than adhesives. Because it’s a short-term procedure and the patient had adequate fasting, induction with intravenous alfentanil, lidocaine and propofol was chosen after premedication with midazolam per os. After abundant hydration of the facial skin with petroleum jelly and occlusion of the right eyelid, manual ventilation with face mask was performed. The possibility of tracheal intubation or the use of a supraglottic device was discussed, but the choice of a wide ribbon for its fixation after venous access loss occurred during the procedure, the postoperative period was uneventful.

Discussion: Timely assessment and planning of the various anaesthetic considerations in the case of a lamellar ichthyosis patient influence the success of the entire procedure. It includes adequate hydration and protection of the scaling areas, eye protection, venous access establishment and fixation, monitoring techniques, maintenance of normothermia, airway approach and nutrition, beyond others.

References:
Balancing the safest approach for a patient with Steinert Myotonic Dystrophy undergoing general anaesthesia: a case report

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Background: Steinert myotonic dystrophy (DM1) is a multisystem myotonic syndrome marked particularly by myotonia, muscular dystrophy and cardiac conduction abnormalities. By affecting variable muscle groups, DM1 predisposes patients to perioperative respiratory complications, as a result of pharyngeal muscle and diaphragm weakness and decreased central respiratory drive, as well as delayed gastric emptying, a risk factor for aspiration. We report the first case of an adult DM1 patient undergoing total intravenous anaesthesia (TIVA) with endotracheal intubation without use of neuromuscular blocking drugs (NMBDs), and complete immediate postoperative respiratory recovery.

Case Report: 47-year-old male, ASA II, with DM1 presented with palpebral ptosis for elective blepharoplasty. Preanesthetic evaluation revealed dysphagia, dysphonia and sleep apnoea requiring CPAP. Ranitidine and metoclopramide were administered preoperatively and TIVA was the chosen anaesthetic technique. Propofol and remifentanil infusions were used for induction and maintenance of general anaesthesia, avoiding long acting opioids, NMBDs and reversal agents. Endotracheal intubation was uneventful. Deepness of anaesthesia was guided by bispectral index monitoring. Hemodynamic and ventilatory stability was observed throughout. Anaesthetic emergence and extubation underwent without incidents. Postoperative pain management was achieved with an opioid free strategy. Full recovery of ventilatory function was observed and there was no record of respiratory complications.

Discussion: DM1 patients may show enhanced sensitivity to the respiratory depressant effects of anaesthetic medications. Anaesthetic and analgesic medications should be carefully titrated to effect. This case was successful in attaining anaesthetic conditions without the need for NMBDs and showed full respiratory recovery, rendering our strategy a safe alternative for DM1 patients undergoing general anaesthesia.

References:

Learning points: DM1 predisposes patients to respiratory complications. Safe general anaesthesia can be achieved with TIVA without unnecessary use of NMBDs.

Jackknife position and epidural anaesthesia in a patient with a pre-existing lumbosacral radiculopathy: a case of double-crush phenomenon

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Background: Double-crush phenomenon is a susceptibility to nerve injury in patients with pre-existing neural compromise when a second insult is practiced. In jack-knife position (JP), under general anaesthesia, endotracheal intubation without use of neuromuscular blocking drugs (NMBDs), and complete immediate postoperative respiratory recovery.

Case Report: A 58-year-old female, ASAII, with LS-S1 lumbosacral radiculopathy and dyslipidemia, was submitted to a perirectal cystic hamartoma excision (posterior approach), in jack-knife position (JP), under general anaesthesia. Intraoperatively, it was necessary a wider tissue removal than expected, which implied 3h in JP. Also, we placed an epidural catheter for postoperative analgesia. 24h after the procedure, the patient reported persistent bilateral hypesthesia of the anterolateral thigh, although without pain at the surgery site. One month after discharge, the patient maintained the same symptoms, so pregabalin was prescribed and neurophysiologic study was made. Five months later, she had no hypesthesia and study results described the pre-existing lumbosacral radiculopathy (LR). However, she reported a significant worsening of her LR symptoms since the procedure, so neurology collaboration and MRI lumbosacral image for further study were included.

Discussion: In this case, pre-existing LR increased the susceptibility to new neurological deficits and worsening of previous neurological complaints. JP induced external compression of the lateral femoral cutaneous nerve, resulting in hyposensitivity of the anterolateral thigh (meralgia paresthetica) potentiated by her established radiculopathy. Besides, she reported significant worsening of her LR symptoms after the procedure. In fact, pre-existing compressive lumbar disk disease has been proposed as a potential risk factor for neurologic complications following an epidural technique. Several mechanisms of injury have been proposed, including an ischemic or compressive effect after the injection of large volumes of local anaesthetic into a relatively confined space.

References:

Learning points: The thyrotoxic crisis is a very serious adverse event that can occur during surgery in those patients who have not achieved an euthyroid state prior to surgery.
6042

Anesthetic technique in a patient with leiomyosarcoma of the inferior vena cava. A case report

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Background: A leiomyosarcoma of the inferior vena cava is a rare tumor with a poor prognosis. Since the first description in 1871, only 400 cases have been reported in the literature. Due to their low prevalence, no real consensus has been reached on the proper treatment of these tumors. The prognosis is bad and directly depends on the extent of the surgical resection.

Case Report: This report presents the case of a 48-year-old woman, diagnosed with inferior vena cava leiomyosarcoma, who is operated on a scheduled basis for resection. Rapid sequence induction is performed with Diazepam, Fentanyl, Propofol and Rocuronium, without incidents. The central venous line is cannulated in the left internal jugular vein and the 7F volume vein access. In addition, invasive monitoring is placed with SwanGanz catheter. The anesthetic management is performed with Sevofluran, Remifentanil and Rocuronium. Tumor resection is performed with a donor graft of infrarenal cava and an autologous graft with a falciform ligament in the left renal vein. Duodenal resection is also performed with mechanical lateral-lateral duodenal-jejunal anastomosis. The patient presents hemodynamic lability throughout the surgery, with a tendency to hypotension and tachycardia, requiring administration of beta blockers and nitroglycerin during the intraoperative period to get hemodynamic stability. Abundant bleeding of difficult quantification (approximately three liters are estimated), requiring politransfusion. Guided transfusion is monitored at all times with ROTEM. Good tolerance to clamps and resection of the inferior vena cava.

Discussion: Lower vena cava leiomyosarcoma has a low incidence, hence the importance of reporting all those cases that occur on a daily basis, due to the limited literature on this tumor and its management. From the anesthetic point of view, it can be a challenge due to all the pathophysiology that is associated with this type of lesion, both during induction, as well as intraoperatively and postoperative management.

References:

Learning points: Lower vena cava leiomyosarcoma is a very rare tumor with poor prognosis. The anesthetic management for resection of this tumor can be very complex, due to all the pathophysiological changes that both the tumor and its resection imply.

6125

Cholinesterase deficiency: a forgotten complication

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Background: Succinylcholine associated prolonged paralysis appears in 1 of 2800 cases. Among 5 to 19% surgical patients show decreased cholinesterase activity preoperatively.

Case Report: Gastroscopy to remove a foreign object was scheduled on a 30 years-old male without known diseases. Induction with propofol, fentanyl and suxamethonium. Non inciden endotracheal intubation. The procedure was finished after 30 minutes but no spontaneous breathing was achieved. Biespectral index showed values around 80 and there was no improvement to opioid reversal with naloxone. There was no availability of devices monitoring muscular relaxation to confirm our suspicion on delayed succinylcholine metabolism. The patient was transferred under remifentanil sedation and mechanical ventilation to Intensive Care Unit. Two hours later showed complete spontaneous neuromuscular reversal and was extubated successfully. Blood samples were analyzed, observing low levels of plasmatic cholinesterase (2852U/L, reference levels 5990-12220). That deficiency may be related to genetic causes as well as diseases or drugs. Nevertheless, literature tell us that apneas longer than 60 minutes after suxamyloline treatment are probably related to atypical genetic traits. Dibucaine testing is currently undergoing in order to acurate diagnosis.

Discussion: The rise of rocuronium as the election drug for rapid sequence induction due to the appearance of sugammadex, has led to a drastic decrease on the use of succinylcholine. Adverse effects and contraindication are spare but well-known. Prolonged paralysis by succinylcholine is a potentially serious entity that every anesthesiologist should identify and treat, as well as conducting proper differential diagnosis.

References:

Learning points: Previously considered physiological and pathological causes, along with drugs associated to cholinesterase deficiency. Keep heavy suspicion on dubious curarization after succinylcholine. Neuromuscular monitoring is key to minimize complications and avoid anesthesia awareness. Need of diagnostic test to advise the patient on his condition, its implications and the probability of having affected relatives.

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6097

About a rare disease: congenital erythropoietic porphyria

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Background: Congenital Erythropoietic Porphyria (CEP) is a rare autosomal recessive disorder, with 200 cases reported, caused by altered activity of uroporphyrinogen III synthase within the heme biosynthetic pathway. The reduced activity of the enzyme leads to accumulation of porphyrins in red blood cells, plasma, teeth and bones causing haemolytic anemia and severe cutaneous photosensitivity which represents anesthetic concerns in the management of these patients.

Case Report: A 67-year-old man, Jehovah’s Witness, with CEP diagnosed at the clinic of Porto. Since the first description in 1871, only 400 cases have been reported in the literature. Due to their low prevalence, no real consensus has been reached on the proper treatment of these tumors. The prognosis is bad and directly depends on the extent of the surgical resection.

Case Report: This report presents the case of a 48-year-old woman, diagnosed with inferior vena cava leiomyosarcoma, who is operated on a scheduled basis for resection. Rapid sequence induction is performed with Diazepam, Fentanyl, Propofol and Rocuronium, without incidents. The central venous line is cannulated in the left internal jugular vein and the 7F volume vein access. In addition, invasive monitoring is placed with SwanGanz catheter. The anesthetic management is performed with Sevofluran, Remifentanil and Rocuronium. Tumor resection is also performed with mechanical lateral-lateral duodenal-jejunal anastomosis. The patient presents hemodynamic lability throughout the surgery, with a tendency to hypotension and tachycardia, requiring administration of beta blockers and nitroglycerin during the intraoperative period to get hemodynamic stability. Abundant bleeding of difficult quantification (approximately three liters are estimated), requiring politransfusion. Guided transfusion is monitored at all times with ROTEM. Good tolerance to clamps and resection of the inferior vena cava.

Discussion: Lower vena cava leiomyosarcoma has a low incidence, hence the importance of reporting all those cases that occur on a daily basis, due to the limited literature on this tumor and its management. From the anesthetic point of view, it can be a challenge due to all the pathophysiology that is associated with this type of lesion, both during induction, as well as intraoperatively and postoperative management.

References:

Learning points: The key to successful management of patients with this disease lies on preventing aggravation of phototoxic injury and triggering porphyrin crises. The administration of spinal morphine seems to be safe in this group of patients but further documentation is needed.

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References:
Anesthetic approach of a patient with Amyotrophic Lateral Sclerosis

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Background: Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease that affects the upper motor neuron, causing muscle atrophy of the respiratory and bulbar muscles. Although data concerning the anesthetic approach is scarce, these patients appear to be more susceptible to anesthetic complications than the general population.

Case Report: A 61 years old man diagnosed with ALS in 2015, with bulbar and respiratory dysfunction, currently under riluzole treatment, was submitted to a radical prostatectomy due to a prostate adenocarcinoma, under intravenous general anesthesia with remifentanil and propofol delivered by target-controlled infusion (TCI), myorelaxation with 30 mg of rocuronium with train of four monitoring. We followed a multimodal analgesia strategy with conventional analgesia using paracetamol, parecoxib and tramadol and regional analgesia performing a bilateral transversus abdominis plane (TAP) block with 20 ml of ropivacaine 0.2%. The intraoperative period was uneventful. Neuromuscular block reversal was done with sugammadex. Right after the surgery, the patient was successfully extubated and transferred to postoperative anesthesia care unit. No complications occurred in the postoperative period.

Discussion: Postoperative respiratory failure seems to be the main problem, particularly in patients who already have bulbar involvement. In a study of 18 patients who underwent general anesthesia, 4 remained intubated and had to be transferred to the Intensive Care Unit. Many authors favor the use of intravenous anesthetics with remifentanil and propofol over balanced anesthesia because of the higher rates of respiratory depression. Regional techniques should be privileged because they are opioid sparing, lowering the respiratory depression. However, neuromuscular blockades are not recommended because they may precipitate the disease. This underlying mechanism is unknown. Some authors believe that the demyelination of the spinal cord makes it more susceptible to toxicity by local anesthetics (2).


Learning points: Use reversible, short acting agents. Sugammadex is effective in reversing the neuromuscular blockade.

Spastic paraparesis and electroconvulsive therapy - a case report

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Background: Hereditary Spastic Paraparesis (HSP) is a heterogeneous group of genetic neurodegenerative diseases that affects the corticospinal tract and is characterized by progressive spasticity of the lower limbs. Electroconvulsive therapy (ECT) is performed under general anesthesia (GA) and muscle relaxation. There is no scientific evidence of the superiority of an induction agent over the others and succinylcholine (SCh) is the preferred neuromuscular blocking agent (NMBA). On HSP monitoring the depth of anesthesia is recommended and SCh is contraindicated due to the upregulation of nicotinic receptors and the risk of hyperkalemia.

Case Report: 19 years old male, ASA II, 60kg, with inaugural psychotic depression. Severe aortic stenosis (SAS) is associated with morbidity and mortality after non-cardiac surgery (NCS). Perioperative complications in NCS patients with AS include the following: Myocardial infarction (MI), heart failure, arrhythmias, stroke, hypotension, death. We present anesthetic management of SAS patient coming for urgent NCS.

Case Report: A 66 y/o female with a history of PCI in LAD 6 years ago, HBP and SAS, presented for acute cholecystitis and underwent urgent laparoscopic cholecystectomy (LC). Considering the urgency and her medical condition, the decision is made to proceed with the LC procedure and defer surgery of aortic valve replacement (SAVR). TTE showed the patients SAS, calcified aortic valve with peak and mean gradient of 103mmHg and 51mmHg, moderate AR and mild TR. Severe concentric hypertrophy of LV with normal EF. Mallampati score III, BMI=39.4 We chose GA and we took care to avoid arrhythmias and hypertension with fluids and the administration of vasoconstrictor. Standard ASA monitoring, and TEE was performed during the procedure to provide continuous monitoring. Preinduction arterial line was cannulated for BP monitoring. Central venous catheter(RJ) was inserted to provide administration of fluids and drugs. Anesthesia was induced with fentanyl «lidocain + propofol + rocuronium. Maintenance of anesthesia with TIVA. The intubation was performed successfully under video laringoscope. MAP was maintained above 65mmHg. The peroperative course was uneventful. The patient was extubated in OR and transferred in PACU in a good hemodynamic condition. The patient was transferred to the step-down unit for follow up. The patient discharged in the POD2. The postoperative course was uneventful. The patient admitted at the hospital one month later to proceed with elective SAVR. The peroperative and postoperative course was uneventful. The patient was discharged in POD9 in a good hemodynamic condition.

Discussion: Patients with AS are at risk for increased complications after NCS. Proper triaging of AS patients for NCS depends on identifying the urgency and risk of surgery and degree of stenosis. With close intraoperative monitoring and careful anesthetic planning, urgent NCS can be performed safely and with an acceptable risk profile. Close collaboration between the anesthesiology and surgical team is essential.

Myasthenia gravis - Rare but be aware!

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Background: Myasthenia gravis is an autoimmune disorder, mediated by antibodies directed to acetylcholine receptors in the neuromuscular junction, resulting in weakness of the skeletal muscle. Due to the characteristics of the disease, its specific therapy and probable involvement of the bulbar and respiratory muscles, there are critical features in the anaesthetic management of these patients.

Case Report: 32 years old patient with past medical history of myasthenia gravis, under corticosteroid therapy and pyridostigmine 60mg prn, recently aggravated with bulbar symptoms (diplopia, dysphagia and phonation disorders). She entered emergency department with complaints of abdominal pain, being later diagnosed with ectopic pregnancy and referred for urgent laparotomy and unilateral salpingectomy. Intraoperatively, a combined epidural-spinal block at L3-L4 level was performed, opioid free, only with bupivacaine (10mg), uneventfully. Surgery proceeded without any complications, neither pain nor dyspnea. Postoperative analgesia was achieved with epidural inflation of ropivacaine 0.1%, plus intermittent paracetamol intravenously. The patient remained 5 hours under vigilance in the post-anaesthetic care unit and 4 days in the gynecological ward. Before discharge a re-evaluation was performed by the neurologist.

Discussion: Myasthenia gravis has an important impact on the anaesthetic approach during ECT. No complications during ECT in patients with HSP using propofol/etomidate, rocuronium and sugammadex. BIS allowed the use of a lower dose of the induction agent and a target of 60 was enough to prevent awareness. Rocuronium 0.3mg/kg and TOF of 2 were enough to avoid mechanical complications.

Learning points: No complications during ECT in patients with HSP using propofol/etomidate, rocuronium and sugammadex. BIS allowed the use of a lower dose of the induction agent and a target of 60 was enough to prevent awareness. Rocuronium 0.3mg/kg and TOF of 2 were enough to avoid mechanical complications.

References:

6371

Management of bilateral vocal cord palsy after total thyroidectomy – Case report

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Background: Recurrent laryngeal nerve damage (RLND) after thyroid surgery is a rare complication, ranging from hoarseness to life-threatening respiratory distress. Although the incidence of bilateral RLND (BRLND) following total thyroidectomy (TT) is as low as 0.5%, it is still the most common cause of bilateral vocal cord palsy (BVCP).

Case Report: A 59-year-old male with Graves disease was proposed for a TT. Prior to surgery the patient was euthyroid, had no obstructive symptoms or difficult airway. On laryngoscopy the vocal cords had normal movement. The CT scan showed a large goiter with reduction of the tracheal lumen. General anesthesia with intubation via direct laryngoscopy was performed in a single attempt. TT was completed with an uneventful intra-operative period. At the end of the procedure, neuromuscular block was reversed. Immediately after smooth extubation, the patient developed stridor and respiratory distress. Positive pressure ventilation was applied. As the symptoms did not improve, a fiber optic laryngoscopy was performed, revealing BVCP in the paramedian position. The patient was immediately reintubated. Later that day a tracheostomy was performed under GA.

Discussion: RLND is a rare and troublesome complication of TT that must be promptly treated. The injury can occur by ischemia, contusion or actual transection. This patient had two risks factors: a large goiter and TT. The ENT examinations are important to determine pre-operative vocal cord status. Although RLND is the most obvious cause of stridor after TT, other causes to be considered are residual NM blockade, stroke, anaphylaxis and even hypocalcemia. In the presence of stridor and respiratory distress, urgent reintubation is required and if vocal cord palsy is confirmed, tracheostomy must be performed.

References:

6073

Lewis-Sumner Syndrome – Challenges on the anaesthetic management of an orphan disease

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Background: Lewis-Sumner Syndrome (LSS) or Multifocal Acquired Demyelinating Sensory Motor neuropathy is a rare immune neuromuscular disorder without any published reports in anaesthesiology. We describe the anaesthetic management of a patient suffering from the disease, using total intravenous anaesthesia (TIVA), rocuronium and sugammadex.

Case Report: A 63-year-old, ASA III, diabetic woman presented for lumbar discectomy. She had a previous diagnosis of LSS with neurogenic bladder and sensory-motor polyneuropathy as well as severe degenerative lumbosacral polyradiculopathy. A pre-anaesthetic evaluation with emphasis on neurological deficits was performed. Surgery was performed under general anaesthesia with standard monitoring, including invasive blood pressure, neuromuscular monitoring and bispectral index. General anaesthesia was induced with fentanyl, propofol and rocuronium (0.4mg/Kg) and maintenance was assured with TIVA. No further muscle relaxant was given. Surgery lasted 110 minutes. Before emergence the train-of-four (TOF) ratio was 49, so neuromuscular block was reversed with 2mg/kg of sugammadex. Blood gas analysis performed in the recovery room showed no respiratory insufficiency and the patient remained stable without worsening of sensory-motor deficits. She was discharged home 3 days later. On her neurology follow-up, she reported pain relief and better mobility of the lower limbs.

Discussion: There are no reported cases on the anaesthetic management of LSS. There is some doubt regarding LSS classification and some authors point out similarities with Chronic Inflammatory Demyelinating Polyradiculoneuropathy (CIDP). Theoretical concerns with the use of neuromuscular drugs in patients with demyelinating neuropathies have been raised.1 There is a report of prolonged effect of vecuronium in a patient with CIDP.2 In our case, rocuronium effect was also prolonged and low dosage was sufficient to provide intubation conditions (TOF count 0). Sugammadex allowed total reversion of neuromuscular block and no respiratory complications occurred. The combination of rocuronium and sugammadex proved to be a good choice for patients with LSS.

References:

Learning points: LSS is an orphan disease with no reported cases of anaesthetic management. Lower dose of rocuronium and sugammadex were safely used in a patient with LSS.
The Carbon Footprint of Anaesthetic Agents: An LCA Case Study in the UK

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Background and Goal of Study: Anaesthetic gases emit a significant amount of carbon dioxide equivalent (CO2E) at every stage of their life-cycle. The implementation of a technology that recycles wasted anaesthetic gases requires an early understanding of its environmental impact. The greenhouse gas (GHG) captured by such technology may significantly exceed the emissions generated in the other stages of the life-cycle combined.

Materials and Methods: This study employs a life cycle assessment (LCA) model and discusses the environmental implications of using a recycle and reuse technology. LCA applies a cradle-to-grave approach to assess the environmental impacts associated with all stages of a product’s life-cycle, including manufacturing, transporting, utilisation, and residues.

Results and Discussion: The LCA results indicate that the emissions generated during manufacturing are the highest for Sevoflurane while Desflurane produces the highest total emission once the wasted vented gases are considered. The CO2E generated can be reduced by almost 80% if one uses Desflurane with the sustainable technology instead of using Sevoflurane without recycling the wasted gases. In the case of low-flow rate, Sevoflurane produces the highest total emission followed by Desflurane in our model. Moreover, data collected in all acute NHS Trusts in the UK under the Freedom of Information Act 2000 shows that while the number of surgery cases keeps growing the use of anaesthetic gases is not slowing down. Recycling wasted anaesthetic gases is crucial to reduce the carbon footprint of health services.

Conclusion: If the reuse and recycle technology is successfully implemented at a large scale, our results indicate a large decrease in volatile anaesthetic agents going into the environment. This shifts the current policy from encouraging the use of Sevoflurane instead of Desflurane to the opposite spectrum.

References:

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Materials and Methods: This study employs a life cycle assessment (LCA) model and discusses the environmental implications of using a recycle and reuse technology. LCA applies a cradle-to-grave approach to assess the environmental impacts associated with all stages of a product’s life-cycle, including manufacturing, transporting, utilisation, and residues.

Results and Discussion: The LCA results indicate that the emissions generated during manufacturing are the highest for Sevoflurane while Desflurane produces the highest total emission once the wasted vented gases are considered. The CO2E generated can be reduced by almost 80% if one uses Desflurane with the sustainable technology instead of using Sevoflurane without recycling the wasted gases. In the case of low-flow rate, Sevoflurane produces the highest total emission followed by Desflurane in our model. Moreover, data collected in all acute NHS Trusts in the UK under the Freedom of Information Act 2000 shows that while the number of surgery cases keeps growing the use of anaesthetic gases is not slowing down. Recycling wasted anaesthetic gases is crucial to reduce the carbon footprint of health services.

Conclusion: If the reuse and recycle technology is successfully implemented at a large scale, our results indicate a large decrease in volatile anaesthetic agents going into the environment. This shifts the current policy from encouraging the use of Sevoflurane instead of Desflurane to the opposite spectrum.

References:

The efficacy and safety of ciprofol for the induction of general anaesthesia in selective surgery: a phase III, multi-centre, randomized, propofol-controlled, double-blind Trial

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Background and Goal of Study: Ciprofol (HS93488 emulsion injection), a new anaesthetic 2,6-disubstituted phenolic derivative, binds toward GABAA receptor which is same as propofol[1]. Based on the results of previous studies (Clinical Trial Registration: identifier: NCT03773835, NCT03773042, NCT03709056), ciprofol provided effectively sedative effects with a quick onset. This multi-centre, randomized, double-blind study was designed to compare the efficacy and safety of ciprofol 0.4 mg/kg and propofol 2 mg/kg for the induction of general anaesthesia in patients scheduled for elective surgery.

Materials and Methods: Patients aged 18-64 years with a body mass index between 18 and 30 kg/m2, American Society of Anesthesiologists physical status of I or II, were studied. The primary efficacy end point was anaesthesia induction success rate, which was defined as Modified Observer’s Assessment of Alertness/Sedation score ≤ 1 (MOASA ≤ 1) after study drugs administration (up to giving 2 supplemental dose) without requiring alternative sedative of propofol. Other end points included the time to successful anaesthesia induction, the time to the loss of the eyelash reflex, safety and pharmacokinetics.

Results and Discussion: Eighteen centers selected 216 patients and 178 patients underwent randomization. The anaesthesia induction success rate of ciprofol 0.4mg/kg and propofol 2mg/kg were both 100.0% in Full Analysis Set or Per-Protocol Set. The lower limit of the one-sided 97.5% CI (-4.18%) for the difference of anaesthesia induction success rate was no more than -9%. This indicated ciprofol 0.4 mg/kg was comparable to propofol 2 mg/kg for induction. There were no significant differences in adverse events between the ciprofol group and the propofol group. Using centralized randomization procedure, they were randomized into 5 groups, including the 5mg, 7mg, 8mg remimazolam tosylate and 5mg remimazolam tosylate + Ramazenil treatment groups and the 1.5mg/kg propofol control group. Observation indexes included sedation success rate, sedation recovery time and incidence rates of hypotension, hypoxemia, respiratory depression, injection pain, adverse event and adverse reaction during sedation.

Conclusion: The sedation induction success rate between the treatment groups and the control group (P>0.05). However, the sedation recovery time was significantly shorter in the treatment groups than in the propofol control group (P<0.05). In addition, there were no statistically differences in the incidence rates of hypotension and respiratory depression during sedation between the treatment groups and the control group (P>0.05). The incidence rates of hypoxemia, injection pain, adverse event and adverse reaction during sedation were significantly lower in the treatment groups than in the control group (P<0.05). Serious adverse event was not observed in any group.

Conclusion: Remimazolam tosylate had equivalent success rate of sedation but lower incidence rates of adverse event and adverse reaction than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

References:
1. Wang X.1, Wang X.2, Zhu Q.1, Zuo Y.2 1West China Hospital, Sichuan University - Chengdu (China), 2West China Hospital, Sichuan University - Chengdu (China)

The efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment

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Background and Goal of Study: To evaluate the efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment.

Materials and Methods: A phase II multi-center, randomized, single-blinded, dose-exploration and active comparator-controlled trial was conducted. A total of 156 patients (18-60 years old) with grade I or II ASA score and 18-30kg/m2 BMI who underwent conventional gastroscopic diagnosis and treatment were selected. Using centralized randomization procedure, they were randomized into 5 groups, including the 5mg, 7mg, 8mg remimazolam tosylate and 5mg remimazolam tosylate + Ramazenil treatment groups and the 1.5mg/kg propofol control group. Observation indexes included sedation success rate, sedation recovery time and incidence rates of hypotension, hypoxemia, respiratory depression, injection pain, adverse event and adverse reaction during sedation.

Results and Discussion: There was no statistically difference in the sedation success rate between the treatment groups and the control group (P>0.05). However, the sedation recovery time was significantly shorter in the treatment groups than in the propofol control group (P<0.05). In addition, there were no statistically differences in the incidence rates of hypotension and respiratory depression during sedation between the treatment groups and the control group (P>0.05). The incidence rates of hypoxemia, injection pain, adverse event and adverse reaction during sedation were significantly lower in the treatment groups than in the control group (P<0.05). Serious adverse event was not observed in any group.

Conclusion: Remimazolam tosylate had equivalent success rate of sedation but lower incidence rates of adverse event and adverse reaction than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

References:
1. Chen S.1, Yuan T.1, Zhang J.1, Huang Y.2, Tian M.3 1Peking Union Medical College Hospital - Beijing (China)
Conclusion: The sedation success rate of remimazolam tosylate is not inferior to that of propofol. Remimazolam tosylate has lower incidence rates of sedation-induced hypotension and respiratory depression than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

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Comparison of the degree of sympathetic nervous system suppression during general anaesthesia using Sevoflurane/O2 vs Sevoflurane/N2O with the same MAC

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Background and Goal of Study: N2O may stimulate the sympathetic nervous system at end-tidal concentrations FA> 40%.1 We examined whether an anesthetic consisting of sevoflurane/N2O versus sevoflurane only at equipotent MAC would offer a similar degree of sympathetic suppression in patients undergoing robot assisted radical prostatectomy(RARP).

Materials and Methods: 19 ASA I-III patients undergoing RARP were randomized to receive sevoflurane(Sevo/O2 group, n=10) or(Sevo/N2O group, n=9). Patients taking drugs altering sympathetic tone were excluded. Anesthesia was induced with propofol(1-2mg/kg).remifentanil continuous infusion(4ng/ml),rocuronium(0.5mg/kg) or cisatracurium(0.1-0.15mg/kg).the tracheas intubated and mechanical ventilation started.The Zeus anesthesia machine(Dräger, Lübeck, Germany) was used in target control mode.The FAO2 target was 40% in(Sevo/O2 group) and 50% in(Sevo/ N2O).with initial 5 min high flow gas flow deitrigoration to ensure maintaining FAN2O at 45-47%.MAC target was set at 0.8 in both groups at all times. The degree of sympathetic suppression was measured by parameters known to be affected by the sympathetic/parasympathetic balance(figure1):ANI(Loos, France),qNOX(Quantium Medical, Mataro, Spain),SSI,SE,RE, MAP and HR2. The study started with first intra-abdominal electrocautery incision. Data were collected every 8 seconds for an arbitrary 20 min period(RUGLoop, Deemed, Tense, Belgium). The study was stopped if a vasopressor or atropine was used. T-test at 1 min intervals was used to compare groups, with P< 0.05 indicating statistical significance.

Results: (Figure1) The difference between all compared parameters was highly significant. Mainly, with less sympathetic suppression in(Sevo/N2O) group.

Conclusion: When anesthesia in patients undergoing RARP is maintained at 0.8 MAC, substituting part of the sevoflurane by 50% N2O decreases sympathetic suppression. Whether this is caused by the lower sevoflurane partial pressure or MAC, substituting part of the sevoflurane by 50% N2O decreases sympathetic suppression. Whether this is caused by the lower sevoflurane partial pressure or higher N2O partial pressure or both, cannot be determined by this study.


5147

Use of magnesium sulfate in general anesthesia as a coadjuvant, a review

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Background and Goal of Study: We performed an analysis of magnesium sulfate used in continuous infusion in the perioperative situation, taking great importance today thanks to the OFA.

Materials and Methods: We have carried out a bibliographic research in the main biomedical databases (PUBMED, WOS, Cochrane) to analyze the main studies and their results in the use of magnesium sulfate as an adjuvant in general anesthesia.

Results and Discussion: We have carried out a bibliographic research, we found more than 50 articles where we have been able to see how magnesium sulfate has demonstrated how its use in continuous perfusion allows us to reduce anesthetic doses during the surgical intervention, as well as greater control over postoperative pain. An important article is a meta-analysis made by Albrecht et al, which is the first systematic review on this topic demonstrating a clinically significant decrease in mortality, morbidity, and costs vs anesthesia with opioids alone. Using magnesium sulfate, without giving statistically significant results. Another article to highlight is one written by Rodriguez Rubio et al., which has demonstrated a decrease in the requirements of propofol, muscle relaxants and opioids in induction and maintenance of anesthesia. Currently, the recommended doses are: 30-50 mg per kg bolus followed by continuous infusion of 7 to 15 mg per kg per hour of maintenance, starting 10-15 minutes before induction or just after induction.

Conclusion: We are facing a revolution as far as anesthesia is concerned, since the appearance of opioid derivatives in the 60s, which produced great hemodynamic stability intraoperatively, new adjuvant drugs are currently appearing that can contribute to this without the adverse effects of opioids. Magnesium sulfate has demonstrated an analgesic and anesthetic effect more than evident, reducing pain and with it the consumption of opioids and decreasing the doses of anesthetics used and adrenergic response during the otorachial intubation.


5776

Efficacy and safety of remimazolam tosylate for general anesthesia in elective surgery: A clinical trial

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Background and Goal of Study: This study aimed to assess the efficacy and safety of intravenous remimazolam tosylate in Chinese patients undergoing elective surgery under general anesthesia, comparatively to propofol.

Materials and Methods: The patients were randomized into 4 groups to receive remimazolam tosylate (6, 12 and 18 mg/kg/h) or propofol in this Phase II multicenter, randomized, double-blind, dose-finding, positive drug parallel controlled trial. The primary efficacy endpoint was the success rate of achieving anesthesia/sedation depth. The secondary efficacy endpoints included changes in bispectral index score (BIS), anesthesia recovery time, anesthesia induction time, and safety profile.

Results and Discussion: The results showed that the rates of successful anesthesia were not significantly different among the four groups (P>0.05). During anesthesia, BIS values in the remimazolam (6, 12, and 18 mg/kg/h) and propofol groups fluctuated between 40 and 60. The anesthesia induction time was gradually decreased with increasing dose of remimazolam tosylate. Recovery time was longer with remimazolam administration at 6 and 18 mg/kg/h groups compared with the propofol group (all P>0.05). The incidence rates of deep sedation, inadequate sedation, hypotension, and hypoxemia were not significantly different among the four groups (all P>0.05). There was no serious adverse event.

Conclusion: Remimazolam tosylate was not inferior to propofol in terms of anesthesia success and adverse event occurrence. This study was registered with ClinicalTrials.gov (NCT02406872), CFDA clinical trial register number CTR20150191, and CFDA clinical trial document numbers 2013L00702, 2013L00703, 2013L00704, and 2015L01799.
A lipid-free etomidate formulation based on designed self-assembling peptide

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Background and Goal of Study: Etomidate and propofol lipid emulsions are widely used in induction and maintenance of anesthesia, but the use of lipid as carrier also causes some drawbacks including pain on injection, bacteria contamination and hyperlipidicemia. Thus, a lipid-free formulation based on self-assembling peptides would be promising to prevent these side-effects.

Materials and Methods: Self-assembling peptide GQY was dissolved in 0.9% normal saline and 5mM GQY solution was obtained. After that, etomidate was added into the GQY solution at the concentration of 2 mg/mL equal to the clinical lipid emulsion. Nanoparticles formed in the etomidate-GQY formulation were observed by TEM. Healthy adult male SD rats divided 2 groups (GQY group and lipid group) were used in further pharmacodynamic experiments. Rats were placed supine in the cage after single injection of etomidate through the lateral caudal vein. Loss of righting reflex (LORR) occurred when rats fell to right themselves. Up-and-down method was applied to find the hypnotic median effective dose (ED50). ED50 was taken average of three tests. 2ED50 of two formulations was administrated (n=24 each group). And the time to act, LORR duration, sedation duration and adverse events was observed and recorded.

Results and Discussion: Etomidate-GQY solution was white turbid liquid with nanoparticle size of less than 50 nm. The ED50 (95%CI) of etomidate-GQY solution and lipid emulsion was 0.80 (0.75-0.86) mg/kg and 0.68 (0.64-0.72) mg/kg, respectively, which indicated that the potency of etomidate in two different formulations was similar. And the onset time (0.12 (0.12, 0.13) min vs. [0.12 (0.12, 0.13) min] vs. [0.12 (0.12, 0.13) min]) was shorter compared with that of lipid group (P<0.01). The duration for LORR ([5.74±1.34] min vs. [6.22±1.37] min, P=0.23), and sedation duration ([12.58±2.18] min vs. [11.71±2.47] min, P=0.20) of etomidate-GQY solution and lipid emulsion had no difference. The incidence of myoclonus was 10/24 in GQY group and 6/24 in lipid group (P=0.36). No respiratory depression or other adverse reaction was observed.

Conclusion: Hydrophobic etomidate could be successfully encapsulated by self-assembling peptide GQY and form stable nanoparticles. And the GQY formulation of etomidate had the similar efficacy in anesthesia induction to lipid emulsion. We are going to study further about this lipid-free formulation, as well as to develop lipid-free propofol formulation based the peptide.

5300

Propofol wastage and disposal: doing the right thing

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Background and Goal of Study: Propofol is believed to have a greenhouse gas impact 4 orders of magnitude lower than desflurane or nitrous oxide [1]. However, a comprehensive life cycle analysis of its environmental impact was not mandatory at the time of its discovery and was not performed. Nevertheless, it is known that propofol does not biodegrade, accumulates in fat and can be toxic to aquatic organisms [2]. Unused propofol, including empty ampoules and glassware, must therefore be disposed of by incineration to prevent it from entering the watercourse. In 2012, a study in New York demonstrated that 45% of all propofol dispensed was wasted [2]. Avoidance of unnecessary waste and disposal of propofol are of paramount importance.

Materials and Methods: We sought to establish a baseline for propofol waste at Queens Medical Centre Nottingham, UK. We recorded the volume of propofol dispensed and the volume administered in 50 cases. We used a questionnaire to ascertain knowledge about propofol disposal and its environmental impact amongst anaesthetists and operating department practitioners (ODPs).

Results and Discussion: Overall, we found that 23% of dispensed propofol was wasted.10 ODPs and 41 Anaesthetists completed the questionnaire. Of these, 75% of anaesthetists and 70% of ODPs did not know how to correctly dispose of propofol for colonoscopy.10 ODPs and 41 Anaesthetists completed the questionnaire. Of these, 75% of anaesthetists and 70% of ODPs did not know how to correctly dispose of propofol wastage and disposal: doing the right thing.

Conclusion: The state of the environment is a major public health crisis which we cannot ignore. This audit has shown that increased awareness is required amongst our peers to help overcome the environmental impact propofol has. Waste propofol must be disposed of by incineration and all anaesthetists and ODPs have a responsibility to ensure this happens. We believe this and other environmental issues should be integrated within the anaesthetic curriculum.

References:

5698

The efficacy and safety of ciprofol versus propofol for deep sedation during colonoscopy: A phase III, multi-center, randomized, double-blind, non-inferiority trial

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Background and Goal of Study: Ciprofol (HSK3486) is a close analog of propofol, which acts on GABA receptors to induce sedation and general anaesthesia. We aimed to compare the efficacy and safety of ciprofol and propofol for deep sedation during colonoscopy.

Materials and Methods: A phase III, multi-center, randomized, double-blind, non-inferiority trial was performed at 17 sites in China. Patients were randomly assigned to receive ciprofol (0.4 mg/kg) or propofol (1.5 mg/kg). The primary outcome was the success rates of colonoscopy, and analysed by intention to treat and a margin of 8%. The secondary outcome included induction time (time to reach the MOAA/S ≤1 after administration of first dose of study medication); fully alert time (first 3 consecutive MOAA/S scores of 5 after administration of first dose of study medication); discharge time (time to readiness for discharge after the end of the procedure) and safety. The trial was registered at ClinicalTrials.gov with registration number NCT03674008.

Results and Discussion: A total of 289 eligible participants were underwent randomization. The success rates of colonoscopy in ciprofol group and propofol group was 100% and 99.2%, a difference of 0.8% (95%CI: -2.2~4.2) that did not exceed the predefined 8% margin. There was no significantly difference observed in induction time between the two groups (1.0±0.418 vs. 1.13±0.416 min, P=0.05). Fully alert time was longer in ciprofol group (3.21±1.68 min) than that of propofol group (2.83±2.01 min, P=0.001).Time to readiness for discharge was significantly longer in ciprofol group (7.23±3.198 vs. 5.83±3.028 min, P<0.001). Although the fully alert time and time to readiness for discharge was statistically significant, the time to ready for discharge from end of the procedure in ciprofol group is still within 10 minutes, and this delay has been estimated as the minimal clinically important difference in patients undergoing colonoscopy. The overall rates of adverse events
Results: interaction as independent variables, Subject and Side as nested random effects. A
analysed using a generalized additive mixed model with HHb, Time and their
All NIRS data were time aligned to cuff release for data comparison. CCO was
of rest (baseline), directly followed by a 5 minute interval of arterial occlusion or
We designed the intervention as collecting NIRS data continuously during 1 minute
period of 30 minutes, the opposite to the former condition was applied to each arm.
In this single center randomized controlled trial in healthy volunteers,
Materials and Methods: We followed-up oncologic outcomes of patients who
between propofol-based total intravenous anesthesia (TIVA) compared to balanced
Statistical analysis was performed using SPSS 20.0 (Chicago, USA), p<0.05 was
compared for cytotoxic proliferative effect at 6th, 24th, 48th and 72th hours.
and March 2019.
Results and Discussion: TIVA and VA groups showed identical biochemical recurrence-free survival at all-time points after RARP (Figure 1). The predictive factors of prostate cancer recurrence were determined by cox regression as follows: colloid input (1.002, 1.000-1.003; P = 0.011), initial PSA level (1.025, 1.007-1.044; 
P = 0.006), and pathological tumor stage 3b (4.217, 1.207-14.735; P = 0.024), but not anesthetic agent (1.227, 0.860-2.283; P = 0.518). Propofol has been reported to have helpful immunomodulatory effects, and better survival has been reported after cancer surgery with TIVA than VA. However, other recent studies have shown different results regarding the influence of anesthetic agents on the recurrence of cancer, and different oncologic outcomes have been demonstrated depending on the type of cancer. This is the first study to compare oncologic outcomes after RARP in prostate cancer patients administered propofol-based TIVA or VA during surgery. In addition, a strength of this study is that we analyzed its 7-9 years’ outcomes in patients who were randomly assigned to either propofol-based TIVA or VA groups.
Conclusion: Our findings demonstrate that the effects of propofol-based TIVA are comparable with those of VA with regards to postoperative recurrence in patients with prostate cancer.

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Quantitative assessment of Cytochrome C oxidase patterns in muscle tissue by the use of near-infrared spectroscopy (NIRS) in healthy volunteers
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Background: Cytochrome C oxidase (CCO) acts as final electron acceptor in the respiratory chain and may provide information concerning intracellular oxygen consumption. CCO is a chromophore with an absorption peak in the near-infrared spectrum (NIRS) in its reduced, deoxygenated state. However, this absorption peak overlaps with deoxygenated haemoglobin (HHb) which is present in much higher concentrations(1). NIRO300 (Hamamatsu Photonics, Tokyo, Japan) measures the CCO signal but did not receive FDA approval for this use due to lack of independency of the measured CCO changes. In this study, we hypothesized that the NIRO 300 provides a HHb independent measurement of CCO concentration changes in the near-infrared spectrum.
Methods: In this single center randomized controlled trial in healthy volunteers, subjects were randomized to receive arterial occlusion to the left arm (n=5) and venous stasis on the right arm (n=5) and vice versa during 5 minutes. After a resting period of 30 minutes, the opposite to the former condition was applied to each arm. We placed the NIRO 300 optodes bilateral at the level of the brachioradial muscle. We designed the intervention as collecting NIRS data continuously during 1 minute of rest (baseline), directly followed by a 5 minute interval of arterial occlusion or venous stasis with a final interval for reactive hyperaemia and return to baseline. All NIRS data were time aligned to cuff release for data comparison. CCO was analysed using a generalized additive mixed model with HHb, Time and their interaction as independent variables, Subject and Side as nested random effects. A P value < 0.05 was considered statistically significant.
Results: The characteristics of the volunteers were comparable between both groups. We found a significant non-linear effect of HHb (p < 0.0001) and a temporal influence of the effect of HHb (p < 0.0001) on CCO measurements during arterial occlusion. For venous stasis, we found a significant non-linear effect of HHb (p < 0.0001) on CCO measurements. Elapsed time did significantly mediate the effect of HHb on CCO (p < 0.0001).
Conclusion: We demonstrated that the measured CCO concentration changes are affected by the HHb concentration changes in the brachioradial muscle during two different blood flow alterations. Our results indicate that the NIRO 300 may not be a reliable tool to monitor cellular hypoxia in a clinical setting
Reference:

5720
Volatile anesthetics versus propofol based total intravenous anesthesia on biochemical recurrence in patients undergoing robot assisted radical prostatectomy
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Background and Goal of Study: Recurrence after cancer surgery is a major concern in cancer patients. Growing evidence from preclinical studies has revealed that various anesthetics can influence the immune system in different ways. The current study compared the long-term recurrence of prostate cancer after robot-assisted radical prostatectomy (RARP) in terms of selection of anesthetic agents between propofol-based total intravenous anesthesia (TIVA) compared to balanced anesthesia with volatile anesthetics and remifentanil (VA).
Materials and Methods: We followed-up oncologic outcomes of patients who underwent RARP and had participated in two previous prospective randomized controlled trials, and compared outcomes of those who received TIVA (n = 64) to those who received VA (n = 64). The follow-up period was between November 2010 and March 2019.
Results and Discussion: TIVA and VA groups showed identical biochemical recurrence-free survival at all-time points after RARP (Figure 1). The predictive factors of prostate cancer recurrence were determined by cox regression as follows: colloid input (1.002, 1.000-1.003; P = 0.011), initial PSA level (1.025, 1.007-1.044; 
P = 0.006), and pathological tumor stage 3b (4.217, 1.207-14.735; P = 0.024), but not anesthetic agent (1.227, 0.860-2.283; P = 0.518). Propofol has been reported to have helpful immunomodulatory effects, and better survival has been reported after cancer surgery with TIVA than VA. However, other recent studies have shown different results regarding the influence of anesthetic agents on the recurrence of cancer, and different oncologic outcomes have been demonstrated depending on the type of cancer. This is the first study to compare oncologic outcomes after RARP in prostate cancer patients administered propofol-based TIVA or VA during surgery. In addition, a strength of this study is that we analyzed its 7-9 years’ outcomes in patients who were randomly assigned to either propofol-based TIVA or VA groups.
Conclusion: Our findings demonstrate that the effects of propofol-based TIVA are comparable with those of VA with regards to postoperative recurrence in patients with prostate cancer.

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The effect of propofol on rat lung mesenchymal stem cell
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Background and Goal of Study: Pulmonary diseases are an important cause of morbidity and mortality. Allogeneic lung transplantation is the only treatment for advanced chronic lung diseases. Because of insufficient number and tissue rejection, stem cell therapy will be the hope in lung diseases. Propofol is a frequently used agent in anesthesia practice. Propofol may be administered to patients with end-stage lung disease who are candidates for stem cell therapy due to the need for anesthesia or sedation. Therefore, the aim of our study was to investigate the cytotoxic / proliferative effect of propofol on lung mesenchymal stem cell (MSC).
Materials and Methods: With the permission of G.U.ET-18.003 from the local ethics committee of animal experiments; MSCs were isolated from the lungs of two Wistar Albino rats. In the second stage, these cells were transformed into adipocytes, chondrocytes and osteocytes, identified according to surface antigens in flow cytometry and they proved to be MSCs. Cells were placed in 32-well e-plates on the Xcelligence Reel Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well. The doses of propofol 25(n=6), 50 (n=9) and 100 µM (n=9) was considered significant.
Conclusion: Propofol can be used in anesthesia practice as a safe agent that does not affect the proliferation of MSCs in the lung. However, we recommend that propofol should be used in low doses because it has better cell proliferation values when used in low doses compared to high doses.
The effect of dexmedetomidine on rat lung mesenchymal stem cell

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Background and Goal of Study: Allogeneic lung transplantation is the only treatment today in chronic lung diseases. However, inadequate number of donors and tissue rejection are the major problems of this treatment. Stem cell therapy, which has started to be used in clinical practice in recent years, can be a hope for lung diseases. However, the effect of anesthetic agents on lung mesenchymal stem cells is not known. Dexmedetomidin, one of popular anesthetic agents, can be used in these population because of sedation, analgesia, anesthesia. The aim of our study is to investigate the effect of dexmedetomidine on lung mesenchymal stem cells which has never been investigated before.

Materials and Methods: With the permission of G.U.ET-18.003 from the local ethics committee of animal experiments; mesenchymal stem cells were obtained from the lungs of 2 newborn Wistar Albino rats, were producted in stem cell culture medium. Lung mesenchymal stem cells were differentiated to adipocyte, osteocyte and chondrocytes; surface markers were identified in flow cytometry, proving that these cells were mesenchymal stem cells according to International Society Cell & Gene Therapy (ISCT). Cells were placed in 16-well e-plates on the Xcelligence Reel Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well and three wells per group (n:3). Dexmedetomidine was applied at doses of 0.1, 1 and 10 µM. Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well and three

Results and Discussion: Dexmedetomidine did not affect proliferation of lung mesenchymal stem cells at all doses and durations used (Table 1). Conclusion: Dexmedetomidine can be used safely in patients with chronic lung disease who will be candidates for mesenchymal stem cell therapy when have procedures need for sedation, analgesia and anesthesia.
The retrospective analysis of 60 cases of analgesedation in X-ray operation room during stenting of coronary arteries was done for 3 groups (20 patients in each group). Group #1 – Fentanyl 2 mg/kg + Diazepam 3 mg/kg, Group #2 – Fentanyl 1.5 mg/kg + Propofol 3-4 mg/kg, Group #3 – Fentanyl 1 mg/kg + Propofol 2-3 mg/kg + Ketamine 0.3 mg/kg.

**Results and Discussion:** In ileal myocytes ketamine (100 μM) strongly inhibited both carbachol- and GTPylS-induced mICAT. The inhibition (IC50 of about 3 μM) was slow and practically irreversible. It was associated with altered voltage dependence and kinetics of mICAT. Ketamine abolished carbachol-induced calcium oscillations in fura-2AM loaded myocytes. The retrospective analysis showed that there were no incidences of vomiting in all groups, but there were cases of intra/postoperative nausea: group #1 – 55%, group #2 – 0/5%, group #3 – 15/10%.

**Conclusion:** Thus, intra and postoperative nausea in group #3 could be explained, at least in part, by the action of ketamine on small intestinal smooth muscles.

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**6058**

**The influence of low s(+) ketamine doses on electroencephalogram during total intravenous anesthesia**

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**Background and Goal of Study:** S-Ketamine (SK) plays an important role in pain modulation in surgical patients. However, its intraoperative use may not validate electroencephalogram (EEG) anesthetic adequacy indices. This study aims to evaluate the EEG derived parameters: bispectral index (BIS) and electrolymogram activity (EMG) in relation to varying doses of SK.

**Materials and Methods:** Forty patients, male and female, aged between 20 and 45 years, who underwent controlled effector site (esTIVA) total intravenous anesthesia (TIVA), with BIS maintained between 45 and 55, before SK, were randomly assigned to 5 equal groups. In the control group k 0, the patients did not receive SK; k 1, k 2, k 3 and k 4 received SK in a 200 μg.kg-1 bolus iv, followed by continuous infusion of 100 μg.kg-1.h-1; 200 μg.kg-1.h-1; 300 μg.kg-1.h-1 and 400 μg.kg-1.h-1, respectively. In all patients in groups k1, k2, k3 and k4, 200 μg.kg-1 bolus SK was used. Eleven moments were evaluated in each group: M0 - before anesthetic induction; M1 - 10 minutes after anesthesia stabilization with BIS between 45 and 55 (with a target of 50); M2 - 3 minutes after SK; M3 -6 minutes after SK, M4 - 9 min after SK, M5 - 12 minutes after SK; M6 - 15 minutes after SK; M7 - 18 minutes after SK; M8 - 21 minutes after SK; M9 - 24 minutes after SK and M10 - 27 minutes after D. At all times the values of BIS and EMG were noted. The electroencephalographic data obtained were analyzed using ANOVA for repeated measures and adjusted p-value for multiple comparisons by Tukey test, considering as significant, p < 0.05.

**Results and Discussion:** Comparing the mean values of BIS and EMG between all groups, in each moment, no significant changes were observed (< 0.05). No studies evaluating low SK doses during TIVA esTIVA controlled and its influence on BIS and EMG were found in the literature.

**Conclusion:** Electroencephalographic parameters (BIS and EMG) can be used to assess anesthetic adequacy when this model of SK infusion and TIVA is observed.

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**4431**

**Postoperative pain and steroid pulse therapy affect oral intake after tonsillectomy for IgA nephropathy**

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**Background and Goal of Study:** Early oral intake after surgery is associated with a decrease in postoperative complications and shortened hospital stay. The aim of this study was to retrospectively examine the predictors of adequate oral intake after tonsillectomy for IgA nephropathy.

**Materials and Methods:** This study was a retrospective observational study conducted at a single institution, which was reviewed and approved by the Ethics Committee of Ohkubo Hospital, Public Health Corporation. We reviewed patients with IgA nephropathy who underwent tonsillectomy between January 1, 2014, and March 31, 2019. The patients were divided into two groups: the possible group (amount of oral intake after surgery was 60% or more) and the impossible group (less than 60%). The primary outcome was odds ratio (OR) with a 95% confidence interval (CI) between various patient factors and oral intake, assessed using logistic regression analysis (p<0.05 as the level of significance, calculated with the Jouf-Hochberg method). Pain was evaluated with and without analgesics before initial intake after tonsillectomy.

**Results and Discussion:** A total of 293 patients (212 patients in the possible group and 81 in the impossible group) were reviewed. The insufficient initial intake after tonsillectomy was associated with the need for analgesic administration before initial intake [OR=2.28, 95% CI(1.24, 4.19), p<0.02] and steroid therapy before surgery [OR=0.33, 95% CI(0.15, 0.74), p<0.02]. There was no correlation between initial oral intake and the incidence of postoperative nausea and vomiting (PONV) [OR=1.53, 95% CI(0.78, 3.01), p<0.22]. Pain was the most common reason for lack of intake (n=41, 50.6%), followed by unknown reasons (n=21, 25.9%), PONV (n=11, 13.6%), and unsatisfactory meal served (n=8, 9.9%).

**Conclusion:** After tonsillectomy for IgA nephropathy, weak postoperative pain and steroid pulse therapy before surgery had a positive effect on the initial oral intake. No significant difference between groups was observed in terms of the incidence of PONV, whereas some patients complained that PONV was the cause of poor dietary intake. Taken together, appropriate postoperative analgesic management and the prevention of PONV are necessary for early oral intake after tonsillectomy.

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**4677**

**An investigation of the association between perioperative blood transfusion and recurrence of pancreatic cancer after surgical resection**

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**Background and Goal of Study:** The controversial effects of perioperative blood transfusion on pancreatic cancer recurrence following surgery stem from shortfalls in analytic approaches of previous studies that failed to separate blood transfusion effects from other potential confounders. We utilized a retrospective cohort to investigate the effect of perioperative blood transfusion on cancer prognosis for periodic pancreatic cancer resection.

**Materials and Methods:** We identified patients with stage I through III pancreatic cancer undergoing tumor resection at a tertiary medical center in Taiwan between January 2010 and December 2018 and then divided into transfusion and non-transfusion groups based on whether they received perioperative packed red blood cell (PRBC) transfusion or not. and evaluated through October 2019. Recurrence and patient death were collected from 286 patients with the median follow-up time of 14.5 months and 160 (55.9%) of them received red cell transfusion within 7 days of surgery. Postoperative disease-free survival and overall survival were measured using proportional hazards regression models with inverse probability of treatment weighting (IPTW) to balance observed covariates between the transfusion and non-transfusion groups. Restricted cubic spline functions were used to characterize dose-response effects of the amount of transfusion on cancer recurrence and mortality.

**Results and Discussion:** Perioperative PRBC transfusions were associated with increased risk of cancer recurrence (IPTW adjusted HR: 1.62, 95% CI: 1.18 – 2.23, p = 0.003) and all-cause mortality (IPTW adjusted HR: 1.63, 95% CI: 1.19 – 2.24, p = 0.002) after pancreatic cancer resections. Restricted cubic spline regression analysis disclosed a linear dose-response association between the amount of pRBC transfusion and cancer recurrence and the prevention of PONV are necessary for early oral intake after tonsillectomy.
A Case Report of Seizures During General Anaesthesia for Cervical Spine Surgery: Undetected Cerebrospinal Fluid Leak Leading to Intracranial Haemorrhage and Status Epilepticus

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Background: Cerebrospinal fluid (CSF) leak is a known complication of spine surgery, with an incidence of 0.3-1.3% in cervical spine surgery[1]. Symptoms range from mild (headache, vertigo) to potentially life-threatening (meningitis, intracranial haemorrhage)[1,2]. Most publications report intracranial events after emergence of general anesthesia[1,2], hours-days post-procedure. We report a case of seizure during GA with status epilepticus secondary to CSF leak caused by active drain suction.

Case Report: 75-year-old underwent C1-T2 posterior decompression for cervical myelopathy. After resuming supine position, he developed tonic-clonic seizures. Blood gas sampling ruled out metabolic causes. Surgical drain was found to be active suction. He took antihypertensive medication, was given intravenous Midazolam, and was maintained with sevoflurane. His hemodynamics was stable throughout the surgery.

Discussion: Generalized involuntary muscle contraction after the emergence of anesthesia is often treated as a seizure. Here, we emphasize the importance of past medical history and characteristics of muscle contraction for differential diagnosis before EEG and polygraphy take place.

Learning points: The characteristics of myoclonus varies with different causes. The leading cause of myoclonus in this case is myelopathy, but we should keep in mind that drug such as propofol, sevoflurane and high dose fentanyl has been reported to induce myoclonus. Clonazepam can resolve myoclonus. Clonazepam is the drug of choice for propriospinal myoclonus.

References:
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Background: Myoclonus is a common medical sign of various diseases. To differentiate the cause of myoclonus at the spot is difficult. Here, we present a case of propriospinal myoclonus after cervical laminoplasty in the post-anesthesia care unit (PACU).

Case Report: A 70-year-old man with a diagnosis of ossification of posterior longitudinal ligament with myelopathy received cervical laminoplasty. He did not have a history of seizure but he experienced involuntary upper limb muscle contraction when he bent his head down. He took antihypertensive medication and pain killers before the surgery. All of his preoperative tests were within normal limits. General anesthesia was induced with propofol 200mg, fentanyl 100mcg, cisatracurium 10mg, and was maintained with sevoflurane. His hemodynamics was stable throughout the surgery.

Discussion: Generalized involuntary muscle contraction after the emergence of anesthesia is often treated as a seizure. Here, we emphasize the importance of past medical history and characteristics of muscle contraction for differential diagnosis before EEG and polygraphy take place.

Learning points: The characteristics of myoclonus varies with different causes. The leading cause of myoclonus in this case is myelopathy, but we should keep in mind that drug such as propofol, sevoflurane and high dose fentanyl has been reported to induce myoclonus. Clonazepam can resolve myoclonus. Clonazepam is the drug of choice for propriospinal myoclonus.

References:
Perioperative anaphylaxis to patent blue dye: a case report

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Background: Anaphylaxis is defined as a potentially fatal severe systemic reaction. Patients undergoing surgery for sentinel ganglion biopsy in breast cancer and malignant melanoma. Hypersensitivity to the agent is rarely documented in adults and children1 and the diagnosis can be a challenge. We report an atypical case of anaphylaxis to patent blue dye with a late onset and a bifasic reaction in a patient undergoing breast tumorectomy and sentinel ganglion biopsy.

Case Report: 50 year old female patient, American Society of Anesthesiologists class 1, without previous allergic reactions. After 40 minutes since the retroareolar administration of 2.5 ml of patent blue dye 2.5%, the patient developed suddenly hypotension (72%), bradycardia (60 b/min) and cyanosis, with tracheostomy being cheaper but at the expense of more complications and longer sick leaves3.

References:

Learning points: "When things don’t go your way, always remember to go back to A. - How a case of status asthmaticus can turn out to be a tube obstruction

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When things don’t go your way, always remember to go back to A. - How a case of status asthmaticus can turn out to be a tube obstruction

Case report: A 34 y.o. man with a medical history of asthma was diagnosed with anaphylaxis to a drug, presenting allergic reaction to patent blue dye.

References:

Learning points: Patent blue dye anaphylaxis is a rare condition and the diagnosis is a challenge to anaesthesiologists. The variable clinical presentation and late onset of symptoms/signs are factors that can difficult the diagnosis. Patent blue dye anaphylaxis should be considered in the differential diagnosis of perioperative allergic reactions whenever it is used.
Unexpected coma in a patient with Parkinson’s Disease following general anaesthesia

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Background: Parkinson’s disease (PD) is a disorder of the central nervous system and these patients represent a particular anaesthetic challenge (1,2).

Case Report: A 65 years old male with PD under carbidopa/levodopa (25mg/100mg) five times daily was scheduled for an inguinal hernia repair surgery. He had light bradykinesia of the limbs, slow walking, dystonia of the toes and unpredictable off periods. The patient received his usual medication orally in the morning of the surgery. The surgery took 3 hours and when anaesthesia was discontinued the patient quickly started spontaneous ventilation, opened his eyes but failed to demonstrate any facial movements or any response to direct commands and presented a severe hypotonia of the limbs. He had no response to pain or any verbal or motor response. Possible diagnoses were a delayed emergence of anaesthesia, a stroke leading to a locked-in syndrome or an off-syndrome. CT scan was negative for acute cerebrovascular events and 300 mg of levodopa was given through a nasogastric tube. Over the next minutes, he showed progressive improvement in responsiveness to questions and in muscular tone. Levodopa administration was continued every 3 hours and at the end of the day he was already able to speak by gestures and move with a light bradykinesia.

Discussion: Levodopa is an effective drug to treat motor symptoms of PD and to prevent an acute exacerbation it should be used until the day of surgery (1-3). This patient received his usual medication in the morning of the surgery, but an unforeseen delay lead to a prolonged time without administration of additional doses. The patient emerged from the anaesthesia with a GCS of 3 which was reversed with the administration of Levodopa via nasogastric tube. There are no prior reports of a comatose state with hypotonic muscle tone, expressionless facies and unresponsiveness to verbal command in these patients.


Learning points: Off-syndrome in patients with PD is expectable if the timing of levodopa dose is not adjusted properly and symptoms usually improve with administration of Parkinson’s medication. Minimize drug interruptions and place a nasogastric tube for additional doses may be helpful to prevent exacerbation of PD symptoms.

References:

A strange cause of intraoperative desaturation

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Background: Platypnea-Orthodeoxia Syndrome (POS) is a rare clinical entity characterized by dyspnea and arterial desaturation from supine to an upright position. The pathophysiology of POS remains unclear. We present a case of POS during the intraoperative period.

Case Report: A 54-year-old man with previous history of hypertension, obesity and alcoholic liver disease was diagnosed of esophageal carcinoma with a pericardial fistula, resulting in pericardial and bilateral pleural effusion. A pericardial window and a palliative esophageal prosthesis placement were performed urgently. The surgery proceeded without any incident but before emergence, when incorporating the patient to the upright position, he experienced sudden desaturation up to 80%, which reverted spontaneously when the patient was placed back to the supine. Technical and obstructive causes of hypoxemia were ruled out by inspection, examination, X-ray and bronchoscopy. However, episodes of desaturation persisted in the upright position every time the maneuver was repeated. Due to the absence of pathological findings and the hemodynamic stability, the patient was extubated without incidents.

Discussion: All causes of hypoxemia improve with an increase in oxygen inspired fraction except low cardiac output and shunt. The most frequent cause of POS is the presence right-to-left shunt (RTLS) through a permeable oval foramen (POF). Identified by hepatopulmonary syndrome. POS requires the presence of an anatomical component that allows the passage of deoxygenated blood to the systemic circulation, and a functional component, responsible for RTLS through the anatomical defect. The functional component may be due to intracardiac, extracardiac or miscellaneous etiologies. It has been suggested that upright position would increase the RTLS by favoring the emptying of left cavities, decreasing the compliance of the right ventricle and redistributing the flow from the inferior vena cava through the anatomical defect. The certainty diagnosis is based on the echocardiogram with bubble study and the treatment depends on the underlying cause.

References:
2. Learning points: In the presence of dyspnea or desaturation in upright position not justified by other causes, POS should be considered. It may be a priority to rule out a POF.
A rare case of thyrotoxicosis in patient with ovarian struma 34 years after total thyroidectomy
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Background: Ovarian struma is extremely rare (1% of all ovarian tumors), with incidence of thyrotoxicosis about 8%. Presentation of thyrotoxicosis varies, being especially complex in cases of preexisting comorbidity which can be aggravated, or even caused, by unrecognized thyroid hormone excess. Perioperative approach to the thyrotoxic patient is very challenging for anesthesiologist, especially in case of previous cardiac dysfunction.

Case Report: A 68 year old female patient with hypertensive diastolic heart dysfunction and atrial fibrillation was admitted to hospital with acute heart failure. She was diagnosed as having thyrotoxicosis. On admission she had very high levels of FT3 and FT4, but postponed by anesthesiologist because of severe thyrotoxicosis, assumed both iatrogenic and endogenous. Substitutional levethyroxin therapy was started after total thyroidectomy 34 years ago, with no endocrinologic controls. After successful treatment with thiamazol and propranolol, laparoscopic procedure was performed. Pleural effusions were drained preoperatively, arterial and central venous lines were inserted. General anesthesia was induced with propofol, sufentanil and rocuronium, maintained with sevoflurane. Anesthesia, surgery and postoperative period were uneventful.

Discussion: Thyrotoxicosis is state of thyroid hormone excess with variety of causes, manifestations and therapies. Ovarian struma is extremely rare cause of thyrotoxicosis or thyroid storm, which is a life threatening clinical syndrome with 30% mortality. Administration of thyrastatics, beta blockers and corticosteroids is crucial for control of symptoms and intraoperative hemodynamic stability. There are no studies about optimal type of anesthesia. Anesthesiologist's plan is much more than choice of anesthetic, it must include algorithm for possible intraoperative complications and postoperative management.

References:
2. Furman WR at al. Anesthesia for patients with thyroid disease and for patients who undergo thyroid or parathyroid surgery.UpToDate (Feb 2019).

Comparative effects of Propofol, Sevoflurane, or Desflurane on Postoperative Pulmonary Complications for Lung Resection Surgery: a randomised clinical trial
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Background and Goal of Study: It is controversial about pulmonary-protective and immunomodulatory property of volatile anesthetics in patients undergoing lung surgery, especially during the one-lung ventilation. The effect on pulmonary outcome is yet undetermined. We hypothesized that volatile anesthesia is superior to intravenous anesthesia regarding postoperative complications in patients undergoing lung surgery.

Materials and Methods: Patients scheduled for lung surgery with one-lung ventilation were randomly assigned to one of three parallel arms to received propofol, sevoflurane, or desflurane as general anesthetic. The outcomes include postoperative pulmonary complications (PPCs, defined following the ARISCAT study) and major postoperative complications classification (according to the Clavien-Dindo score).

Results and Discussion: The three groups had similar demographics, disease and intraoperative characteristics. Of 837 screened patients, 504 were randomized and 495 were analyzed, with 163 in the propofol group, 165 in the sevoflurane group, and 167 in the desflurane group. There was no difference in PPCs incidence between patients in the propofol group and the volatile group (34.3% in propofol, 33.9% in sevoflurane, and 33.5% in desflurane, p=0.99). The Clavien-Dindo score did not differ significantly across groups.

Conclusion: No difference between the three anesthetic regimens was evident. Compared with the propofol, volatile anesthetics had no benefit in the pulmonary protection for the patients undergoing lung surgery.

Does low-flow anesthesia reduce emergence agitation in adult women?
A prospective, randomized, clinical study
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Background and Goal of Study: It’s known that low-flow anesthesia (LFA) technique has many advantages. In this prospective study, we aimed to determine whether LFA has an effect on emergence agitation (EA) in the post-anesthesia care unit (PACU) in women underwent laparotomic gynecologic surgeries.

Materials and Methods: After receiving approval, 64 female patients who scheduled for elective laparotomic gynecologic surgery requiring general anesthesia were enrolled in this prospective, randomised study. Patients were randomly divided into two groups as Group 2 (n = 32) and Group 0.5 (n = 32). General anesthesia was administered using a standardised protocol for all patients in both groups. At the beginning of anesthesia fresh gas flow (FGF) rate was set at 4 L/min in both groups. When all patients reached 1 MAC of sevoflurane (AbbVie Inc.), then FGF was reduced to 2 L/min in Group 2 and 0.5 L/min in Group 0.5. Sevoflurane concentration adjusted to 1-1.1 MAC during throughout surgery. Vapor was closed in Group 0.5, 15 min before and in Group 2 end of the operation. At the end of the surgery FGF was increased to 4 L/min. All patients were extubated when the TOF ratio was >4: presence of agitation, <4: presence of sedation.

Results and Discussion: Emergence agitation was observed in 5 patients in the PACU. There was no significant difference between two groups. At the all evaluation times, the number of patients with SAS>4 was significantly higher in Group 2 than Group 0.5 (p>0.05). In the literature, there is no study that is demonstrating the effects of low flow anesthesia on emergence agitation in adult patients. It is known that awakening agitation in pediatric patients is associated with rapid redistribution of inhalation anesthetics from the brain.

Kounis syndrome after sugammadex administration
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Background: We present a case of Kounis syndrome (KS, “allergic angina syndrome”) after sugammadex administration. Informed consent of the patient for the publication of this case was obtained.

Case Report: A 70-year-old woman with no remarkable medical history or previous cardiac dysfunction was admitted to hospital with acute heart failure. A 68 year old female patient with hypertensive diastolic heart dysfunction and atrial fibrillation was admitted to hospital with acute heart failure. The patient was moved to PACU with norepinephrine perfusion at 0.4 ug/kg/min. About one hour later she was normally extubated. The patient was reintubated and perfusion of norepinephrine was initiated. We performed a transthoracic echocardiogram in which good cardiac contractility was observed; by this time the ECG had return to normal. Skin redness was observed when normal hemodynamic returned. The patient was moved to PACU with norepinephrine perfusion at 0.4 ug/kg/min. About one hour later she was normally extubated. Intradermal allergy tests obtained a positive result to sugammadex. The patient was extubated and perfusion of norepinephrine was initiated. We performed a transthoracic echocardiogram in which good cardiac contractility was observed; by this time the ECG had return to normal. Skin redness was observed when normal hemodynamic returned. The patient was moved to PACU with norepinephrine perfusion at 0.4 ug/kg/min. About one hour later she was normally extubated. Intradermal allergy tests obtained a positive result to sugammadex.
Iatrogenic scrotal pneumatocele with severe bradycardia and hypotension as a complication of TAPP hernioplasty: a case report

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Background: Transabdominal preperitoneal (TAPP) hernioplasty is one of the possible approaches to laparoscopic hernia surgical repair. This case report presents a unique iatrogenic surgical complication of this technique: scrotal pneumatocele (air in the scrotum) with severe hemodynamic effects.

Case Report: A 42-year-old male, ASA II, previous smoker otherwise healthy, with no known allergies, underwent a programmed hernioplasty with transabdominal preperitoneal approach under balanced general anesthesia. During surgery, sudden severe bradycardia and hypotension occurred, being successfully treated with 0.5 + 0.5 mg of Atropine. While searching for possible causes, the anesthesia team found beneath the surgical drapes that an exuberant scrotal pneumatocele had been formed. Other causes for the bradycardia were excluded, such as sudden hypovolemic shock, hypoxemia, and electrolyte abnormality. After the patient was hemodynamically stabilized, the surgery continued without other difficulties. In the end, and with disinflation of pneumoperitoneum, scrotal pneumatocele disappeared without any scotral complaints during the postoperative period.

Discussion: This case shows scrotal pneumatocele as an iatrogenic complication of TAPP Hernioplasty not described before in the scientific literature. Excluding other possible causes, bradycardia and hypotension were attributed to hypervagotonia due to a secondary parasympathetic reflex caused by air in the scrotum. Although not having any postoperative consequences, the iatrogenic scrotal pneumatocele caused severe intraoperative hemodynamic adverse effects that could have put the patient's life at risk.

References:

Learning points:
- The anesthesiology team should be always aware of possible complications under the surgical drapes. Scrotal pneumatocele can be an iatrogenic complication of hemioplasty by TAPP technique, which can have severe intraoperative adverse effects.
Anaphylactic reaction in a patient undergoing laparoscopic oophorectomy

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Background: The incidence of anaphylaxis in the perioperative period is 1:4000 to 1:25000. Various mechanisms cause activation of mast cells and basophils which in turn release inflammatory mediators leading to the onset of clinical features potentially life-threatening. This case illustrates the anesthetic management of a anaphylactic reaction during anesthetic induction.

Case Report: A 22 year old female of ASA physical status class 1 was schedule for laparoscopic oophorectomy. Before anesthesia induction 2 g of cefazolin and 500 mg of metronidazole were administrated. Anaesthesia was induced with midazolam, droperidol and fentanyl at which time the patient complaint about mild respiratory difficulty. Induction continued with propofol and rocuronium. At this time, the patient developed labial and periorbital swelling with cardiovascular collapse (BP 35/17 mmHg and HR 150 beats min-1). Endotracheal intubation was performed and she was treated with i.v. volume, ephedrine and amiodarone. This restored cardiovascular stability within 20 min. Surgery was performed and at the end the patient was successfully exubated, although some labial and periorbital edema were still present, for which clemastine was administrated. Blood was withdrawn for histamine and tryptase measurements and an immunology appointment was scheduled. She had no complaints after anesthesia emergency and after three days went home.

Discussion: Perioperative anaphylaxis tends to be severe and has a higher mortality rate than anaphylaxis occurring in other settings, partly because to factors that impair early recognition. Diagnosis is presumptive based on clinical signs and the timing of the reaction in relation to the drugs administered. Antibiotics and neuromuscular blocking agents are the most common triggers. Although different from the case described the cornerstones of treatment are adrenaline and I.V. fluids. Histamine and tryptase levels should be measure and referral to an allergy specialist for definitive diagnosis.

References:
1. doi: 10.4103/0259-1162.108286.

Learning points: Anaphylactic reactions are important causes for perioperative morbidity and mortality; Prompt diagnosis and treatment are crucial for the successful management of anaphylaxis; All patients should measure histamine and tryptase levels and be follow up, so the culprit drug and safe alternatives are identified, thus ensuring patient safety during future anaesthetics.

Myoclonic Jerks Post General Anaesthesia — A Case Report

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Case Report: A 29-year-old Male with no medical history and a previous uneventful general anaesthetic (GA), presented for a knee meniscus repair. GA was induced with intravenous (IV) propofol 200mcg and fentanyl 50mcg. IV cefazolin 2g was given for antibiotic prophylaxis. A laryngeal mask airway was inserted, and GA was maintained with sevoﬂurane and oxygen/air mixture. Surgery proceeded uneventfully. IV morphine 6mg and paracetamol 1g was given for analgesia. Anti-emetics included IV ondansetron 4mg and dexamethasone 8mg. Upon awakening, he had involuntary jerking movements of his head, torso and upper limbs, occurring 2 to 3 times every few minutes. Each episode lasted a few seconds. These movements were not distractible, choreiform, nor dystonic in nature. There was accompanying myalgia, but no slurred speech, aura, photophobia, neck stiffness or diplopia. He was conscious and aware of the jerks. Neurological examination was otherwise normal. He was afibrile and haemodynamically stable. Blood investigations revealed normal calcium, magnesium and serum electrolyte levels. He was transferred to the high dependency and prescribed IV Midazolam and oral Clonazepam by the neurologist. An EEG performed to exclude seizures was reported to be normal. The jerks reduced in frequency following the administration of benzodiazepines, and he was discharged after complete resolution of his symptoms on the 2nd post-operative day.

Discussion: Myoclonic jerks post anaesthesia are a rare occurrence, the mechanisms of which are relatively unknown. Drugs reported to be associated include propofol, fentanyl, ramelteon and ondansetron. This phenomenon is idiosyncratic and impossible to predict. It is important to rule out differential diagnoses such as adverse drug reactions, local anaesthetic reactions, emergence delirium, hysterical response and shivering. Investigations such as electrolyte levels, EEG, CT/MRI Brain should be performed. Treatment may involve aborting myoclonic jerks with benzodiazepines, barbituates or anti-epileptics. All cases of unexplained seizure-like activity after anaesthesia should be reported. The symptoms are usually self-limiting without any long-term sequelae. It is important to reassure the patient as these symptoms may be distressing, and they should be reviewed regularly till resolution of symptoms. It may be prudent to provide a memo to avoid administering similar drugs for future anaesthesia to prevent reoccurrence of such symptoms.
6068

Intra-operative anaphylaxis after ketorolac administration unveils sensitization to multiple neuromuscular blocking agents and midazolam

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Background: Anaphylaxis during anaesthesia is a serious complication with considerable morbidity and mortality (3-6%). Therefore, it demands adequate recognition, management and investigation. During the episode, removal of suspected drugs is mandatory, but their identification is often difficult such that 40% of the time wrong drugs are discarded.1

Case: A 43-year-old female, ASA II patient with smoking habits, controlled asthma and allergy to egg yolk was scheduled for abdominal liposuction. After midazolam, remifentanil, thiopental and rocuronium, she was intubated and volatile anaesthesia commenced without any incident. Ketalorac was administered 45 minutes after the anesthetic induction. Immediately, a severe brachiocephasympathetic response started, followed by arterial hypotension (minimum: 55/29 mmHg) and a widespread rash. Anaphylaxis due to ketorolac was suspected and treated with fluidotherapy, a sympathomimetic, hydrocortisone, clemastine, aminophylline and inhaled salbutamol. The clinical evolution was good and the patient was extubated and transferred to the PACU without incidents. Skin tests were performed 13 weeks later and were positive for midazolam as well as for tested neuromuscular blocking agents (NMBA): rocuronium, atracurium and cisatracurium. The only reliable test to confirm sensitization to ketorolac was a provocation test, which was not performed due to high risk of anaphylaxis.1 Therefore, the anaphylaxis was believed to be caused by ketorolac, rocuronium and/or midazolam.

Discussion: Type I hypersensitivity reactions during anaesthesia typically occur within the first minutes after IV exposure, however delayed onset may occur.1 In this case, the investigation was crucial because it detected sensitization to unsuspected agents that putatively contributed to the anaphylaxis (even though their action did not occur immediately). It identified a sensitization to midazolam, for which a small number of cases of anaphylaxis have been reported.2 Furthermore, it identified a cross-sensitivity between ketorolac, rocuronium and/or midazolam.

References:

Learning points: The temporal relationship between drug administration and anaphylaxis symptoms may not be a reliable predictor of the causative agent.

5511

Intravenous lidocaine perfusion for postoperative analgesia in CRS + HIPEC: a retrospective analysis

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Background and Goal of Study: Surgical approach of peritoneal carcinomatosis following Sugarbaker’s technique (medial laparotomy and coliseum technique), is performed in our hospital under combined anaesthesia: thoracic peridural catheter (TPC) + balanced anaesthesia. The use of the TPC during 5 days after the surgery provides the patient good quality analgesia. Our challenge is to find the best strategy for the postoperative pain management in patients who are not candidates for TPC.

Materials and Methods: Based on the successful use of intravenous lidocaine, not only in multimodal pain management, but also in reducing postoperative ileus, reducing PONV and reducing length of hospital stay, reported in the last years, we applied this approach to the patients who were not candidates for TPC for postoperative pain management. These patients received a lidocaine bolus of 15 mcg/kg at anaesthetic induction (balanced anaesthesia, with sevoflurane, rocuronium in continuous perfusion and fentanyl on demand), followed by a continuous intravenous lidocaine perfusion at 1.5 mcg/kg/h, started before surgical incision, and maintained during 48 hours. Between September 2016 and November 2019, 20 patients received intravenous lidocaine as a first option and 20 patients received TPC as a second option.

Results and Discussion: 19 of the patients had a good analgesia quality, with VAS (0-10 cm) between 0 and 3 during the 5 days following the surgery. No one of them presented adverse effects due to the lidocaine administration. Only one patient needed opioid administration during this period (intravenous morphine perfusion at 1 mg/h during 24 hours, between the second and the third postoperative day).

Conclusion: Although it is a small sample, these results suggest that lidocaine intravenous perfusion provide a good postoperative analgesia, and we think that a study comparing intravenous lidocaine perfusion to TPC should be considered. Other possible benefits of lidocaine administration (reduction of postoperative ileus, reduction of length of hospital stay, less postoperative nausea and vomiting) should also be compared.

4910

Does regional scalp block reduce pain after craniotomy?

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Background and Goal of Study: There is no consensus regarding the best anesthetic regimen for use in neurosurgery. Performing a regional scalp block as an adjunct to various anesthesia techniques has the potential for reducing analgesic and vasoactive requirements during craniotomy surgeries and in the post-operative period. We evaluated our 2.5 year experience in a new Neurosurgical department.

Materials and Methods: A retrospective qualitative analysis of electronic charts from Shaare Zedek Medical Center for patients undergoing craniotomy surgery for the postoperative pain management in patients who are not candidates for TPC. Multimodal analgesia and rectus abdominis sheath block in exploratory laparotomy

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Background: Multimodal analgesia has been stimulated by the excessive use of opioids and their unwanted postoperative (PO) effects. The gold analgesic blueprint for major abdominal surgeries is neuraxial block, however, it is not a risk-free technique and has contraindications. In this context, regional block in association with multimodal analgesia and opioids becomes a good alternative.

Case Report: A 60 years old, no comorbidities, in the fifth postoperative day of videolaparoscopic cancer rectosigmoidectomy, with abdominal distension and sepsis is admitted for performing exploratory laparotomy. General anesthesia was inducted in rapid sequence with esmolol 60mg, midazolam 1mg, fentanyl 70mcg, propofol 50mg, rocuronium 80mg. An attack dose of 0.5ml/kg of a multimodal solution (MS), including dexametomidine 2mcg/ml, ketamine 0.5mg/ml and lidocaine 4mg/ml, was made. Anesthesia was maintained with sevoflurane and continuous infusion of SM in 0.25ml/kg. Patient remained hemodynamically stable. A blockade of the rectus abdominis sheath with bilateral ropivacaine 0.3% 40ml was performed at the end of the surgery. Infusion of the 0.125mg/kg MS was maintained for 48h postoperatively. Patient referred pain score below 3, needing no complimentary analgesia.

Discussion: Multimodal analgesia may reduce the excessive use of opioids that have high rates of effects produced in the PO. In addition, proper control of intra and PO noceiception is crucial to reduce stress response, respiratory complications, deep vein thrombosis and chronic pain. Rectal sheath analgesia (RSA) provides analgesia in the anterior abdominal wall region. This case reports a patient with pain score below 3, needing no complimentary analgesia.
contraindications to epidural block. RSA was chosen at the end of surgery for analgesia associated with multifocal analgesia that contributes visceral as well as somatic analgesia intra and PO, reducing opioid use and its unwanted effects.

References:

Learning points: A multimodal analgesia that incorporates regional analgesia is an alternative that can reduce high dose opioid requirements and possible associated adverse effects.

Effectiveness of continuous wound infusion of 0.375% ropivacaine by On-Q pain relief system for postoperative pain management in major abdominal procedures

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Background and Goal of Study: Optimal pain management after major abdominal surgery presents unique challenges. The goal of this study is to compare the effectiveness of the On-Q surgical incision site pain-relief system to intravenous patient controlled analgesia.

Materials and Methods: Thirty six patients, ASA I-III, who underwent major surgery (peripheral pancreatectomy, Whipple’s, cancer colon surgery) were randomized to either the On-Q catheter/pump or the i.v. PCA group. Exclusion criteria were history of chronic pain, allergic reactions to local anesthetics, inability to use a PCA device. Intraoperatively, all patients received fentanyl, paracetamol 1mg, lornoxicam 8mg and morphine 8-10mg i.v. Post-op instructions for 3mg paracetamol and 8mg lornoxicam i/day were given. On-Q group: 24 patients, aged 38-87 (mean 69,4y) received a continuous infusion of ropivacaine 0.375%, at a rate of 2ml/hour through each catheter before skin suturing. PCA i.v. (100 ml morphine 0.3mg/ml, bolus 0.6mg, lockout 15/min) was used as a “rescue” regimen. Both groups received 0.375% ropivacaine by On-Q pain relief system for 3 days, starting at PACU (POD0), 24h (POD1) 48h (POD2); Total morphine consumption was also recorded in both groups.

Results and Discussion: Pain scores were: a) POD0: On-Q group 0-8, (mean value 2,92), 8/24 patients had 0 pain, PCA group 0-6 (mean value 3,33) (only 1 patient with 0 pain) b) POD1: On-Q group 0-9 (mean 3,29), and PCA group 2-4 (mean value 2.92, c) POD2: On-Q group 0-7 (11/24 patients had 0 pain) (mean value 2), PCA group 1-4 (mean value 2.67). From the On-Q group, 10/24 patients (41.7%) used the PCA, receiving 0-30 mg morphine (mean 3.2mg) during 48h. In the PCA group, 11/12 patients (91.7%) received 2-45mg morphine (mean 10.2mg). Although patients in the On-Q group showed a rise in pain scores on POD1, the overall pain scores were significantly lower and the “drop” in pain scores is higher in the On-Q group at all time-points. Total morphine consumption was also significantly lower in the On-Q group.

Conclusion: Continuous wound perfusion with a ropivacaine solution using the On-Q system seems to provide effective postoperative analgesia with less opioid consumption in major abdominal surgery.

Anesthetic factors affecting outcome after DIEP flap surgery, a retrospective regression analysis of the impact of opioid free anesthesia

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Background and Objectives: Deep Inferior Epigastric Perforator flap (DIEPFlap) is an autologous free flap reconstructive technique after mastectomy. Opioid free anaesthesia (OFA) might improve outcome. Primary objective evaluated OFA versus opioid anaesthesia (OA) regarding flap revisions and complications. Secondary objectives measured the effect on PONV, pain, postoperative opioids, flap perfusion and length of stay (LOS).

Methods: A retrospective single-centre cohort study approved by the hospital Ethical Committee. All 204 patients who underwent DIEP flap surgery from January 2014 to April 2019 were included. All patients provided consent to allow anonymized data analysis. Anaesthesia was classified as OFA if no peri-operative opioids were given until wound closure. Balanced anaesthesia was obtained by a combination of 0.5 Mac sevoflurane and 3 mg/kg/h propofol. Based on working schedule, patients were assigned to an OFA or OA. OFA protocol consists of a loading and infusion of dexmedetomidine, lidocaine and ketamine, continued postoperative at a below-sedative level. OFA patients got a goal directed fluid therapy, whereas OA (sufentanil and remifentanil) got a liberal fluid strategy, both with extra vasoconstrictors to maintain perfusion pressure. Paracetamol and NSAIDs with opioids were provided.

Results and Discussion: 55 Patients got OFA, 149 got OA. No difference in flap revisions (1.8% vs 6.1%, p=0.205) was observed, number of minor complications was lower in the OFA group (17.9% vs 51.4%, p<0.001). OFA required less postoperative opioids (40.0% vs 87.3%, p<0.001) and had a shorter LOS (6.8 vs 7.5 days p=0.003). OFA compared to OA was associated with less PONV (12.7% vs 43.6%, p<0.001), lower VAS score (1.9 vs 4.9, p<0.001) and a lower skin to flap temperature difference (1.04°C vs 1.41°C, p=0.048). Linear regression confirmed OFA being an independent factor for primary and secondary outcome. Kroll reported 0.74 mg/kg morphine equivalents1. Our OA group required only 0.15 mg/kg, even further reduced to 0.03 mg/kg in OFA. According to Manahan, up to 78% of patients experience PONV after DIEP flap reconstruction2. We found a lower rate with even 50% more reduction in the OFA group, making this method clinical useful.

Conclusion: OFA is associated with improved outcome after DIEP flap surgery.

References:

Perioperative outcomes in pancreatoduodenectomy surgery: epidural versus patient controlled analgesia

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Background and Goal of Study: Pancreatoduodenectomy (PDC) remains one of the most anaesthetic and surgical demanding open abdominal surgery. Although epidural analgesia (EA) remains the Gold-Standard for most open abdominal surgical procedures, the optimal analgesic technique remains under debate. The choice of the analgesic technique usually takes under consideration the analgesic efficacy, but the implications in the progression of the disease and in morbi-mortality are also primordial aspects. Should we take under consideration other parameters beside the analgesic outcome? This study aimed to compare the epidural analgesia (EA) and intravenous patient controlled analgesia (PCA) based on postoperative clinical outcomes.

Materials and Methods: Retrospective observational study with adult patients (>18yr) submitted to PDC between 1ST January 2018 and 30th September 2019 in tertiary medical center. According to analgesic technique the patients were divided into two groups (EA vs morphine PCA). Demographic parameters were analyzed. Outcomes studied were: 30 days mortality, acute pain unit stay (days), surgical intermediate care unit (SICU) stay (days), hospital stay (days), urgency readmission. For the statistically analysis we used SPSS version 23.

Results and Discussion: The study included 42 patients. Mean of age was 66 ±10 years, with 54.3% male, 59.5% ASA I and 40.5% ASA III. Group distribution was: EA 26.2% and PCA 73.8%. Data distribution for normality was tested. No statistically significant differences were found in terms of 30 days mortality (p=0.210) between the two groups. Neither in relation to other outcomes: acute pain unit stay (mean of 4704

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days: 3.8, p=0.785), nor SICU stay (p=0.571), nor hospital stay (median of 14 days, p=0.585), nor urgency readmission in 30 days period (p= 0.442). However there was no death in the EA group, but were 4 deaths in the PCA group.

Conclusion: Adequate postoperative pain control is of paramount importance. However, according to the anesthetic technique chosen, the implications in post-operative stay and complications are also important factors to take under consideration. Although our results do not have statistically significant differences between both techniques, we emphasize that a future study with a larger number of patients may lead to different results.

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4670

Case Report: Effect of steroids on a case of allodynia following Spinal anesthesia in Cesarean section

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Background: Most neurological complications with spinal anesthesia are associated with paresthesia on introduction of the spinal needle. There is a debate about the benefits of the use of steroids in cases of nerve injury in shortening the duration of the effects caused by nerve injury.

Case Report: Intrathecal anesthesia was provided for a 27 years old female scheduled for C.S. in sitting position with a 25G beveled cutting needle at the L4-5 intervertebral space level, the patient experienced paresthesia during introduction of the needle where the needle introduction was stopped and the paresthesia had completely disappeared before the injection of fentanyl and hyperbaric bupivacaine.

Two hours after the unevenful operation the patient complained of severe pain on the medial aspect of the foot with marked tactile allodynia. The patient was given a single dose of 100mg hydrocortisone intravenous. 45 minutes later the pain dramatically improved with disappearance of allodynia and after 2 hours the patient was able to walk with minor pain and within 6 hours the pain completely disappeared and did not appear again within the next 48 hours.

Discussion: The most accepted explanation for paresthesia is the contact of the spinal needle with a nerve root that may have caused an inflammatory response.

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4534

Novel supraclavicular ultrasonographic real-time guidance during insertion of peripherally inserted central catheter lines

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Background and Goal of Study: Mispositioning is common during insertion of PICC lines. Available techniques to evaluate tip position include fluoroscopy and chest x-ray. Fluoroscopy is resource demanding and exposes both patients and personnel to radiation. Chest x-ray is performed after compromise of field sterility and catheter repositioning entails a completely new procedure. None of the techniques provide precise information on catheter position throughout insertion. A novel supraclavicular ultrasonographic technique facilitates visualisation of the right subclavian, internal jugular (IJV) and brachiocephalic vein and provides guidance of catheter insertion in real-time. The aim of this study was to assess the feasibility of ultrasonographic real-time guidance of PICC line insertion using the supraclavicular view.

Materials and Methods: This was a observational study including 20 patients. The junction of the right IJV and subclavian vein (IJV-subclavian junction), forming the right brachiocephalic vein, was visualised using a microconvex probe in the right supraclavicular fossa. The wire guide tip was identified at the IJV-subclavian junction allowing for estimation of optimal catheter length. During catheter insertion the stiffening wire was identified in real-time, and in case of mispositioning, the catheter was redirected into the right brachiocephalic vein. Final catheter tip placement was validated with fluoroscopy or chest x-ray.

Results and Discussion: In all patients the IJV-subclavian junction and the right brachiocephalic vein were identified. Insufficient upper arm vein patency precluded successful insertion in one patient. Thrombi were identified in two patients in the right brachiocephalic vein.

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4325

Evaluating the risk of radial nerve injury during radial cutaneous venous puncture in volunter participants

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Background and Goal of Study: When placing an intravenous continuous fluid line, studies reported that radial venous punctures within 12-cm proximal to the radial styloid process should be avoided because of the risk of radial nerve damage, which sometimes progresses to complex regional pain syndrome 1). However, the relationship between radial nerve injury and puncture length was not clear, and reported lengths were correct.

In this study, we investigated the intersection points between the superficial branches of the radial nerve and the cephalic vein using portable ultrasound and a cutaneous nerve stimulator, in volunteer participants.

Materials and Methods: After obtaining Institutional Review Board approval (#4679; January 3, 2018 ) and participants’ informed consent, we used a linear ultrasound probe (LOGIQ e; GE Healthcare, Madison, WI, USA) and a pen-type nerve stimulator (Stimuplex®; B Braun, Melsungen, Germany). First, we identified the superficial branches of the radial nerve by minimum amplitude to notice stimulation (approx. 1.2–1.4 mA) using Stimuplex® at participants’ wrists. Next, we moved the ultrasound probe proximally to find the intersections between the nerve branches and the cephalic vein. We measured the number of proximate distances to the intersections from the radial styloid process, for each participant.

Results and Discussion: Thirty-two volunteers participated. The intersection points were 9.3 ± 3.5 cm proximately on the left arm and 9.1 ± 3.9 cm on the right arm (mean ± standard deviation). Furthermore, the rate of crossing points beyond the 12-cm range1 was 25% on the left arms and 19% on the right arms (Figure).

Conclusion: Using living volunteers, our results showed that there was no safe venipuncture point in the forearm on the radial side to prevent damage to the superficial radial nerve, using ultrasound and a nerve stimulator.

References:
**5576**

**Neuromuscular block management in Kugelberg-Welander Syndrome**

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**Background:** Kugelberg Welander syndrome is a milder type of Spinal muscular atrophy (SMA type III) with symptoms typically presenting after 12 months and survival into adulthood. We report our neuromuscular block (NMB) management in a patient with SMA type III.

**Case Report:** A 46-year-old wheelchair woman (157cm, 100kg), ASA III, underwent laparoscopic cholecystectomy under general anesthesia with standard ASA, BIS and train-of-four monitoring. Anesthesia was induced with intravenous propofol (180 mg), fentanyl (0.15 mg) and rocuronium (60 mg); laryngoscopy and tracheal intubation proceeded uneventfully and anesthesia was maintained by pressure-controlled ventilation with sevoflurane in O2 titrated to BIS 40-60. At the time of pharmacologic reversal, the last and only rocuronium bolus (10 mg) had mg 27 minutes. Sugammadex (400mg) was administered (PTC 6/10) and after 50s the patient presented a TOF ratio=0.90. She was extubated uneventfully. At discharge time to the ward, she was hemodynamically stable without signs of residual NMB or recurarization.

**Discussion:** The management of anesthesia in patients with SMA is often challenging due to muscle weakness, anesthesia-related respiratory complications, hypersensitivity to nondepolarizing muscle relaxants, and succinylcholine-induced hyperkalemia. Only few cases reported the use of muscle relaxants in these patients, and the majority used neostigmine as NMB reversal agent. Anticholinesterase agents often do not guarantee an adequate recovery of neuromuscular function. As far as we know, there are only 3 cases reporting the use of Sugammadex in SMA type III. 1, 2, 3 All of them presented an efficient NMB reversal with no adverse effects. Sugammadex has been demonstrated to be safe and effective in patients with cardiovascular disease and other neuromuscular disorders. Apparently our patient didn’t reveal an increased sensitivity to rocuronium, and the sugammadex reversal was very efficient with no adverse effects.

**References:**
1. Hugo Vitella, Reversal of neuromuscular blockade with sugammadex in a patient with spinal muscular atrophy type III.
2. Tz-Ping Gau, Multimodal anaesthesia management of a morbidity obese spinal muscular atrophy patient with obstructive sleep apnea.
3. Inamori M, General anesthetic management of a patient with spinal muscular atrophy type III.

**Learning points:** Our case reinforces that the combination of rocuronium and sugammadex should be considered in the NMB management of patients with SMA.

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**5944**

**Fingers Hook Technique to Improve Trachway Assisted Nasotracheal Intubation**

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**Background and Goal of Study:** To load a nasotracheal tube on Trachway (a video stylet) has been demonstrated an effective technique in patients undergoing oromaxillofacial surgery. The goal is to investigate an alternate technique to instead of the conventional technique of jaw thrust to improve the nasotracheal intubation.

**Materials and Methods:** Eighty patients undergoing oromaxillofacial surgery with Trachway assisted nasotracheal intubation were included in this prospective, randomized, single blind, clinical trial study. The induction agents of fentanyl 2 mcg/kg, thiamylal 5mg/kg, rocuronium 0.1mg/kg were administrated and intubation initiated 2 minutes later. In group C (conventional jaw thrust), an assistant raised up patient’s bilateral mandible angle to increase oropharyngeal space exposure during Trachway assembly advanced. In group F (fingers hook), the intubator put the left index and middle fingers on submandibular space and deeply compressed it as the Trachway assembly advanced. The intubating attempts, intubation time spent, the scores counted by modified nasal intubation difficulty scale (MNIDS), intubation related bleeding and side effects were recorded and analyzed.

**Results and Discussion:** The airway characteristics between groups are comparable. There are 6 out of 40 patients in group C and 9 out of 40 patients in group F need no assisted technique to advance the Trachway assembly into trachea. Therefore, 34 patients in group C and 31 patients in group F were analyzed in final. The intubation attempts and intubation time spent were comparable between groups. However, the average score of MNIDS was 3.7±0.5 in group C and 2.8±0.5 in group F (P<0.001). Patients categorized into score of MNIDS ≥ 3 and 4 were 1, 7, 26 in group C and 8, 22, 1 in group F, respectively; there is a statistical significance between groups (P<0.001).

**Conclusion:** As compared with the conventional jaw thrust technique, the fingers hook provides an effective and easy technique for patients undergoing oromaxillofacial surgery.

**References:**

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**6274**

**Difficult central venous access due to venous valves - a case report**

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**Background:** Central venous cannulation (CVC) is a common procedure in anaesthesia and intensive care. Although most of the times it is accomplished without any complications, difficulties do arise. Internal jugular vein (IJV) valve is a rare cause of failed UV cannulation. We report a case of bilateral IJV valves that lead to failure of jugular central venous access.

**Case Report:** A 58 years old female patient was admitted to the cardiothoracic high dependency care unit with Type B aortic dissection. CVC insertion request was made by the cardiothoracic team for vasopressor administration. She was reviewed by anaesthesia registrar and plan was made to put the CVC in post operative care unit with full monitoring and emergency equipment availability. During the ultrasound guided insertion, it was noted that the guide wire did not advance beyond a certain length. Further detailed scanning of the IJV in the lower part of the neck revealed presence of a flap like structure in the vein. Same issue was encountered in contralateral side.

**Learning points:** Careful ultrasound scanning of intended access site should be done before central venous cannulation procedure is undertaken to avoid difficulties.

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**5199**

**Sedation during drug induced sleep endoscopy: comparison of continuous infusion of propofol vs continuous infusion of midazolam**

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**Background and Goal of Study:** Drug induced sleep endoscopy (DISE) is a diagnostic procedure for planning surgery in obstructive sleep apnoea (OSA) patients. The impact of the sedative agents on achieving the desired sedation as well as the influence on the airways and on the cardiovascular system are critical. This observational study compares two different sedative drug regimens for DISE.

**Materials and Methods:** After ERB approval and informed consent, 34 OSA patients were enrolled. Midazolam 0.05-0.07 mg/kg e.v., atropine 0.01 mg/kg e.v. and lidocaine 2% aerosol were given before allocation to propofol (group P n=19): loading 1.5 mg/kg/h, increasing of 0.1 mg/kg/h (maximum dose 3.5 mg/kg/h); or midazolam (group M n=15): loading 0.05 mg/kg/h, increased after 5 minutes of 0.02 mg/kg/h (maximum dose 0.25 mg/kg/h). Both groups received supplemental oxygen. Primary endpoint was to compare the groups in terms of time needed to reach the target sedation in order to start the endoscopy (Entropia of 65-75). Secondary endpoint was to find out differences in term of complications and the endoscopist's satisfaction (blinded to the group).

**Results and Discussion:** Group M took a significantly higher time to reach the target sedation in order to start the endoscopy (Entropia of 65-75). Group M took a significantly higher time to reach the target sedation in order to start the endoscopy (Entropia of 65-75). Group M took a significantly higher time to reach the target sedation in order to start the endoscopy (Entropia of 65-75).

**Conclusion:** Propofol allows adequate sedation in a shorter time, without being associated with more complications than midazolam during DISE.

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**General Anaesthesiology**

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Noise exposure on emergence from anaesthesia

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Background and Goal of Study: Exposure to noise is unavoidable in the operating theatre environment, but increased noise pollution during the critical phase of emergence from anaesthesia has a detrimental impact upon clinical performance and patient outcomes. It impairs the ability of the anaesthetist to perform tasks requiring a high degree of concentration and information processing such as those essential to safe emergence from anaesthesia. This increases the potential for clinical error and patient harm. Increased noise exposure on emergence is associated with adverse neuro-humeral responses in the patient and can exacerbate the stress response.

Materials and Methods: We monitored noise pollution across thirty different theatre cases representative of the standard workload in a District General Hospital with a focus on noise levels (dB-A) at the time of emergence from anaesthesia. Measurements were taken using a pre-calibrated decibel meter positioned on the anaesthetic workstation to closely resemble the noise exposure experienced by the patient and anaesthetist.

Results and Discussion: Our results show that the average noise levels in theatre increase after the WHO Surgical Sign-out in fifty-five percent of cases studied. Two-thirds of cases were associated with a greater than five decibel increase in noise level after the sign-out. The noise levels at emergence were greater than a standard conversation at one metre (60dB) in all cases. Noise pollution is significant in our theatres and frequently increases during the critical phases of anaesthesia. It can impair effective communication, lead to distraction and impact upon situational awareness.

Conclusion: Provision of an evidence-based multi-disciplinary education package and visual cues in theatre can help to minimise non-patient orientated activity and noise pollution on emergence from anaesthesia. In addition, re-emphasis of the principles of The Sterile Cockpit and mirroring the induction environment with that of emergence, alongside increased anaesthetic vigilance, can contribute to improving patient safety in this setting.

Intraoperative intravascular effect of Ringers lactate and hyperoncotic albumin during haemorrhage in cystectomy patients

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Background and Goal of Study: Crystalloids quickly equilibrate between the intravascular and interstitial volumes, consequently they are mainly used to treat temporary volume deficits. In contrast, iso-oncotic colloids induce a long-lasting plasma volume expansion. As doubts have been raised about synthetic colloids, albumin solutions have been used more extensively. The effect of 20% albumin on blood volume expansion and crystalloid kinetic in a clinical setting involving relevant intraoperative blood loss during major abdominal surgery is still unknown. We expect that fluid replacement with crystalloid will be better sustained intravascularly with the administration of 20% albumin during haemorrhage.

Materials and Methods: In this single-arm, single centre feasibility study, an i.v. infusion of 3 mL/kgBW of 20% albumin was administered over 30 min to 13 cystectomy patients during the bleeding phase (mean blood loss 973mL) in addition to Ringers lactate solution. Blood samples were collected at regular intervals over a period of 300 min to estimate clinical efficacy (i.e. plasma volume expansion / infused volume) which was analysed with a regression modelling equation.

Results and Discussion: Mean haemorrhage was 973 mL (SD ±395). The regression method showed a strong linearity (r = 0.82) between the blood loss minus the blood volume expansion and the independent effects of the infused volume of Ringers lactate and 20% albumin solutions (all P < 0.001). The mean clinical efficacy was for the Ringer solution 0.37 (95% CI 0.30 to 0.44) mL/mL and for the 20% albumin 1.77 (95% CI 1.17 to 2.37) mL/mL on an average of 5 hours. This resulted that the 20% albumin expanded plasma volume around 5 times stronger / more potent than the Ringers lactate solution.

Conclusion: The infusion of 20% albumin during haemorrhage of around 1000 mL expands blood volume by 1.8 times and its effect was long standing whereas Ringer solution expanded by 0.4 time. These results suggest that 20% albumin can be used as a potent blood volume expander in this setting, but also sustaining a pronounced longer intravascular effect of Ringers lactate solution.
Ambulatory Anaesthesia

4642

The effect of preoperative anxiety on pain after third molar tooth surgery

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Background and Goal of Study: This study aims to investigate the effects of preoperative anxiety upon postoperative pain in patients who will undergo third molar dental surgery.

Materials and Methods: 50 patients, aged 18-70, the anxiety levels were measured with Spielberger State-Trait Anxiety Inventory (STAI FORM TX-1) and (STAI FORM TX-2). Patients with scores of STAI-1 > 35 and STAI-2 > 35 were considered as low anxiety patients and the group was named as LA (n: 20). Patients with a score of STAI-1 >35 and STAI-2 >35 were considered as high anxiety level patients and the group was named as HA (n: 20). After their levels of anxiety were established, all the patients were administered desflurane intravenously and they went into third molar dental surgery after local anesthesia. The pain scores of patients in the postoperative period (15 th minute, 30 th minute, 1 st, 2 nd, 4 th, 6 th, 8 th, 12 th and 24 th hours) were assessed using Visual Analog Scale (VAS). In the postoperative period, the patients were administered 275 mg naproxen sodium PO when VAS was ≥ 4. The first analgesic requirement time, total analgesic consumption, patient and doctor satisfaction were recorded.

Results and Discussion: The dissimilar difference between Group LA and Group HA in terms of postoperative pain and analgesic consumption shows that preoperative anxiety is not too intensive to have an effect upon the postoperative pain related to the third molar dental surgery. Fear of dental extraction does not constitute a high level of anxiety. Preoperative anxiety is not significantly correlated with the postoperative pain in third molar dental surgery.

Conclusion: Our study shows that anxiety has no effect on third molar dental surgery pain when an effective analgesia administered before pain mechanism triggered and patients' pain levels are controlled in frequent intervals.

4706

Driving skills of patients at the time of discharge after sedation for colonoscopy are impaired by comparison with those of their escorts: a prospective study

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Background and Goal of Study: Driving performance is altered for several hours after anaesthesia. Most experts and guidelines for day-case surgery recommend a 12-24 hour non-driving period after general anaesthesia2,3. However, driving skills after procedural sedation have not been assessed so far. We therefore designed this study to compare driving skills of patients who underwent procedural sedation with the ones of their escorts.

Materials and Methods: Driving skills of 30 patients who underwent colonoscopy under sedation were compared to the ones of their escorts. Sedation was provided with propofol. During the driving test, all patients had reached a PADSS score > 9. The duration of the sedation, the dose of propofol and the delay between PADSS > 9 and the driving test were recorded. For all participants, gender, age, number of collisions, speeding, crossings of traffic separating or shoulder lines as well as the distances travelled while speeding or weaving out of traffic lanes were recorded. The data were analyzed in SPSS Statistics 26, presented in means and standard deviation for descriptive variables.

Results and Discussion: Significant difference between Group LA and Group HA in terms of postoperative pain and analgesic consumption shows that preoperative anxiety is not too intensive to have an effect upon the postoperative pain related to the third molar dental surgery. Fear of dental extraction does not constitute a high level of anxiety. Preoperative anxiety is not significantly correlated with the postoperative pain in third molar dental surgery.

Conclusion: Our study shows that anxiety has no effect on third molar dental surgery pain when an effective analgesia administered before pain mechanism triggered and patients’ pain levels are controlled in frequent intervals.

4749

Degree of satisfaction in patients undergoing major outpatient surgery (OS) in our hospital

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Background and Goal of Study: Ambulatory surgery continues to increase, as a result of less invasive surgical techniques, improved patient selection and preparation. Patients need to be informed about what will happen on the day of surgery. A well-prepared patient tends to be more relaxed and is more likely to comply with important instructions. Patient satisfaction is difficult to define, depending somewhat on the patient’s expectation of care. The objective of the study is to determine the degree of satisfaction with OS in our hospital.

Materials and Methods: A descriptive observational study has been conducted. By means of a satisfaction survey carried out during 4 weeks in the surgical area of OS. An evaluation of the information received prior to surgery, satisfaction with the care and treatment received, as well as demographic variables were collected. The responses were written using a Likert type scale scored as follows: very good 5, good 4, regular 3, bad 2 and very bad 1. The data were analyzed in SPSS Statistics 26, presented in means and standard deviation for descriptive variables.

Results and Discussion: 379 surveys of OS patients were collected over a period of 4 weeks. 193 (51%) females and 186 (49%) males. The evaluation of information received scored an average of 4.8; care received 4.9; privacy 4.9; resolution of doubts 4.9 and overall satisfaction 4.8. Finally, 374 patients (98.7%) would undergo surgery again in our hospital. 5 patients (1.3%) would not undergo surgery in our hospital again. It has been demonstrated that experience in OS improves with the friendly treatment and with the information provided by the entire surgical team.

Conclusion: Patient satisfaction in outpatient surgery of our hospital is high. The satisfaction survey is a useful tool to measure the degree of patient satisfaction with the surgical process.

References:
**Physical status of pediatric patients in outpatient anesthesia**

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**Background and Goal of Study:** Children who demonstrate fear and anxiety of dental treatment require deep sedation or general anesthesia. Nowadays dentists treat multiple caries of primary teeth even in small patients, in whom such treatment is possible only under conditions of general anesthesia. Analysis of physical status, age and comorbidities in children who underwent general anesthesia in outpatient dental clinics.

**Materials and Methods:** The database of outpatient anesthesia care in dental clinics for 2015-2018 was analyzed. The following data were recorded: indications for dental surgery under general anesthesia, age, gender, ASA, planned surgery, complications of anesthesia.

**Results and Discussion:** The number of patients 1687, boys 1147 (68%) girls 540 (32%), mean age 4.5 ± 2.3 yo. All patients were examined by a dentist, anesthetist and found to be in need of treatment for multiple caries under general anesthesia. 1248 (76%) children were treated as scheduled, 439 children (26%) were anesthetized urgently during the treatment of purulent processes in oral cavity. 604 children (40%) underwent multiple extractions of teeth with complicated caries, with boys predominating 398 (60%) girls 206 (34%). ASA I-1265 (75%), ASA II-422 (25%) patients. 439 (26%) children have allergy to various factors. In 388 (23%) children, there were concomitant CNS diseases (cerebral palsy, autism, others) that caused treatment under general anesthesia. Anatomical and physiological barriers to dental treatment (gag reflex, increased salivation, limited mouth opening) were most commonly observed in children with congenital malformations of CNS - in 101 cases (6%). 978 (58%) children had an overwhelming fear of treatment as a result of unsuccessful previous dental treatment, including 649 boys (60%) 329 girls (34%). All patients underwent treatment - sevoflurane, propofol, fentanyl. Intubation - 81% of cases. The hemodynamics were stable, the recovery of consciousness occurred within 35 min after the treatment. There were no serious complications. The children were discharged home 96 min after surgery.

**Conclusion:** The vast majority of children who require treatment of multiple dental caries in an outpatient settings under anesthesia have concomitant CNS pathology, allergic reactions, ASA I-II, previous experience of unsuccessful dental treatment without anesthesia. General anesthesia - sevoflurane, propofol, fentanyl with intubation is optimal in such treatment.

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**Predicting factors of unplanned admission in ambulatory laparoscopic surgery**

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**Background and Goal of Study:** The objective of this study was to determine the factors associated with a higher probability of unplanned income after an ambulatory laparoscopic surgery.

**Materials and Methods:** This is a prospective study of 297 adult patients operated by laparoscopic surgery on an outpatient care at La Fe Hospital in Valencia during one year period. The inclusion criteria were age over 18 years old and indication of outpatient laparoscopic surgery. The diagnoses were coded according to the International Classification of Diseases (ICD-9). The variables of the study included preoperative, intraoperative and postoperative factors. The unplanned hospital admission on the same day as a dependent variable. Admission criteria were preestablished. A comparative analysis was performed between patients with or without a hospital admission, using Student’s t, Mann-Whitney U and Chi-Square in independent groups. Through logistic regression, the association of the variables regarding the necessity for hospital admission was verified.

**Results and Discussion:** The 8.1% of the patients required hospitalization (CI 4.8-11.3). It was significantly higher in gynecological surgery (12.1% vs 5.5%; p<0.04), higher ASA (12.1% vs 4.5%; p=0.017), smokers (13.5% vs 8.2%; p=0.03), pneumoperitoneum time >45 minutes (11.7% vs 4.5%; p=0.02), anesthetic complications (44.4% vs 7.0%; p=0.003), surgical complications (36.4% vs 4.5%; p=0.001), presence of NVPO (13.5% vs 3.7%; p=0.003) or vomi (42.9% vs 3.3%; p=0.006). The unplanned admissions rate is one of the most used factors in the outpatients units to analyze the results. The overall rate of unplanned admission in outpatients units is between 0.09-16. The appearance of complications increases the risk of unplanned admission. The NVPO has been the most common reason for unplanned admission after an ambulatory surgery (up to 50%). The occurrence of interventions in the abdominal cavity benefits the development of adhesions and fibrosis, differing surgical technique and reducing abdominal compliance.

**Conclusion:** The proportion of unplanned admissions in this type of surgery is about 8.1%, being higher in gynecological surgery. The probability of postoperative admission is 8.7 times higher when surgical complications appear, 6.5 times higher if pneumoperitoneum> 100 minutes and 4.1 times higher if NVPO.
Outpatient Surgery Cancellations: Reasons and Suggestions for Improvement

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Background and Goal of Study: Unexpected delay or cancellation of elective surgeries has significant impact on hospital performance and patients outcomes. Efficiency is at risk, waiting time increases, patient care may be compromised, resources are wasted, and cost increases.1 This study aims to identify the frequency and reasons of surgery cancellation in an outpatient surgical center during 2018 and to prioritize areas of improvement.

Materials and Methods: A retrospective evaluation of the rate of surgery cancellation in one outpatient center was performed. The data of scheduled surgeries from 5 different surgical specialties were collected from January to December 2018. The number of patients operated, canceled, and the reason for cancellation, whenever available, were recorded. We included all cases appearing on the definitive operative room (OR) list that were not performed on that day. We excluded the days when personnel absence led to complete cancellations. Statistical treatment was made with Microsoft Excel 2007 and proposed improvements were discussed. Results and Discussion: A total of 2802 surgeries were listed of which 288 (10.28%) were canceled. Contribution to total cancellation was highest in vascular surgery 17.53%, followed by general surgery 10.52%, gynecology 9.83%, orthopedics 7.46% and plastic 4.43%. According to category, 39.2% of cancellations was related to patient absence, 29% unavailable OR time, 18.3% associated with anesthesia, 13% due to not recorded reasons, 4.8% related to surgeons and 4.5% due to other reasons. There was no mean of establishing the reason of cancellation for any particular patient, which constitutes a primary field of improvement.

Conclusion: Apart from patient absence, most cases of surgical cancellation were related to unavailable OR time, which is consistent with literature.2 Since the main trigger was patient absence, the next step is to implement reduction strategies, starting by adequate documentation. Regarding anesthesia-associated causes, is important to understand the reasons for which a specific patient is cancelled, so we can further improve their preoperative assessment, risk stratification and clinical optimization.

References:

6107

Ambulatory surgery taken to the limit

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Background: The number and complexity of procedures and patients managed in ambulatory surgery have increased steadily.1 Dilated cardiomyopathy (DCMP) is associated with high perioperative morbidity and mortality.2,3 We report the anaesthetic management of a patient with alcoholic DCMP undergoing shoulder arthroscopy in the ambulatory setting.

Case Report: 44-year-old male, ASA IV, BMI 25.2, with recently diagnosed alcoholic DCMP (LVEF 30%), but clinically stable, was proposed for diagnostic shoulder arthroscopy in beach chair position. Patient was premedicated with 50mcg fentanyl + 1mg midazolam, and an interscalene and cervical superficial blocks were performed with 30ml, 0.75% ropivacaine. Intraoperative sedoanalgesia was attained with 10mg ketamine, 10mg propofol and 1g acetaminophen, 30mg cetorolac was the only analgesic required postoperatively. Surgery lasted 35 minutes and the patient was kept monitored in the postanaesthesia care unit for 2 hours, and discharged home the same evening. No complications were reported.

Discussion: Major advantages of ambulatory surgery depend on adequate patient evaluation and optimization for each type of surgery.1 Anaesthetic management of patients with DCMP is challenging and can be complicated by congestive heart failure and malignant arrhythmias;2,3 although ASA status alone is not a rejection criteria for ambulatory surgery1 Being able to perform the surgery with a peripheral nerve/plexus block (alone or in combination with sedoanalgesia) would avoid many of the complications associated with DCMP.2,3 Communication with the surgeon, the short-expected length and good patient collaboration were vital for the success of our anaesthetic approach.

References:

6236

Surgical outcome with topic anaesthesia for intracorneal rings – our reality

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Background and Goal of Study: Intracorneal ring implantation is used in the treatment of keratoconus in young patients, aiming to improve visual acuity. This surgery should take place in an outpatient regime with topic anaesthetic and light sedation. Despite the recommendations, most centres in our country often choose general anaesthesia as the first approach. This paper aims to describe our experience with this type of ambulatory surgery, evaluate surgeon satisfaction and surgical timing.

Materials and Methods: We have analysed physical and digital documentation about each patient submitted to ophthalmologic ambulatory surgery under the diagnosis of keratoconus between 2016 and the first semester of 2019. From a total of 88 cases we have excluded 31 due to bad codification or lack of information. Results and Discussion: From our initial 57 patients, 47.3% were male and all 57 were classified as ASA I or II. All patients were submitted to pre anaesthetic evaluation to select candidates and to clarify about the anaesthetic procedure. Our protocol included premedication with 1000mg acetaminophen IV and 1 mg midazolam IV. Topic anaesthesia was performed with oxybuprocaine. During surgical intervention, 22.8% of patients needed extra sedation or analgesia due to anxiety or difficult collaboration. Only one case was converted to general anaesthesia probably due to bad patient selection. The median surgical duration was 24.8 minutes and median post anaesthetic care unit duration was around 45 minutes. All patients returned home within the same day. All data was collected and analysed after ethical approval from our Hospital Ethics Committee.

Conclusion: Our centre protocol was successful in more than 75% of our patients. Although topic anaesthesia is a safe approach we have to consider patient limitations such as fear, anxiety or claustrophobia. Sedation/analgesia helps tolerate the surgical procedure and improves patient collaboration. With this approach we improve recovery without compromising surgical time. Surgeon satisfaction also improves with topical anaesthesia since they have immediate feedback from the patient, quicker turnover between patients and no overnight stay.

References:

4620

Dexmedetomidine sedoanalgesia in ophthalmology: can you see it?

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Background and Goal of Study: A significant proportion of patients that anesthetists deal in ophthalmology are elderly and with multiple comorbidities, making it sometimes challenging to achieve an optimal level of sedation and good surgical conditions. Dexmedetomidine (Dex) is a selective α2 agonist with sedative and anxiolytic action. It also seems to lower the intraocular pressure. The aim of this study is to evaluate the effect of dex sedation on patient and surgeon satisfaction in cataract surgery with intraocular lens implantation and vitrectomy.

Materials and Methods: We’ve conducted a prospective study on patients requiring sedation for cataract surgery with intraocular lens implantation and vitrectomy. Dex was initiated 30 minutes prior to surgery with an initial infusion dose of 0.6–1.2 mcg/Kg/h. Blinded interviews were conducted postoperatively in order to access patient and surgeon satisfaction using a 5-point satisfaction scale (very unsatisfied, unsatisfied, neither satisfied nor dissatisfied, satisfied, very satisfied). Data collection included RASS scale, perioperative pain, respiratory rate and hemodynamic parameters. Visual Analogue Scale(VAS) was used to quantify pain intensity.

Learning points: The increasing number of patients and procedures performed in the ambulatory setting has numerous advantages for patients, healthcare providers and hospitals. Despite the high morbimortality associated to DCMP patients, ambulatory surgery is not contra-indicated as long as proper preoperative optimization and close cooperation between patient and medical staff is maintained, allowing for same day patient discharge.
Results and Discussion: We analyzed 21 patients: 12 patients submitted to cataract extraction and 9 to vitrectomy. The mean age of the sample was 73 ± 9.05 (50-84); 52% (N=11) were ASA 2 and 48% (N=10) were ASA 3. At the end of the procedure 86% (N=18) of patients referred a VAS of (0 range 0 to 2), and 95% (N=20) said that were satisfied or very satisfied with the anesthesia provided. In 81% (N=17) of the cases the surgeon said that was satisfied and very satisfied with the surgical conditions. Most patients (62%) at the beginning of the procedure presented a RASS scale of -1 (Range -2 to 1). The most frequent cardiovascular adverse effect was bradycardia and it occurred in 5 patients (24%). There were no respiratory adverse events.

Conclusions: Dex sedation can be a precious help in sedoanalgesia for ophthalmological surgery. Despite being a small sample, our analysis revealed that most of the patients experienced no pain and were at least satisfied with the anesthesia provided. The same was observed for surgical conditions: ophthalmologists were often satisfied or very satisfied. The low infusion of Dex allowed patients to be cooperative when verbally stimulated during the procedure. Bradycardia was the most frequent lateral effect but was easily reversed in all cases.

### 4688

A comparison of general anesthesia and conscious sedation in procedure-related complications during esophageal endoscopic submucosal dissection

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Background and Goal of Study: Endoscopic submucosal dissection (ESD) has a favorable outcome compared to esophagectomy for early esophageal neoplasia. General anesthesia has been used recently for esophageal ESD to minimize complications from insufficient sedation and patient movement.

Materials and Methods: We retrospectively reviewed the electronic medical records of 158 patients who underwent esophageal ESD under general anesthesia or conscious sedation provided by anesthesiologists. We evaluated the incidence of procedure-related complications, including perforation, post-ESD bleeding, cardiopulmonary adverse events (arrhythmia, hypotension, and hypoxemia), stricture, aspiration pneumonia, and procedure failure. Frank perforation, post-ESD bleeding requiring a vigorous diagnostic approach, and cardiopulmonary adverse events were regarded as acute complications of ESD.

Results and Discussion: Acute complications occurred only in the conscious sedation group (8/83 (9.6%) vs. 0/75 (0.0%), p-value = 0.007). The numbers of patients with frank perforation, post-ESD bleeding, and cardiopulmonary adverse events were four, one, and three, respectively. Moreover, aspiration pneumonia after ESD occurred only in the conscious sedation group (7/83 (8.4%) vs. 0/75 (0.0%), p-value = 0.014). The ESD procedure failed in four patients in the conscious sedation group. The incidences of stricture requiring stent insertion and hospital stay after ESD were comparable between the two groups.

Conclusions: General anesthesia is associated with a lower incidence of acute procedure-related complications in esophageal ESD compared to conscious sedation provided by anesthesiologists. Therefore, we recommend general anesthesia as a safer option for esophageal ESD.

### 4689

A randomized controlled trial evaluating high flow nasal oxygen during ERCP in the prone position

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Background and Goal of Study: Sedation for endoscopic retrograde cholangiopancreatography (ERCP) can be challenging in that deep sedation is required in elderly patients in the prone position. The aim of the present study was to investigate and compare the effects of a high flow nasal oxygen (HFN0) delivery system and conventional nasal cannula oxygen delivery on oxygenation.

Materials and Methods: A prospective randomized trial with patients undergoing endoscopic retrograde cholangiopancreatography in the prone position. For each patient, the lowest oxygen saturation (SpO2) level, incidence of hypoxemia (SpO2 < 90%), and procedure interruptions due to airway interventions, as well as end-tidal CO2 (mmHg) at the end of the procedure, were recorded.

Results and Discussion: The lowest SpO2 recorded during the procedure was higher in the high flow nasal oxygen group than in the conventional control group (99.8 ± 0.6 % vs. 95.1 ± 7.3 %; p = 0.001). Hypoxemia occurred only in the control group [seven cases (19.4%); p = 0.011]. Procedural interruptions including discontinuing sedation, patient stimulation, and jaw thrusting occurred only in the control group [nine (25.0%), 10 (27.8%), and 10 (27.8%) cases, respectively; p = 0.001 for each]. End-tidal CO2 was lower in the high flow nasal oxygen group than in the control group (30.4 ± 6.6 mmHg vs. 33.9 ± 7.4 mmHg; p = 0.045).

Conclusion: High flow nasal oxygen provided adequate oxygenation without causing procedural interruptions during endoscopic retrograde cholangiopancreatography compared with conventional nasal cannula. We thus suggest that high flow nasal oxygen may be used as a standard oxygen delivery method in endoscopic retrograde cholangiopancreatography.

### Table 1. Comparison of outcomes between the HFN0 and control groups during ERCP

<table>
<thead>
<tr>
<th>Control group (N = 30)</th>
<th>HFN0 group (N = 30)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline SpO2 (%)</td>
<td>98.2 ± 1.6</td>
<td>97.5 ± 1.7</td>
</tr>
<tr>
<td>Lowest SpO2 (%) during procedure</td>
<td>90.1 ± 7.3</td>
<td>99.8 ± 6.5</td>
</tr>
<tr>
<td>Procedure interruption (%)</td>
<td>7 (19.4%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Procedure interruption (%)</td>
<td>10 (27.8%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>CO2 at end of procedure (mmHg)</td>
<td>33.9 ± 7.4</td>
<td>30.4 ± 6.6</td>
</tr>
</tbody>
</table>

### 4886

Vascular surgery for varicose veins in ambulatory: is there a better analgesic protocol to prevent post operative pain?

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Background and Goal of Study: Ambulatory surgery is growing from minor procedures performed on healthy patients to complex surgeries on elderly patients with multiple comorbidities. Thus, appropriate discharge assessment is important to secure safety and quality of care. (1) One of the major points for discharge is postoperative pain control. In this study we looked for differences between the use of an intraoperative analgesia strategy: Paracetamol (PA) vs PA+Parecoxib (PX) vs PA+Cetorolac (C) and PA+Metamizol (M). The primary endpoint was the use of rescue analgesia in postoperative period. Demographic parameters are evaluated and Chisq test were used to analyze and compare the main endpoint.

Results and Discussion: Mean age of the P was 49.5 (±12.5) years, with 60% female; 21% were classified as ASA I, 76% ASA II and 3% ASA III. The group distribution was: PA 21%, PX 28%; C 29% and M 22%. 6% of the patients had no pain in postoperative period, 24% mild pain, 34% moderate pain, 4% severe pain and 12% miss data. There were no significant statistical differences between the four groups (p=0.55). 64% of P required rescue analgesia in the postoperative period (29% non-opioid vs. 34% opioid use). Metamizol seems the most effective distribution was: PA 21%; PX 28%; C 29% and M 22%. 26% of the patients had rescue analgesia in postoperative period. Demographic parameters are evaluated to the intraoperative analgesia strategy: Paracetamol (PA) vs PA+Parecoxib (PX) was recruited according to the inclusion criteria: >18 years, outpatient, general surgery for varicose veins in ambulatory: is there a better analgesic protocol to prevent post operative pain?
the importance of multimodal analgesia in the control of postoperative pain. We emphasize that a study with a larger number of patients may lead to different results. With the progressive requirement of outpatient surgery, it will be pertinent to conduct such studies in order to optimize analgesia, patient satisfaction and safety.

References:

4952

The outpatient anesthesia problems with adult dentistry patients

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Background and Goal of Study: A significant part of dental care is provided in outpatient dental clinics. For the quality treatment of adult patients with concomitant diseases, allergies, the presence of a vomiting reflex, fear and more, the special treatment approach and mental comfort of the patient are highly required. One of the best ways is anesthetiologic support, which consists of the combined use of analgesolysis and local anesthesia. To analyze the problems that arise during analgesolysis in outpatient dental patients.

Methods and materials: The evaluation term of 1454 analgesolyses, which were conducted in 2013-2018 in adult patients at private dental clinics, was analyzed. Age, gender, ASA physical status, duration, and complications during the postoperative period were recorded.

Results and Discussion: The average age of patients was 52 ± 13 years (25 to 93 years), 45% of patients were older than 60 years. There were 804 males (55%) and 650 females (45%), ASA I - 611 (42%), ASA II - 598 (48%), ASA III - 45 patients (10%). All patients were operated under local anesthesia and analgesolysis: analgesia was administered by fentanyl and desmoprophene, sedation by propofol, dexametomidine, sometimes by thiopental and midazolam. All patients were closely monitored. The average time of treatment was 100 min, analgesolysis 115 min. The duration of the analgesolysis was smooth, which made it possible to carry out the dental treatment as planned. The following problems were reported during the analgesolysis: 14 cases of paroxysmal tachycardia; 37 bleeding from the operating wound; increase in BP, which required the introduction of antihypertensive drugs in 31% of patients, hemostatics were administered in 70% of patients. At discharge from the clinic, patients met the criteria of the PADS scale on average 2 hours after the end of the procedure. The emotional state of the patients after the intervention under the analgesolysis is much more positive. The postoperative period was more smoothly because the toothache is favorably influenced by the residual background of central action analgesics.

Conclusions: The most common problems during analgesolysis for outpatient dental interventions are arterial hypertension, cardiac arrhythmias, and bleeding. An analgesolysis allows for outpatient dental manipulations of any complexity.

5451

Impact of anaesthesia on delay and failure-to-launch rate for same-day discharge total hip replacement patients

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Background and Goal of Study: Same-day discharge (SSD) for total hip arthroplasty (THA) has been made possible by minimally invasive surgery and advances in ambulatory anaesthesia. We endeavoured to analyse the most recent data available over a year and determine which factors are associated with failure to discharge (‘failure to launch’) patients on the same day. We were especially interested in comparing intrathecal bupivacaine vs. ropivacaine to ascertain whether ropivacaine, which is shorter acting1, would lead to an earlier discharge from post-anaesthesia care unit (PACU).

Materials and Methods: Following IRB approval, data of patients undergoing THA and scheduled for SSD from May 2018 until April 2019 were retrospectively collected. Demographics including smoking status, anaesthesia type and medications, surgical time, time in Phase I PACU and opioid analgesics administered in the PACU expressed as morphine equivalent were recorded.

Results and Discussion: Two hundred eighty-one patients’ records were analysed. Only three patients received general anaesthesia. No patient receiving spinal anaesthesia had to be administered unanticipated general anaesthesia. Fourteen patients could not be discharged on the day of surgery (aspiration: 1; syncpe/ light-headedness: 7; severe nausea: 2; uncontrolled pain: 2; excessive blood loss/ drainage: 2). A further four patients, while being discharged on the day of surgery, were readmitted and/or revised within two weeks. A Pearson correlation coefficient table was built to explore the relationship between the various data collected. None of the variables was significantly associated with a failure to discharge the patient on the day of surgery. The use of intrathecal ropivacaine significantly shortened the time to discharge from Phase I PACU (79 ± 38.9 vs. 112 ± 54.1 minutes; p < 0.001).

Conclusion: The fact that we could not find any predictor of the failure to discharge is probably a reflection of careful pre-operative patient selection. Intrathecal ropivacaine is clearly shorter acting than bupivacaine and should be used preferentially. Using even shorter acting medications such as mevipacine2 or chloroprocaine might lead to even shorter discharge times but an unanticipated longer induction of surgery might then necessitate conversion to general anaesthesia.

References:

5462

Anesthesia for gynecological major ambulatory surgery: our experience

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Background and Goal of Study: Major Ambulatory Surgery (MAS) is considered a big advance in health sector. It can be applied to many surgeries and the anesthesiologist has an important role on it. We present data from MAS gynecologic interventions performed in our centre.

Materials and Methods: We’ve made a study of women undergoing gynecological laparoscopic surgery in MAS. Patients were followed during the first postoperative week. Informed consent was obtained. Registered variables were age, ASA score, visual analog scale (VAS) score for pain, need for analgesic rescues, oral tolerance, presence of complications and general condition.

Results and Discussion: Our 56 patients were aged 20 to 70 and presented ASA scores I, II and III (68%, 28% and 4% respectively). Interventions included diagnostic laparoscopy, tubaric ligation, salpingectomy, cystectomy, and laparoscopic adhesiolysis.

Results showed: In PACU (Post Anesthesia Care Unit), incidence of early PONV (Postoperative nausea and vomiting) was 5.35%. 80% of patients were discharged to MAS unit in less than 90 minutes. One patient required hospital admission for post-surgical complication (hemoperitoneum). Overall readmission rate was 1.78%. 74% said that they were satisfied with the intervention. After 48h, incidence of nausea remained at 7.6%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their normal activities. 45.09% had a good general condition. After 24h, only 62.71% took analgesics. 7.8% had nauseous sensation. All them had drunk normally and 90.2% had eaten normally. 27.45% had returned to normal activities. 45.09% had a good general condition. After 48h, incidence of nausea remained at 7.6%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their normal activities and 7.8% had joined their job. 80.39% rated their general condition as good. MAS is acquiring a great importance due to the decrease of costs and great acceptance by users. Gynecological surgery on a MAS regimen has experienced an increase in recent years since it is minimally invasive surgery, with a low rate of local and systemic complications, and few anesthetic contraindications. In order to obtain satisfactory results it is important to have a well-structured circuit, make an adequate selection of patients and procedures, and inform patients extensively.

Conclusion: These data show the current state of MAS in our center, a tertiary hospital with 1086 beds. They are good general results showing MAS as a good alternative to perform gynecologic surgical procedures.
Postoperative nausea and vomiting in children – our experience in the ambulatory setting

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) incidence in childhood ranges between 13 and 42% (1), can be even higher in outpatients (2) and is twice as high compared with adults. PONV can result in increased risk of bleeding, wound dehiscence, prolonged postanaesthetic care unit stay and unanticipated hospital admission (2). This high incidence warrants the use of antiemetic prophylaxis instead of therapy. Our main goal was to audit PONV rate in paediatric population, comparing it to the literature findings, and if measures to avoid PONV were adequately taken.

Materials and Methods: This study occurred in our hospital for a period of two years. Patient inclusion excluded patients of type surgery and intraoperative period was recorded. In the PACU, nausea, vomit and PONV therapeutic administration were registered. In the first day after surgery, our staff called the parents to ask about nausea, vomit and the need to take the PONV prophylaxis prescribed. Descriptive analysis was performed with SPSS software, version 24.

Results and Discussion: Our population had 234 patients: 57% male, 11% under 3 years. ASA functional status was 1 in 71,8% of patients, 2 in 26,5% and 3 in 1,7%. 45,3% of surgeries performed had risk for PONV. The most common surgery performed was adenotonsillectomy, which increases PONV risk. Only 4,7% patients didn’t have risk factor for PONV, almost half (47,4%) had 3 risk factors. Intraoperative PONV prophylaxis was performed in 88,9% patients: double therapy in 49,6% cases and triple in 27,8%. Any studies regarding prevalence and number of antiemetics used in paediatric setting were found to compare to these values. Nitrous oxide was used in 1,7% of patients and neostigmine in 10,7% of cases. PONV occurred in 1,7% of patients and no patient was unexpectedly admitted. Despite PONV incidence described is higher in child, in our ambulatory setting we had an expressively low incidence. The reduced number of PONV cases limited the statistical analysis.

Conclusion: In our population, we had a high prevalence of antiemetic prophylaxis administration and a low prevalence of PONV. Although a casual link can’t be established, our data suggests that administration of prophylactic antiemetics and also eviction of emetic factors may play an important role in reducing PONV in children on day surgery.

References:

Learning points: day care surgery, improving locoregional breast cancer treatment, team working, selecting patients.

6369

Comparison of pain between unilateral and bilateral inguinal hernia repair in a tertiary hospital surgical day care center

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Background and Goal of Study: We aim to measure pain at Post Anesthetic Unit entry. 24 hours (h) and 30 days, postoperative complications, daily activity constraints and time to professional reintegration between unilateral and bilateral inguinal hernia repair surgery to assess any potential benefit of bilateral surgery.

Results and Discussion: 176 unilateral and 39 bilateral hernia repairs, median age (interquartile range, IQR) 55(19) years vs 51(24) years (p=0.12). 85.8% vs 100% males (p=0.03) with similar ASA-PS (p=0.36) and no differences in the analgesic scheme between groups (table 1). Pain at PACU entry was similar in both groups (median VAS[IQR]: 0[0], p=0.91). Although bilateral surgery was associated with greater pain (median VAS[IQR]) at 24h and 30 days (0[2] vs 0[3], p=0.03 and 0[2] vs 0[3], p=0.03) there were no statistically significant differences in restriction to daily life activity (p=0.28) or time to return to work (p=0.40). There were also no differences in incidence of postoperative complications (table 2).

Conclusion: In terms of pain control at PACU, 24h and 30 days our study did not show differences between unilateral and bilateral hernia repair. And also there is no difference on resume normal daily activities and work. The main limitation of this work is the study design.

6281

Breast cancer with intraoperative radiotherapy in hybrid operating room under general anesthesia. First experience in Argentina

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Background: The possibility of reducing aggression and duration of breast cancer treatment is an option in select patients or with difficulties accessing the radiotherapy treatment. The IORT technique (mammary quadrantectomy plus sentinel node plus radiotherapy) is a novel technique that provides complete treatment to selected patients, saving several weeks of treatment and avoid radiating other organs. This hybrid operating room is placed in a day care center, where must be combined surgery, radiotherapy and anesthesia patients, generating cost efficient outcomes, faster outcome and one case of postoperative delirium 24hs postoperative no need to be treated.

Discussion: The IORT thecnique is a reality in the city of Rosario Argentina, learning points: day care surgery, improving locoregional brest cancer treatment, team working, selecting patients.

6377

Spinal versus general anesthesia for hemorrhoidectomy in a tertiary hospital surgical day care center

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Background and Goal of Study: We aim to measure pain at Post Anesthetic Care Unit (PACU) entry, 24 hours (h) and 30 days, nausea/vomiting, daily activity constraints and time to professional reintegration between general (GA) and spinal anesthesia (SA) in hemorrhoidectomies performed in ambulatory setting.

Materials and Methods: Observational study, retrospective cohort from a Portuguese tertiary hospital surgical day care center. Inclusion criteria: hemorrhoidectomy performed in ambulatory setting. Exclusion criteria: age <18 years, absent medical data from Electronic Health Record.

Results and Discussion: 49 GA and 13 SA, median ages (interquartile range) 49(14) years and 46(6) years (p=0.24). 51% vs 53% males (p=0.86) and all ASA-

Conclusion: In terms of pain control at PACU, 24h and 30 days our study did not show differences between unilateral and bilateral hernia repair. And also there is no difference on resume normal daily activities and work. The main limitation of this work is the study design.
Incidence of hypotension and hypoxemia during procedural sedation in relation to the duration of supraventricular cardiac ablations, a retrospective cohort study

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Background and Goal of Study: Arrhythmias are treated by cardiac ablation (CA) performed under moderate-to-deep sedation (MDS). CA can take up to several hours. A previous study found an association between the risk of a sedation related adverse event and procedure duration. We investigated the incidence of sedation related events (SRE) using Target Controlled Infusions (TCI) of propofol and remifentanil in relation to the duration of the procedure.

Materials and Methods: In this retrospective cohort study we reviewed the anesthetic records of 229 patients undergoing CA for supraventricular arrhythmias under MDS, between January – November 2019 in the University Medical Center Groningen. An IRB waiver was obtained. SRE related events were described by hypotension: mean arterial pressure below 65 mmHg, longer than 10 minutes requiring treatment. Hypoxemia: any oxygen saturation below 75% or oxygen saturation below 90% for more than 60 seconds. Procedures were divided into 2 groups: group A ≤120 minutes, group B >120 minutes. MDS was administered using the Minto model. Patients received a single bolus of 5-10 mg esketamine. Sedation was targeted at an Observer’s Assessment of Alertness and Sedation score of 3 to 2. Statistical analyses included Student t-test and Chi-square test. P-values <0.05 were considered statistically significant.

Results and Discussion: Demographic characteristics were similar in both groups (Table 1). There were no SRE’s in group A and three SRE’s in group B (p = 0.149): hypotension (2) and hypoxemia (1). However, all these events took place in the first two hours after the start of the procedure. All procedures were completed and no patient suffered lasting health consequences. Our data suggest that procedure duration was not a risk factor for hypotension and hypoxemia. However, a larger prospective study is needed to obtain more data.

Conclusion: In this study procedure duration is not a risk factor for hypoxemia and hypotension. However, a larger prospective study is needed to obtain more data.

Reference:
developing PIA graded as severe in Group C, whereas none in Group P.

**Conclusion:** The present study demonstrates that an additional dose of bolus propofol (0.5mg/kg) after ECT sessions seems to be ideal for reducing the incidence of PIA, especially at 5th minutes after ECT. Due to its short half life, recall-propofol does not affect the incidence of PIA emerging at the late period after ECT. In conclusion, recall-dose propofol should be considered in patients undergoing ECT who may develop severe PIA.

**References:**

**4954**

**Laparoscopic nissen fundoplication on a patient with patent foramen ovale in ambulatory surgery**

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**Background:** Patent foramen ovale (PFO) is estimated to have a prevalence of 25%. PFO has the potential for right-to-left shunt, hypoxemia, paradoxical embolization and ischemic stroke. Despite its advantages compared to open surgical techniques, the safety of laparoscopic surgery in patients with congenital heart disease has been controversial, being contraindicated in some reports (1). During pneumoperitoneum, the possibility of paradoxical air embolism (PAE) in patients already at risk makes the anesthesia special. Furthermore, there are no case reports in ambulatory surgery and no consensus of the minimal standard care.

**Case Report:** A 60 year old female patient with gastroesophageal reflux disease was evaluated for laparoscopic Nissen Fundoplication as day surgery. The patient had been recently diagnosed with a PFO with a left-to-right shunt without surgical indication. After discussion, the team decided to perform laparoscopic surgery with increased surveillance for embolic events, limited intraabdominal pressure and slow rate of pneumoperitoneum insufflation. Additionally, if necessary, a hyperbaric chamber is available at the hospital. Surgery was conducted without complications, and the patient was then taken to the postoperative recovery unit. It was decided to keep the patient under surveillance during an overnight stay, in order to quickly detect and respond to any complications. The patient was discharged the day after.

**Discussion:** Noting both the benefits of laparoscopic surgery and the substantial incidence of PFO in the general population (2), the attending and consulting surgeons reasoned that the benefits of laparoscopy greatly exceeded an immeasurably small risk of paradoxical emboli. Although transesophageal echocardiography is the most sensitive monitor for PAE diagnosis, its implementation is not always possible (3). We report a successful case of ambulatory surgery in the presence of a heart condition in which laparoscopic surgery was safely applied with a previously outlined multidisciplinary plan, careful clinical observation and haemodynamic monitoring.

**References:**

**4986**

**Jaw Elevation Device (JED™) use during In-Vitro Fertilization (IVF) procedures under deep sedation**

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**Background and Goal of Study:** IVF is a painful and disturbing interventional procedure and often requires analgesia or anesthesia. Upper airway obstruction may occur in varying degrees in patients undergoing this procedure under sedation. The aim of this study consists of collecting upper airway obstruction occurrence, haemodynamic and ventilatory data and validating the effectiveness of the device, on patients undergoing IVF procedure using procedural sedation and analgesia, and if necessary, to report the use of Jaw Elevation Device (JED™).

**Materials and Methods:** This study is a retrospective data analysis from outpatient, ASA (American Society of Anesthesiologists) I-II and over 18 years of age patient files who underwent IVF procedure in our hospital’s IVF center between the dates May 2016 and May 2018 after approval from Non-Interventional Research Ethics Committee, Dokuz Eylül University Faculty of Medicine. Patients were separated into two groups, according to JED utilization. Demographics and ASA standard monitoring data are collected. Upper airway obstruction time and duration and occurrences during procedure, applied airway maneuvers and their effectiveness, JED utilization and alternative airway management data are collected.

**Results and Discussion:** In our study, data from a total of 130 patients, who underwent oocyte collection procedure under deep sedation is evaluated. In 65 of these patients there were JED utilization. Mean age of patients were 32.9, 33.2 and 33.09; mean body mass index values were 25.79, 24.15 and 24.97; in the control group, JED group and total, respectively. ASA risk score distribution was 44 and 39 ASA I patients; 21 and 26 ASA II patients in the control and JED groups, respectively. Upper airway obstruction occurrence noted in 32 of the patients in control group and in 30 of the patients in JED group. Alternative airway management were employed in 3 and 7 patients in control and JED groups, respectively. The study has the largest population according to similar studies which are associated with JED, providing better opinion about the use of the device.

**Conclusion:** Jaw Elevation Device’s utilization is useful for maintaining an open upper airway during interventional procedures which require a deep sedation plane. However, it is necessary to make proper patient selection without head/neck abnormalities and usage under close vigilance/supervision due to the device’s “slight” inadequacy/imperfection at maintaining an open upper airway.
Ephedrine Prevents Orthostatic Hypotension Immediately After Dental Treatment under Dexmedetomidine Sedation

Background and Goal of Study: Office based dental treatment is undergone in patients with semi-supine position using a reclining chair. We administer dexmedetomidine (Dex) as a sedative during surgical procedure for maintaining patients’ comfortability. Dex has a sympatholytic effect, and heart rate and blood pressure are decreased. After the treatment, the patient is returned to sitting position. Some patients demonstrate mild orthostatic hypotension without reflective increase of heart rate. Thus, we preliminary evaluated the prophylactic effect of ephedrine (Ephe) administration at the end of surgery to prevent from hypotension.

Materials and Methods: After the approval of Ethical Committee of the Institute, prospective, single-blinded randomized study was conducted. 20 adult patients participated in the study after giving written informed consent. The patients were allocated into 2 groups: no intervention otherwise Dex infusion (Control group) and 10-µg Ephe was administered 5 min before the position change to sitting from semi-supine (Ephe group). ASA standard monitor was applied. 6-µg/kg/h Dex was infused 10 min as a loading and subsequently 0.7-µg/kg/h Dex was continuously infused. The infusion was terminated 10 min before the end of the procedure. The changes in the vital signs were observed until returning to the patient to a bed in the ward.

Results and Discussion: There was no difference in patients’ background between the groups (Table). Immediately after the position change, there was no significant difference in heart rate (Figure). However, blood pressure was significantly higher in Ephe group.

Although one of the most emphasized advantage of Dex is providing mild analgesic effect in addition to sedative properties. Cardiovascular effect might be small but sympathetic activities decreased during and after the infusion. 10-µg Ephe administration immediately before the position change effectively maintained the blood pressure after the Dex sedation.

Conclusion: Dexmedetomidine-propofol and ketamine-propofol combinations may be suitable for endoscopy sedation due to their different properties.

References:

Acknowledgements: We thank scribendi for editing.

5843

Performance of Spinal Block With Prilocaine 2% Hyperbaric Solution in Ambulatory Surgery Clinical Setting

Background and Goal of Study: Prilocaine is a local anesthetic characterized by intermediate potency and duration and fast onset of action. A recent formulation of 2% hyperbaric solution is currently available in Europe. With an advocated better safety profile, prilocaine is suggested as substitute to lidocaine, mevipacaine, and to low doses of long-acting local anesthetics in spinal anaesthesia for ambulatory surgery. The relatively sparse and low quality amount of evidence available does not allow a rigorous evidence-based evaluation of its characteristics in the clinical setting.

Materials and Methods: We evaluated the patients who went through ambulatory surgery under spinal block with prilocaine 2% hyperbaric solution over a period of six months at our institution and analysed the data using standard statistical methods.

Results and Discussion: We assessed data from 41 patients: 21 cases of lower limb surgery, 14 cases of inguinal hernia repair and 6 cases of other pelvic region procedures. The time to achieve desired level block was 6 ± 2.2 min. Time to regression of the motor block was 101.8 ± 38.1 min. Time to regression of the sensorial block was 118.4 ± 36.1 min. Time to unassisted ambulation was 247.8 ± 81.9 min. Time to first voiding was 298.2 ± 186.1 min. Time to home discharge was 267.4 ± 92.7 min. There was one failed block. There were no severe adverse events recorded. Three patients had hypotension easily treated.

Conclusion: Spinal Block With Prilocaine 2% Hyperbaric Solution proved to be an efficient and reliable anesthetic strategy for short to intermediate length ambulatory procedures.
Anaesthetic management in a patient with glucose-6-phosphate dehydrogenase deficiency undergoing an out-patient surgery

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Background: Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is an X-linked recessive enzymeopathy responsible for acute haemolysis following exposure to oxidative stress. Drugs which induce haemolysis in these patients are often used in anaesthesia and perioperative pain management. Here, we present a patient with G-6-PD deficiency who underwent uneventful ambulatory surgery.

Case Report: A 20-year-old female patient, ASA II, presented for multiple dental extractions under general anaesthesia in our Ambulatory Unit. Past history revealed well-controlled asthma and G-6-PD deficiency with no history of haemolysis, jaundice or blood transfusion. All the routine investigations were within normal limits (haemoglobin 13.4 g%). In the operating room, fentanyl 0.1mg and propofol 200mg were administered and nasotracheal intubation was facilitated with rocuronium 40mg. Standard ASA monitoring as well as bispectral index and neuromuscular monitoring were applied. Anaesthesia was maintained with iv propofol and intermittent boluses of rocuronium and fentanyl. Cefazolin 2g was given iv as prophylactic antibiotics. The uneventful surgery lasted for 55 minutes. At the end of procedure, anaesthetic agents were discontinued, residual neuromuscular blockade was reversed with neostigmine and atropine and patient was extubated. Paracetamol 1g and metamizole 2g were given for postoperative analgesia. After 3 hours without incidents in the Post Anaesthesia Care Unit, the patient was informed of signs of acute haemolysis and was discharged. Post-surgery calls at 24 hours, 72 hours and at the 7th day revealed the remaining postoperative course was uneventful.

Discussion: During surgery, anaesthetic management should focus on minimizing oxidative stress, and monitoring and treating hemolysis. Drugs that cause oxidative stress and/or induce methemoglobinemia should be avoided in G6PD-deficient patients. However, there is no evidence-based consensus regarding the use of anaesthetic agents in patients with G6PD deficiency. In our case, fentanyl, propofol, rocuronium, paracetamol and metamizole were found to be safe.

References:

Learning points: The inadequate management of G6PD-deficient patients increases the risk of them developing acute hemolytic anemia. We found that, with careful selection, G6PD-deficient patients can be eligible for out-patient surgery.

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A randomised comparison of lumbar plexus, fascia iliaca and femoral nerve blocks for analgesia after hip fracture surgery: a preliminary report

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Background and Goal of Study: Postoperative pain following hip fracture surgery limits patient’s mobility and thereby increases morbidity and mortality. Several peripheral nerve block (PNB) techniques provide adequate analgesia for hip fracture operations which involve the hip joint, proximal femur, and skin of the lateral thigh. This study aims to compare three PNBs, the lumbar plexus block (LPB), fascia iliaca block (FIB) and femoral nerve block (FNB), for acute pain control after hip fracture surgery.

Materials and Methods: This study obtained ethics approval and was registered at the Thai Clinical Trial Registry prior to patient enrollment. A total of 135 patients undergoing dynamic hip screw, intramedullary nail or bipolar hemiarthroplasty were planned to be equally randomised to either the LPB, FIB or FNB groups. All patients received ultrason-guided PNB, using a mixture of 25 mL of levobupivacaine 0.3%, adrenaline 5 µg/mL and dexamethasone 5 mg, before a spinal block (SPB).

Results: From August 2018 to October 2019, 80 out of 135 patients were recruited with comparable demographic data, types of operation, and SPB technique among the three groups. Three patients were excluded due to conversion to general anaesthesia, leaving 25, 26 and 26 patients in the LPB, FIB and FNB groups, respectively. Postoperative morphine consumption [median(IQR); 2(0-3) vs 3(0-4) vs 3(0-4) mg; P=0.905] and 4-point verbal rating scale [median(IQR); 0(0-1) vs 0(0-0) vs 0(0-1); P=0.216] at 24 hours were not different among the groups. The median(IQR) times for performing the LPB, FIB and FNB were 5.4(4.2-6.7), 3.5(3.0-6.4) and 2.9(2.5-4.1) minutes. When compared between groups, the procedural time of the LPB was more than the FIB [P<0.019] and the FNB [P<0.001], and that of the FIB was longer than the FNB [P=0.019]. There were no vascular puncture, paresthesia or LA toxicity from all PNBs. Patients started walking with aid on postoperative day 1-3 in all groups [P=0.863].

Conclusions: From the preliminary results, the LPB, FIB and FNB provided effective pain control after hip fracture surgery. The ultrasound-guided FNB had the shortest procedural time as implying the simplest technique.

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Compartment psoas block efficacy and safety for elderly patients with proximal femur fractures

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Background and Goal of Study: Proximal femur fractures are most common fractures in the elderly and associated with significant mortality and morbidity, with high economic and social impact. Perioperative pain management influence outcomes and mortality after femur surgery with early mobilization being possible. The goal of the study was to compare the efficacy and safety of the compartment psoas block for perioperative analgesia in elderly patients with proximal femur fractures.

Materials and Methods: The randomized controlled study was held in medical center «Into-Sana» (Odesa, Ukraine). Patients with proximal femur fractures and older than 60 years were included in the study. They were randomly allocated to 3 groups – compartment psoas block group (bupivacaine analgesia was started as soon as possible before surgery and prolonged during and after surgery with additional ischiaticus block for surgical anesthesia); spinal anesthesia (SA) group and general (inhaled) anesthesia (GA) group, both with systemic analgesia perioperatively (acetaminophen, NSAIDS, nalbuphine on demand). Categorical data are presented as proportions and continuous data as medians with 25–75% interquartile ranges (IQRs). To assess significance levels, a Kruskal-Wallis test and Fisher’s exact test were used. A p-value of <0.05 was considered significant.

Results and Discussion: 90 patients were included in this study (30 in each group
Comparison of the analgesic effects of adding infiltration between popliteal vessel and capsule of the knee (IPACK) to femoral triangle block for anterior cruciate ligament reconstruction (ACLR): retrospective cohort

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Background and Goal of Study: ACLR is associated with moderate to severe pain, performed generally on an ambulatory basis. Hamstring graft technique, as well as tibial or femoral tunnels, gives a potential source of pain at the posterior aspect of the thigh and knee, exceeding the territory covered by femoral (FB) or femoral triangle (FT) blockades. IPACK blocks sensory nerves coming from the posterior aspect of the knee. The aim of this study was to evaluate the analgesic effects of adding IPACK to FT in ACLR since there are no studies comparing these strategies.

Materials and Methods: This study was conducted at Hospital Italiano de Buenos Aires. Data was extracted from clinical records. We included patients undergoing ACLR (hamstring graft) under general anesthesia and receiving ultrasound-guided FT (at the apex of FT) with or without IPACK (20 ml 0.375% ropivacaine) between June 2016 and June 2019. Patient demographics, anesthetic strategy, postoperative verbal numerical pain scale (VNS), AINEs and opioids (as oral morphine equivalents) administration and total time in post anesthesia care unit (PACU) were examined. Qualitative data were compared using chi-square or Fisher’s exact tests, and quantitative data using Wilcoxon rank-sum test. We used multiple logistic regression to evaluate association between anesthetic strategy and rescue analgesic needs.

Results and Discussion: 180 patients were included, 84 in the FT group and 96 in the IPACK+FT group. VNS pain scores within the first 60 minutes were lower in the IPACK group (29%) than the FT group (50%). There were no significant differences in total opioid administration. The lack of addition of IPACK to FT was associated with a greater need of rescue analgesia (OR 2.46 CI 1.29-4.65 p=0.006) and rescue opioid requirements (OR 2.07 CI 1.29-3.31 p=0.001). There were no differences in the incidence of hospital acquired pneumonia and delirium.

Conclusion: Adding IPACK to FT reduce VNS scores during the first postoperative hour in the PACU and significantly reduce rescue analgesic requirements during total stay in PACU.

References
Regional Anaesthesiology

Comparison of adductor canal block and IPACK block (interspace between the popliteal artery and the capsule of the posterior knee) with adductor canal block and periaricular injection after total knee arthroplasty: preliminary results of a prospective randomized trial

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Background and Goal of Study: Total knee arthroplasty (TKA) has become one of the most common surgical procedures worldwide. Optimal post-operative pain management with multimodal analgesia approach based on regional techniques and systemic analgesics is the cornerstone of enhanced recovery after surgery. The aim of our study was to determine whether the infiltration between the popliteal artery and capsule of the posterior knee block (IPACK), in combination with adductor canal block (ACB), improved analgesia compared to periaricular injection (PAI) after unilateral TKA.

Materials and Methods: This randomized controlled trial included patients undergoing unilateral TKA. Patients either received a PAI with ACB (Group 1) or an IPACK with an ACB (Group 2). The primary outcome was opioid consumption during the first 48 hours post-operatively. The secondary outcomes included visual analogue scale (VAS) at rest and on ambulation on post-operative day one and two (POD 1 and POD 2), time up and go (TUG) test, the range of movement (ROM) and patient satisfaction.

Results and Discussion: Nineteen patients were included in each group. Patients of the Group 1 had less opioid consumption (p=0.05) with significantly lower VAS scores on ambulation (POD1: p=0.033/ POD2: p=0.033) and at rest from the 18-post-operative hour and were more satisfied. However, there was no significantly differences in the mean ROM of knee or in median TUG test between the two groups.

Conclusion: ACB+PAI offers improved pain management in the immediate postoperative period resulting in better patient satisfaction compared to ACB+IPACK. Further studies with larger sample size, evaluating the dose and mode of administration (single shot vs. continuous infusion) of the anesthetic used will probably help in designing optimal pain management protocols after TKA.

Acknowledgements: We gratefully acknowledge Mme Sonia, the kinesiologist for her outstanding contribution to achieve the study.

Femoral triangle and adductor canal blocks versus femoral nerve block for total knee arthroplasty: postoperative pain management and functional recovery

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Background and Goal of Study: Adequate postoperative pain control after knee joint replacement surgery helps to improve patient satisfaction, promote earlier mobilization and functional recovery and reduce the risk of postoperative complications. The aim of the study is to compare femoral triangle and adductor canal blocks with femoral nerve block in order to evaluate postoperative pain management and functional recovery in patients following elective knee arthroplasty.

Materials and Methods: The prospective, double-blinded, randomized study was approved by the local Ethics Committee. 77 patients undergoing elective knee arthroplasty under the spinal anaesthesia were included. Preoperatively all patients were randomized into one of two groups: femoral triangle and distal adductor canal blocks with femoral nerve block in order to evaluate postoperative pain management and functional recovery and reduce the risk of postoperative complications. The aim of the study is to compare femoral triangle and adductor canal blocks with femoral nerve block in order to evaluate postoperative pain management and functional recovery in patients following elective knee arthroplasty.
postoperative knee pain in different leg positions less than 5 points according to VAS. However, there was no difference in pain scores at all time points after the surgery (p > 0.05). Furthermore, there was no difference in requirement of additional opioid analgesics and their adverse effects at all time points (p > 0.05).

Conclusion: FT + AC blocks result in lower extent of motor blockade at first 6 postoperative hours. FT + AC blocks and FN block effectively reduce postoperative pain after the elective knee arthroplasty.

The second group consists of 25 patients with spinal block, accomplished with Marcaine and intrathecal Morphone, providing postoperative analgesia for about 20-24 hours. Postoperative analgesia is provided by Metamizole and Tramadol in recommended doses for patients with GA. Venous blood samples are tested among all patients in order to follow the cortisol's levels before operation, 30 minutes after surgical incision and one hour after the end of the surgical intervention.

Results and Discussion: There were significant differences between the two groups of patients (with spinal block or general anaesthesia) in intraoperative (p=0.003) and postoperative (p=0.0001) cortisol levels.

Conclusion: Neuroaxial anaesthesia is a powerful reducer of stress response in “fast-track” hip prosthesis - attenuates the perioperative stress, postoperative pain and discomfort.

5796
Continuous PENG block: is it possible?
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Background: Peripheral nerve blocks are becoming popular in hip surgery analgesia. Ultrasound guided techniques for blockade of articular hip branches include the PENG block, described by Grönl-Arago, Peng and col., with proven good results. The possibility in placement and permanence of catheters on this anatomic site has not yet been tested. We studied the placement of a catheter at the level of the injection target site of the PENG Block, analysing the challenges and advantages of this technique.

Case Report: A 78-year-old female patient, (155cm, 50kg), ASA III, hospitalized with hip fracture was submitted to hip replacement technique. A combined general anaesthesia with an ultrasound guided PENG block with catheter was proposed to the patient and fully accepted. The PENG block technique, before general anaesthesia, was used: needle tip psosas tendon anteriorly / pubic branch posteriorly. Hydrodissection was performed with Ropivacaine 0.5%, 20ml and the catheter was introduced. The catheter placement was between the psosas tendon and the ischipsubial branch and fixation site at 10cm at the skin. In the postoperative period the analgesia was assured by continuous pumping infusion of Ropivacaine 0.2% 6ml/h for 48h. Analgesia was supplemented with paracetamol and tramadol. Patient reported no resting pain during the next 48h and Visual Analog Scale for Pain was 3/10.

Discussion: Analgesia and early rehabilitation in hip surgery is a challenge for the anaesthesiologist. PENG Block is a recent approach that covers the blockade of 3 nerves that give innervation to the anterior hip capsule. We placed this catheter with the aim of prolonging analgesia, reducing opioid consumption and accelerating rehabilitation process.

References:
3. Learning by heart: The fixation site for the continuous PENG block is a true point to consider with the surgeon before the intervention. The correct location of the catheter tip is very important to achieve correct diffusion of local anaesthetic. We believe that this is just the tip of the iceberg and there is still much to know about the placement and handling of catheters at the PENG block site.

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Single injection ultrasound-guided thoracic paravertebral block versus transversus abdominis plane block in peritoneal dialysis catheter implantation: a randomized controlled trial
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Background and Goal of Study: Ultrasound-guided thoracic paravertebral block (US-TPVB) is generally used for postoperative analgesia. We hypothesized that single-injection US-TPVB could be used as the principal anesthetic technique for peritoneal dialysis catheter (PDC) implantations. The anesthetic effect of a single-injection TPVB would be compared with that of a transversus abdominis plane (TAP) block and local anesthetic infiltration (LAI).

Materials and Methods: Patients undergoing PDC implantations were randomized into Groups TPVB, or TAP or LAI. In Group TPVB, single-injection US-TPVB at T10-T11 level was performed with 20ml of 0.25% ropivacaine. In Group TAP, ultrasound-guided oblique subcostal TAP block was performed with 20ml of 0.25% ropivacaine. In Group LAI, 40ml of 0.25% ropivacaine were used. The quality of analgesia was compared among the three groups.

Results and Discussion: Eighty-eight eligible patients were enrolled. The majority of patients in Groups TPVB (24 of 28), TAP (30/30) and LAI (24 of 30) underwent PDC implantations successfully. Lower general anesthesia conversion rate and higher satisfaction rates by nephrologists and patients were observed in Group TAP, compared with Groups TPVB and LAI.VAS at the majority of time points were lower in Group TAP, except for at the catheter exit sites. Less rescuing sufentanil was consumed in Group TAP. The boundaries of area with surgical anesthesia was smaller. Therefore, TPVB could possibly provide a better anesthetic effect than that of a TAP block for PDC implantation. However, poor predictability of spread of local anesthetics in TPVB consequently affected the reliability of its block. In the contrast, a TAP block provided a more reliable and better anesthetic effect, though such an area with surgical anesthesia was smaller.

Conclusion: Although a single-injection US-TPVB could be the principal anesthetic technique for PDC implantations and provide a comparable anesthetic effect to that of LAI, oblique subcostal TAP block provided a better and more reliable anesthesia than US-TPVB or LAI did for PDC implantations.

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The anaesthesia effect on the perioperative stress in patients with “fast-track” surgery in hip replacement
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Background and Goal of Study: Hip replacement is considered to be a large surgical intervention, related to a high level of stress-response, manifestation of strong pain and patient’s discomfort. The systemic stress response, triggered by surgical trauma is characterized with neuroendocrine dysregulation. The activation of Hypotalamus-Pituitary-Adrenal axis is critical for the coordination of stress response in human’s body against surgical intervention. The cortisol reduces ACTH-secretion and inhibits the release of Corticotropin releasing hormone. During surgical stress, trauma or infection, ACTH- and Cortisol’s levels increase significantly and could keep those levels for 24 hours after the operation.

Aim: To determine the dependence on stress response by anaesthetic techniques in “fast-track” hip endoprosthesis

Materials and Methods: Prospective search between August-November 2019 in a Single center, cohort divided in to two groups, depending on the type of anaesthesia – General (GA) or Neuroaxial anaesthesia. The first group consists of 25 people with GA protocol: Propofol, Lysthenon, Isoflurane maintenance, and intraoperative analgesia with Fentanyl.
Combination of erector spinae plane block and transversus abdominis plane block for incarcerated inguinal hernia repair

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Background: Both, the erector spinae plane (ESP) block and transversus abdominis plane block (TAP) block have been previously described for analgesia in inguinal hernia repair. In this case report we describe a combination of these two blocks in order to achieve intraoperative and postoperative analgesia.

Case Report: A 44 year old patient with incarcerated left sided inguinal hernia was presented to us on our night shift. He had also a dilatative myocardiopathy, mainly right sided due to severe tricuspid valve insufficiency and pulmonary hypertension. Also the left side of the heart was affected with EF 35%. For anesthesia we decided to use a left sided ESP block at level Th9-Th10 and left sided TAP block. For the ESP block we used L-Bupivacain 0.25% 20 ml + Dexamox 2 mg and for the TAP block 0.25% L-Bupivacain 20 ml. After 20 min, the operation started with good operating conditions and anesthesia. We also gave the patient ketamin 50 mg, midazolam 1 mg and fentanyl 0.05 mg i.v. A desincarceration of the sigmoid colon and hernioplastica was done. The bowel was vital and needed no resection.

Discussion: We searched the literature, but we could not find a combination of these two blocks in the same patient for this indication. These techniques have been described separately for inguinal hernia repair, mainly for postoperative analgesia, but there are some reports for intraoperative analgesia as well. We decided to use both blocks in order to increase our success rate. Side effects of this technique may be local anesthetic toxicity because of larger volumes used and also technical difficulties and patient refusal due to two point puncture.

References:

4584

Effectiveness of Bilateral Ultrasound-Guided Erector Spinae Plane Block in Intraoperative and Postoperative Pain control in Lumbar Spine Surgeries. A Randomized Controlled Trial

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Background and Goal of Study: Control of Postoperative pain after spinal surgery is a prerequisite to enable early mobilization, which leads to improved functional recovery and enhance patient satisfaction. The aim of this study is to estimate the efficacy of the ultrasound guided ESP block in intraoperative pain control and postoperative pain management in lumbar spine surgeries.

Materials and Methods: The study was conducted on 70 patients scheduled for elective lumbar spine surgeries in any 2 levels (L1-L5) under general anesthesia in Kair Alainy School of medicine. Patients were randomly allocated into two groups: Group (A) (n=35) include the patients who will undergo ultrasound guided ESP block after induction of GA. Group (B): (n = 35) include the patients who will undergo GA with conventional analgesia. During the surgery, the MAP and HR were traced every 15 minutes. Total Intraoperative fentanyl requirement, and postoperative VAS and time to 1st request of rescue analgesia as well as Incidence of complications were recorded.

Results and Discussion: The study offered a new technique using Bilateral Ultrasound-Guided Erector Spinae Plane Block during Lumbar Spine Surgeries aiming to decrease intra and postoperative pain together with reducing analgesic needs to minimum during and after the operation with the consequent beneficial reduction of narcotic side effects.

References:
Ultrasound-guided rectus sheath block as a part of a multimodal analgesia plan in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity

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Background and Goal of Study: Various method of abdominal field block have been used in anesthetic practice over recent decades. But the last recommendations in multimodal analgesia have lack of information about these techniques in obese patients. The aim of this study is to compare the efficiency of analgesic action of ultrasound guided rectus sheath block (USGRSB) and the local infiltration anesthesia (LIA) of trocar entry points in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity.

Materials and Methods: The retrospective study included 110 patients with BMI≥35 who underwent laparoscopic surgery on upper and middle section of abdominal cavity. Retrospectively patients were divided on two equal groups according to the type of analgesia; group I had bilateral USGRSB, group II received LIA in trocar entry points. Patients in both groups had induced low-flow anesthesia with sevofluran combined with pre-entry analgesia (i.v. paracetamol and dextroseprofen) and systemic analgesia by fentanyl. The primary efficacy endpoints were pain score at rest at 2 postoperative hours. The statistical processing of the study results was carried out using the statistical analysis package MedCalc v. 18.11 (MedCalc Software Inc, Broekstraat, Belgium).

Results and Discussion: The intraoperative fentanyl i.v. dose in group I is considerably decreased: 0.94±0.11 µg/kg vs 1.75±0.16 µg/kg in group II (p=0.027). The pain level by VAS in patients in both groups in average did not exceed 3 points in the first post-operative day, and there was no need in life-saving analgesia with opioids.

Conclusion: The USGRSB has analgetic and opioid-sparing advantages in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity and may be a part of efficient multimodal analgesia plan in that patient’s group.

References:

Efficacy of programmed intermittent bolus infusion erector spinae plane block on postoperative analgesia after video-assisted thoracoscopic surgery: A preliminary randomized controlled trial

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Background: Although thoracic epidural anesthesia and paravertebral block are effective analgesic techniques after thoracic surgery, they cannot be performed because of the risk of hematoma in patients with anticoagulant therapy or coagulopathy. Erector spinae plane block (ESPB), which first reported in 2016, is a relatively superficial interfascial plane block between thoracolumbar transverse process and erector spinae muscle and has a little evidence for analgesic effects after thoracic surgery. We intended to assess the efficacy of ESPB on postoperative analgesia after video-assisted thoracic surgery (VATS).

Materials and Methods: After approval of Institutional Ethics committee, we conducted a prospective, randomized controlled trial. Among patients undergoing VATS at the age of 20–80, with an American Society of Anesthesiologists physical status 1 and 2, we recruited patients with contraindications for epidural anesthesia due to coagulopathy, anticoagulant or antiplatelet therapy. The patients were randomly assigned to ESPB (group E) or control (group C). In group E, after general anesthesia induction, we performed ultrasound-guided ESPB at the level of T5 or T6 with 30ml of 0.25% levobupivacaine, inserted catheter and started intermittent bolus infusion of 0.25% levobupivacaine (20ml every 4hours). In group C, prior to skin closure, the surgeon infiltrated all surgical strata with 20ml of levobupivacaine. In both groups, an intravenous patient-controlled analgesia containing fentanyl and a regular intravenous administration of acetaminophen were initiated as postoperative analgesia. The primary outcome was the fentanyl consumption within 24 hours after the surgery. The secondary outcomes were visual analog scale pain scores under the status of rest and movement, pruritus, nausea and vomiting, drowsiness, and dermatomes anaesthetized to pinprick and cold testing until the second postoperative day and opioid consumption during the surgery.

Results: Twelve patients were included. There was no significant difference between two groups in the consumption of fentanyl within postoperative 24 hours (120 ± 175µg, P=0.94). Intraoperative opioid usage was significantly lower in group E. There were no intergroup differences in terms of other outcomes.

Conclusion: Our results show that postoperative opioid usage and pain were not significantly reduced with ESPB after VATS. During the surgery, ESPB may provide hemodynamics stability and reduce opioid consumption.
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Epidural versus transversus abdominis plane block for abdominal wall analgesia – a systematic review, meta-analysis and trial sequential analysis

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Background and Goal of Study: In the past, pain relief for abdominal surgery has concentrated on epidural analgesia but transversus abdominis plane (TAP) block is now increasingly used. Our aim in the present meta-analysis was to compare analgesic efficacy, side effects and functional outcomes of TAP block versus epidural analgesia.

Materials and Methods: After a systematic search of electronic databases from inception to April 2019, we screened the retrieved citations for eligibility. Only randomised controlled trials that included adult patients having abdominal surgery with TAP block as the intervention and epidural analgesia as the comparator were considered for inclusion. The risk of bias in each trial was assessed with Cochrane Collaboration’s tool. Following data extraction, we conducted meta-analysis if appropriate and performed trial sequential analysis.

Results and Discussion: Sixteen studies with 1110 patients were included. Our first co-primary outcome, postoperative pain score at rest at 12 h, was decreased by a mean difference of 0.74 (95% CI 0.10 to 1.38; p = 0.02) with epidural analgesia compared to TAP block. No difference was found for the second co-primary outcome, postoperative pain score at rest at 24 h. In comparison to epidural analgesia, intravenous morphine equivalent consumption was increased by a mean difference of 9.7 mg (95% CI 5.3 to 14.2 mg; p = 0.0001) at 0–24 h interval, risk ratio of hypotension at 72 h was 0.17 (95% CI 0.06 to 0.48; p = 0.0008), and length of time needed to fulfill discharge criteria was shorter by 0.51 day (95% CI -0.91 to -0.10; p = 0.01) with TAP block. Our systematic review was limited by high risk of detection and performance bias in included trials, significant statistical heterogeneity and publication bias.

Conclusion: Epidural analgesia and TAP block are clinically equivalent in decreasing the postoperative pain score at rest at 12 h and 24 h. The reduced intravenous morphine equivalent consumption at 0–24 h interval with epidural analgesia should be balanced against its increased risk of hypotension. In view of this, TAP block is a favourable alternative to epidural analgesia in abdominal surgery.

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Efficacy of ultrasound-guided erector spinae plane block for postoperative analgesia in robotic-assisted mitral valve repair and lung resection surgery: a retrospective observational study

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Background: Robotic-assisted minimally invasive techniques are increasingly used as part of enhanced recovery after surgery (ERAS) for mitral valve repair (MVR) and lung resection surgery (LRS). Yet, surgical incision in the thoracic region remains associated with significant postoperative pain1 which delays early mobilization. Erector spinae plane block (ESPB) is a simpler and safer analgesic technique compared to thoracic epidural analgesia or paravertebral block, and has been suggested as an alternative in thoracic surgery.2 This study aims to assess the efficacy of ESPB in robotic-assisted minimally invasive cardiothoracic surgery.

Methods: This retrospective observational study over 2 years included 84 patients undergoing robotic-assisted MVR and LRS. 19 out of 57 MVR patients received ESPB postoperatively and 14 out of 27 LRS patients received ESPB preoperatively. Ultrasound-guided ESPB was performed at T5 level with an initial bolus of 30 mL of ropivacaine 0.25%, followed by placement of a perineural catheter allowing delivery of programmed intermittent bolus of ropivacaine 0.125% 10 mL per hour. All patients (ESPB and controls) were given patient-controlled intravenous analgesia using morphine. Morphine consumption and pain score using Visual Analogic Scale (VAS) were both recorded at end of postoperative day 1 and day 2. Statistical analysis was carried out with the Mann-Whitney U test.

Results and Discussion: There was a significantly lower morphine consumption in ESPB patients compared to controls after MVR and LRS (Fig 1). In both surgeries, there was no significant difference between ESPB patients and controls regarding VAS.

Conclusion: This study has demonstrated a significant opioid-sparing analgesic effect when ESPB was performed in patients undergoing robotic-assisted minimally invasive cardiothoracic surgery. Due to its safety profile, ESPB might become an appropriate analgesic technique in the context of ERAS. In that matter, prospective randomized placebo-controlled trials are needed.

References:
Lumbar erector spine plane block: a cadaveric study

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Background and Goal of Study: Erector spinae plane block (ESP block) is a recently described block for chest pain. Total hip arthroplasty is a potential postoperative pain surgery. Postoperative analgesia options are intrathecal and epidural morphine, femoral nerve block, obturator and lateral femoral cutaneous block; lumbar plexus block (posterior approach); continuous epidural block; fascia iliaca block. Lumbar ESP (LESP) block has emerged based on the same principle as the ESP block, but for lumbar level dermatomes. This study aims to evaluate local anesthetic spread in LESP block.

Materials and Methods: An experimental study in which six fresh adult human cadavers underwent 20-30ml (each side) of 0.01% methylene blue solution injection, under ultrasound guidance (low-frequency curve probe) in the plane between the transverse process of L4 and the erector spinae muscle. After injection, the cadavers were submitted to posterior lumbar region dissection. Then, it was verified if lumbar plexus or lumbar spinal nerves would be blue stained.

Results and Discussion: Nine dissections were performed. Spread was homogeneous from L2 to L5, between the erector spinae muscle and the transverse processes, in the specimens submitted to 20ml injection. Lumbar plexus nerves were stained in one side of the specimen submitted to 30ml injection. LESP block emerged, based on ESP principles, as hip region analgesia option. So far, to the best of our knowledge, there are only a few case reports that evidence its use for hip surgery analgesia. It has potential advantages; ease of execution, low risk of nerve damage and safety in patients with coagulation disorders. However, the literature lacks of cadaveric studies that demonstrate local anesthetic spread and possible anatomical mechanisms that explains clinical effectiveness.

Conclusion: In face of the results, the perspective is to reproduce the method with larger volumes, since solution spread seems to be volume dependent.

Regional Anaesthesiology

Uterine leiomyomatectomy in a 41 year old patient with myotonic dystrophy: a case report of opioid-free anesthesia

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Background: Myotonic dystrophy (DM), an autosomal dominant disorder, affects skeletal, smooth and cardiac muscle. Heart conduction defects and central nervous system alterations are also found. Sleep study may be necessary for central or obstructive sleep apnoea. There is no specific treatment, apart from managing complications. Anaesthetic management of these patients is challenging. Hypothermia, shivering and mechanical/electrical stimulation may precipitate myotonia. Moreover, patients are more sensitive to sedative, anaesthetic and neuromuscular blockade, resulting in intraoperative or early postoperative cardiovascular and respiratory problems, along with prolonged recovery from anaesthesia.

Case Report: A 41 y old woman admitted for scheduled uterine leiomyomactomy, suffering from DM since the age of 16. Unable to walk unassisted, she had mild mitral regurgitation and lung restriction (FEV1=58%). According to the neurologist’s consultation and since her respiratory function was severely impaired, she should avoid sedatives and opioids, rendering regional anesthesia the preferable technique. On examination she had a HR of 73/min, BP 128/84 mmHg, respiratory rate 14/min and slight pallor. Airway evaluation showed normal mouth opening, adequate neck mobility, Mallampatti grade II and thyromental distance over 6,5 cm. Epidural anaesthesia was performed. The catheter was inserted at L3-4 level in the sitting position, through an 18G Tuohy needle. Epidural space was detected at 4cm from skin and the catheter was fixed at 10 cm, followed by a lidocaine 2% without adrenaline, test dose, which was negative for numbness or temperature change. Ropivacaine 100mg and clonidine 150mcg were administered. Anaesthetic blockade at T6 level was achieved; operation was uneventful with SpO2 99% throughout and had an excellent outcome.

Discussion: Opioid free anaesthesia although a novel approach, is already the gold standard for certain patients, as in this case with DM. Awareness of specific illnesses and anaesthetic possibilities may provide excellent anesthetic conditions especially when respiratory function is at risk.

References

Learning points: Opioid free epidural anesthesia, when feasible, is a safe choice for patients with myotonic dystrophy, providing excellent anaesthetic conditions and outcome.
Background: The erector spinae plane block (ESP Block) was described by Forero et al. in 2016 and since then it has been an emerging technique for thoracic analgesia, alternative to neuraxial assessment. The injection of local anesthetics can spread to paravertebral, intercostal and dorsal rami of the spinal nerves and promote consistent analgesia.

Case Report: A 7 year old boy diagnosed with ataxia telangiectasia syndrome and non Hodgkin’s lymphoma with bone lesions from T7-T9 and to the spinal canal, was performed with the same anesthetic technique with sevoflurane for the MRI and afterwards it was performed bilateral USG guided ESP block at the level of T6 with of 10 ml of Ropivacaine 0.4% and Lidocaine 0.6%. After 1 hour he was able to sit straight in bed and a pain score of 0 on the PACU. He remained hospitalized and after 24h he presented FLACC scale of 3.

Discussion: The ESP block is a newly described form of peripheral block that can offer analgesia of the posterior thoracic wall. In this case we describe the use of this type of local anesthesia in a pediatric patient with a neurological syndrome as a form of rescue analgesia 48h after the surgical procedure. The result shows that it may be a valuable therapeutic in the pediatric population and as a form of rescue analgesia considering it’s relative simplicity and safety when USG guided.

References:

Learning points: The use of ESP block in a pediatric patient shows us that infants do profit from local anesthesia dispensing neuraxial assessment and reducing opioid consumption in the pain management.

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Bilateral rectus sheath block as the sole perioperative anesthetic technique for open surgical jejunostomy placement to a high-risk patient

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Background: Rectus sheath block (RSB) is a trunk block usually performed under general anesthesia (GA) which provides postoperative analgesia to patients undergoing minor surgical interventions. This case report describes the performance of bilateral RSB as the sole perioperative anesthetic technique to a high-risk patient undergoing open surgical jejunostomy.

Case Report: We present the case of an elderly patient with multiple comorbidities (ASA V) undergoing open surgical jejunostomy. The patient suffered from final stage pancreatic cancer expanding to the superior esophagus and causing superior esophageal stenosis. Open surgical jejunostomy was scheduled so that enteral nutrition could be accomplished. Bilateral RSB was performed as the sole perioperative anesthetic technique, with ultrasound guidance at T8 level, administering at each side 20ml of local anesthetic and 25g of dexmedetomidine. Shortly after the performance of the block, anesthesia of the surgical field was observed. The patient remained hemodynamically stable throughout surgery. No complications were observed. A month after this surgery, the patient was rescheduled for open surgical jejunostomy, after its accidental removal. The surgery was performed with the same anesthetic technique.

Discussion: When confronting a surgical patient with multiple comorbidities, trunk blocks can serve as a safe, alternative technique of analgesia and can also be used alone to provide sufficient analgesia for minor surgeries. In our case, the performance of RSB to a high-risk patient, helped to completely avoid GA, administration of opioids and contributed to the patient’s post-operative analgesia, helping him to be mobilized the same day of surgery and discharge him shortly after surgery. Only one case of open surgical jejunostomy under regional anesthesia (Transversus Abdominis Plane block) has been reported combined with perioperative infusion of dexmedetomidine.


Learning points: Trunk blocks performed alone or in combination with GA can provide superior perioperative analgesia. RSB performed under ultrasound guidance, can serve as a safe and adequate anesthetic technique for high-risk patients undergoing minor abdominal surgeries.
Bezold- Jarisch reflex: a cause of cardiac arrest in spinal anaesthesia

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Background: Cardiac arrest after spinal anaesthesia (SA) has an incidence of 7/10000 cases.1 This case consists of a successful intraoperative resusculation during SA.

Case Report: Male patient, 78 years old, ASA II, hypertension, was admitted for transurethral resection of the bladder. SA was performed with 5% hyperbaric bupivacaine 5mg. Before the incision, a T10 sensitive block level was documented. The patient was hemodynamic stable until 50min after SA, when bradycardia (36-48bp) with hemodynamic repercussion (MAP 40-45mmHg) occurred. Head-down position and rapid infusion of intravenous fluids were performed, as well as epinephrine 10mg and atropine 0.5mg were administered simultaneously. Shortly the ECG showed asystole. Adrenaline 1mg was immediately administered. Sinus rhythm and spontaneous circulation resumed after 1 cycle of CPR. Next to the critical event, hypotension was managed successfully with additional epidrhyne bolus. Blood loss was minimal and until the time of cardiac arrest the patient had received 500mL of crystalloid fluid. After surgery he was transferred to the PACU and heart disease was excluded.

Discussion: Cardiac arrest has been reported within 12–72min after intrathecal administration.2 In elderly patients, it was shown a biphasic change in cardiac output after SA with an initial increase (a fall in afterload), followed by a progressive fall from baseline (a fall in preload).3 Probably inadequate volume loading potentiated relative hypovolemia established by sympathetic block from SA. Vigorous ventricular contractions of an underfill heart were the mechanical stimulus to initiate Bezold-Jarisch reflex which causes inhibition of sympathetic outflow coupled with bradycardia, peripheral vasodilation and cardiovascular collapse. Although anticholinergic drugs are often the initial agent for bradycardia during anaesthesia, it wasn’t a good choice in this case since it prevented ventricular filling by inducing tachycardia. However, α-adrenergic agonists counteract the vasodilation in both the arterial and venous circulations, allowing increased venous return and cardiac output improvement.

References:

Learning points: This is a rare complication which can be seen during SA. α-adrenergic agonists are the most logical choice as 1st line agent to treat bradycardia during SA.

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Safe neuraxial anesthesia in a patient with Charcot-Marie-Tooth disease: a case report

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Learning points: CMT is a progressive neuromuscular disease with lacking anaesthetic management recommendations. Preoperative risk and neuromuscular state assessments are crucial to choose an individualized anaesthetic approach. Neuromuscular blockers are a safe alternative to general anaesthesia in selected patients.

5963

Anesthetic approach of Madelung Disease in performing axillary vein-prosthesis bypass at the deltoplectoral sulcus level: a case report

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Background: Madelung's disease (MD) is a rare disorder of unknown etiology, defined as the presence of multiple and symmetric fatty accumulations, usually involving the upper trunk, neck and head (1). These fat masses cause significant deformity and cerebral immobility. Airway management of these patients is challenging and postoperative respiratory failure is a frequent complication (2). We present a clinical case of a patient with MD who underwent peripheral nerve block (PNB) for axillary vein-prosthesis bypass.

Case Report: A 84-year-old male, classified as ASA IV, was scheduled for axillary vein-prosthesis bypass due to fistula dysfunction for hemodialysis. Past medical history included MD, COPD, chronic kidney disease in stage 5, stroke with aphasia and hemiparesis since early childhood. We decided to perform the procedure under ultrasound-guided clavipectoral fascial plane block (CFPB) in association with supracleavicular brachial plexus block and intercostal block (T2) using 375 mg lidocaine 1.5% (150 mg + 75 mg + 150 mg, respectively), without respiratory, vascular or neurological complications. 24-hour post-procedure, the patient had no pain, sensory or motor block and no adverse effects.

Discussion: The predictors of difficult airway in association with MD patient comorbidities become a challenge for any anesthesiologist. In this case, the recourse to regional anesthesia, with CFPB and intercostal block (T2), was fundamental for the construction of the fistula at the deltoplectoral sulcus level, allowed anesthesia and postoperative analgesia at the surgical intervention sites, preventing the risks associated with general anesthesia in a patient with multiple comorbidities and difficult airway, reduction in opioid-related adverse effects and patient satisfaction.

References:
2. A. Becerra-Bolaños et al. Madelung’s Disease and Airway Management. Anesthesiology 2019; 130:313.

Learning points: Peripheral nerve block becomes an added advantage when we have a predictable difficult airway, reducing anesthetic risks and even promoting postoperative analgesia.
Shoulder adduction weakness and paraesthesia post PECs block: a rarely described and rarely discussed complication

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Background: Pectoral plane blocks (PECs) were first described in 2011 and are growing in popularity. They are most commonly used as an analgesic adjunct for patients undergoing breast surgery but also other procedures such as cardiac defibrillator insertion.

Case Report: We present a case report of a 51 year old lady undergoing wide local excision of the breast and sentinel node biopsy. She received a PECs I and PECs II block, 10mls of 0.25% levobupivacaine was infiltrated below pectoralis major and 20 of ml 0.25% levobupivacaine below pectoralis minor. This block was performed under ultrasound guidance, which demonstrated a good spread of local anaesthetic in these planes. The patient received an uneventful general anaesthetic. Post-operatively, reduced power of shoulder abduction and arm numbness was reported and she was kept overnight for observation. The patient was reviewed the next day and her symptoms had resolved with conservative management and she was safely discharged home.

Discussion: Literature search demonstrates only two previous case reports of PECs blocks. We present a case report of a 51 year old lady undergoing wide local excision of the breast and sentinel node biopsy. The patient received an uneventful general anaesthetic. Post-operatively, reduced power of shoulder abduction and arm numbness was reported and she was kept overnight for observation. The patient was reviewed the next day and her symptoms had resolved with conservative management and she was safely discharged home.

Learning points: Complications of PECs blocks and informed patient consent.

Continuous Spinal Anesthesia in the frail orthopedic elderly patient: a case report

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Background: High-risk elderly patients scheduled for urgent orthopaedic procedures are becoming more common. They often present with severe comorbidities, poor physiologic reserve and overall frailty (1). We present an example of patient management using an uncommon anaesthetic technique: continuous spinal anaesthesia (CSA).

Case Report: A 95-year-old man was scheduled for total hip arthroplasty due to a hip fracture. After hospital admission he developed a nosocomial pneumonia and was not accepted for surgery for 30 days. He had congestive heart failure and COPD, so we decided to perform the procedure under peripheral nerve blocks and CSA. Ultrasound-guided femoral and lateral cutaneous femoral nerve blocks were performed with 8 ml of Rocivacone 0.5%. Dural puncture was at L4-L5 level, using a 18G Tuohy needle, and the catheter was introduced 3 cm intrathecale. 1.8 ml of levobupivacaine 0.25% were given through the catheter, satisfactory surgical sensitive blockade was achieved. The procedure lasted for 1 hour without any further local anesthetic requirements. No adverse hemodynamic effects or intraoperative pulmonary complications were noted. The patient did not complain of postdural puncture headache or pain after surgery, and was safely discharged from anesthesia care.

Discussion: CSA remains a useful anesthetic technique for the high-risk frail patient. An aging population and yours health problems, challenges practitioners to provide effective and safe anesthesia. This technique not only allows us to carefully titrate local anesthetic dose and minimize the risk of a sudden hemodynamic collapse, but also enables us to slowly reach the desired surgical sensory blockade level without the risk of respiratory depression.

References:

Efficacy of ultrasound-guided peripheral nerve block versus forearm Bier’s block in patients undergoing carpal tunnel release: a randomized controlled trial

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Background and Goal of Study: The optimal anesthesia technique for hand surgery is still undecided. Forearm Bier’s block is equally effective in providing a surgical block as compared to a conventional upper arm IVRA, even with a reduced, non-toxic dosage of local anesthetic. The ultrasound-guided peripheral nerve block is an alternative anesthetic technique which targets the median and ulnar nerve at the lower third of the forearm combined with a block of the distal branches of the radial nerve by subcutaneous infiltration of the radial side of the wrist. Thus, we set out to compare a forearm Bier’s block and a distal peripheral nerve block in patients undergoing ambulant carpal tunnel release.

Materials and Methods: In this prospective, mono-center, randomized, observer-blinded superiority trial, a total of 100 patients undergoing elective carpal tunnel release were randomized to receive either forearm Bier’s block (n=50) or ultrasound-guided peripheral nerve block (n=50). The anesthetic efficacy was evaluated by the blinded surgeon. Complete anaesthesia was defined as a full (grade 1) or partial motor (grade 2) block combined with total sensory block (pin prick). Incomplete anaesthesia was defined as a partial motor block and mild pain requiring more intraoperative analgesics (grade 3) or an incomplete motor block with the need of general anaesthesia (grade 4). Furthermore, the satisfaction of the surgeon with the visibility in the surgical field and the patient with perioperative analgesia was evaluated with a 7-point Likert Scale.
Results and Discussion: The results of the quality of the block are presented in table 1. Forearm Bier’s block was significantly more associated with an incomplete block as compared to the peripheral nerve block (17 vs 7; p=0.034). The surgeon’s Chi-square test p=0.027 as well as the patients (p=0.021) were more satisfied with the peripheral nerve block compared to the forearm Bier’s block.

<table>
<thead>
<tr>
<th>Forearm Bier's block</th>
<th>Peripheral nerve block</th>
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<tr>
<td>Complete (grade 1 and 2)</td>
<td>33 (66%)</td>
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<tr>
<td>Incomplete (grade 3 and 4)</td>
<td>17 (34%)</td>
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Conclusion: Ultrasound-guided peripheral nerve block is superior compared to forearm Bier’s block in providing a surgical block to patients undergoing carpal tunnel release.

Regional Anaesthesiology

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Comparison of Ultrasound Guided interscalene brachial plexus block and intra-articular injection of local anesthetics for Arthroscopic shoulder surgery

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Background and Goal of Study: Arthroscopy shoulder surgery is one of the most painful operation. The use of interscalene block (ISB) has been proven to be effective for pain management in shoulder joint surgery. However, ISB may be difficult to perform due to anticoagulant therapy. Total knee arthroplasty is also one of the most painful operation. Epidural anesthesia and femoral nerve block are effective for postoperative pain management. On the other hand, recently some literature reported that percutaneous injection (PAI) of local anesthetics as well as epidual anesthesia or femoral nerve block. The present study is aimed to compare PAI and ISB in patients undergoing arthroscopy shoulder surgery.

Materials and Methods: The retrospective observational study was conducted with approval of local ethics committee (authorization number: 2251). Patients underwent arthroscopy shoulder surgery from January 2018 to September 2019 in this institution were included. 96 patients were assigned to PAI group (n = 21) and ISB group (n = 75). Patients were excluded if they were provided intravenous patient-controlled analgesia and continuous ISB. Data was extracted in medical chart, anesthesia record, nurse chart and blood test. The primary outcome was whether patients used ancillary analgesics in 24 hours. The secondly outcomes were time to first use of ancillary analgesics, and times, kinds and amount of ancillary analgesics in 24 hours, and any complications. Data were analyzed by the Fisher exact test. Confounding factors were controlled by multivariate analysis. P values <0.05 were considered statistically significant.

Results and Discussion: In the patients’ characteristics, there were significant differences in age. Mean age of the patients was 50 in PAI group, 66 in ISB group (p=0.004) and 6 h (P = 0.014) after surgery were significantly different between groups. However, at other times of analysis, there were no significant differences in outcomes between the groups. The onset of sensory and motor block was significantly faster in the subfascial-injection group. The rates of complete sensory and motor block were higher in the subfascial-injection group, except 20 to 30 min after the block onset in the C4 and C3 dermatomes. Other secondary outcomes were similar between both groups.

Conclusion: The extrafascial-injection technique for SCB provides a lower incidence of HDP with similar postoperative analgesia than the subfascial-injection technique.

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Randomized, Controlled Trial Comparing Respiratory and Analgesic Effects of Interscalene Block with Anterior and Posterior Approaches of Suprascapular Nerve Block for Arthroscopic Shoulder Surgeries

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Background and Goal of Study: Interscalene brachial plexus block provides excellent analgesia for arthroscopic shoulder surgeries but is associated with adverse effects including hemidiaphragmatic paresis from phrenic nerve blockade. The aim of this study is to compare the respiratory and analgesic effects of suprascapular nerve blocks with interscalene block.

Materials and Methods: Sixty patients were recruited after taking informed consent and randomized into 3 groups, interscalene block, anterior and posterior suprascapular blocks. Lung function was evaluated at baseline and 30 minutes after the intervention. All blocks were performed under ultrasound guidance with 15 ml of 0.5% ropivacaine. Sensory and motor testing were performed 30 minutes after blocks. Pain scores were assessed at 6, 12 and 24 hours.

Results and Discussion: The interscalene group had a reduction of forced vital capacity of mean (SD), 31.2% (17.9) while the anterior and posterior suprascapular groups had significantly lower reduction of 3.6% (18.6) and 6.8% (8.5) respectively. Similarly, the diaphragmatic excursion in the ISB group decreased more than the anterior and posterior SSB groups; median (IQR) %, -85.7 (-95.3 to -63.3) vs -1.8 (-13.1 to 2.3) and -1.2 (-8.8 to 16.8), p<0.001. Mean pain scores in interscalene and anterior suprascapular groups were lower than the posterior suprascapular group at 6 hours (1.5, 2.2 vs 4.9) and 12 hours (2.9, 3.9 vs 5.4). There were no statistically significant differences in oxycodone consumption post-operatively.

Conclusion: Anterior suprascapular nerve block preserves lung function compared to interscalene block and has a comparable analgesic effect. The anterior suprascapular block is recommended for arthroscopic shoulder surgeries, especially in patients who have reduced lung function.

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A randomized comparison of two injection techniques for supraclavicular brachial plexus block for arthroscopic shoulder surgery: extrafascial versus subfascial injection

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Materials and Methods: Patients Patients scheduled for arthroscopic shoulder surgery were randomly assigned to receive ultrasound-guided supraclavicular block either with subfascial- (intra-cluster injection, n = 25) or extrafascial-injection technique (posterolateral injection, n = 25). We assessed the incidence of HDP as the primary outcome and pain scores, supplemental analgesia, duration of analgesia, sensory and motor block, adverse effects, and patient satisfaction as secondary outcomes.

Results and Discussion: The incidence of HDP was significantly lower in the extrafascial-injection group than in the subfascial group (4% vs. 44.0%, P = 0.003). The pain score at 0.5 h (P = 0.020), and supplemental analgesia at 0.5 (P = 0.009) and 6 h (P = 0.014) after surgery were significantly different between groups. However, adverse effects including hemidiaphragmatic paresis from phrenic nerve blockade at 6 hours (1.5, 2.2 vs 4.9) and 12 hours (2.9, 3.9 vs 5.4). There were no statistically significant differences in oxycodone consumption post-operatively.

Conclusion: Anterior suprascapular nerve block preserves lung function compared to interscalene block and has a comparable analgesic effect. The anterior suprascapular block is recommended for arthroscopic shoulder surgeries, especially in patients who have reduced lung function.
Background and Goal of Study: The dose of local anesthetic (LA) required to produce a good block with a forearm Bier’s block or IVRA can be decreased to non-toxic levels compared to conventional upper arm IVRA. Consequently, there is no minimal tourniquet inflation time after forearm IVRA in contrast to the suggested minimum 20-30 minutes tourniquet inflation time after conventional IVRA. Forearm IVRA may be also be associated with reduced anesthesia-controlled time (ACT) and improved operation room (OR) efficiency. Therefore, our goal was to assess if a forearm IVRA is superior in reducing total OR stay time compared to an upper arm IVRA.

Materials and Methods: In this prospective, mono-center, randomized controlled trial, patients undergoing elective hand and wrist surgery were randomized to receive either forearm Bier’s block (n=140) with 0.5% lidocaine 25ml or upper arm Bier’s block (n=140) with 0.5% lidocaine 40ml. Minimal tourniquet inflation time after upper arm IVRA was set at 25 minutes. To improve homogeneity of the study sample, only patients operated on by one single surgeon (GdW) were selected for analysis. Total OR stay time was defined as departure time from the OR minus arrival time in the OR. Surgical time is time from incision to surgical completion and application of dressings. Differences were evaluated with the Mann Whitney U test. A P-value <0.05 was considered significant.

Results and Discussion: In total, 280 patients were enrolled in this study. Surgery was performed by GdW in 91 patients receiving a forearm IVRA and 102 patients receiving an upper arm IVRA. This resulted in data of 193 patients for analysis. Total OR stay time was significantly shorter after forearm IVRA (29 [28, 35.5] minutes versus 34 [31, 36.25] minutes; p<0.001). Tourniquet inflation time was also significantly shorter after forearm IVRA (20 [17, 23.25] minutes versus 29 [22, 25] minutes; p<0.001). Surgical time was statistically not significantly different (forearm IVRA 7 [4, 9] minutes vs Bier block 7 [5, 9] minutes; p=0.32).

Conclusion: Forearm IVRA is superior to upper arm IVRA in reducing OR stay time by reduction of anesthesia-controlled time. Application of forearm IVRA in patients undergoing hand and wrist surgery with short surgical time may therefore improve OR efficiency.
arm was successfully blocked with their eyes closed. The position that the patient’s reached for with their eyes closed was recorded for each of the set of blocked hand positions.

Results: A total of 60 individual tests were carried out for twenty patients. The patients were able to correctly locate their blocked hand in two tests (12 o’clock and 10 o’clock). In all remaining 58 tests, patients reached between the 10 o’clock and 12 o’clock position. The commonest position was 11 o’clock (45 out of 58).

Discussion: Ninety-seven percent patients were unable to locate their arm after a successful brachial plexus block and went between 10 and 12 o’clock positions irrespective of the actual position of the arm. The results of this study can be useful to test the block, during the consent process, inform patients about this expected conflict and improve their experience.

Conclusion: This study suggests that the perceptive position of anaesthesia on the upper limb can be used to test effectiveness of brachial plexus block.

Background and Goal of Study: Thoracic epidural analgesia (TEA) is recommended as first-line pain treatment for open colorectal surgery according to the latest enhanced recovery after surgery (ERAS) guidelines (1). However, as the use of minimal invasive surgical techniques increases, the use of TEA has been questioned. The aim of this study was to assess pain intensity using either TEA or patient-controlled intravenous analgesia (PCA) with morphine for open and laparoscopic colorectal surgery in the context of an established ERAS protocol.

Materials and Methods: In this multi-center, Swedish study, 226 patients scheduled for elective open or laparoscopic colorectal cancer surgery were randomized to TEA or PCA. Surgery and anaesthesia were standardized in both groups. Numeric rating scale (NRS) pain scores at rest and during activity were registered postoperatively for 48 h. Primary endpoint was NRS pain intensity during activity on day 1. Secondary endpoints were postoperative complications, hemodynamic instability, use of vasoactive drugs and fluids, and length of hospital stay (LOS).

Results and Discussion: Final analysis included 203 patients, 99 received TEA and 104 PCA. There were no differences in baseline characteristics between groups. In both groups, pain scores were generally low, specifically 24 h after surgery. Statistically significant reduction in pain on activity was seen during the first 24 h after surgery in group TEA compared to PCA (mean diff -1.8, 95% CI -2.5 to -1.1), but not thereafter. Patients who underwent laparoscopic procedures also had significantly less pain on activity during the first 24 h in group TEA compared to PCA (mean diff -2.6, 95% CI -3.7 to -1.5). Patients receiving TEA needed significantly more vasopressors during surgery (p<0.001). There was no significant difference in postoperative complications (p=0.76) or LOS (p=0.4).

Conclusion: Although pain on activity was lower when using TEA compared to PCA on the first day after surgery for colorectal cancer surgery after open and laparoscopic procedures, the need for vasoactive drugs was greater, and no difference was found between the groups in postoperative complications or LOS.

References:

A study of malposition of epidural catheter inserted in our hospital outpatient department

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Background: In our anesthesiology outpatient clinic, we insert an epidural catheter for the pain treatment during brachytherapy for prostate cancer in the urology department, and for vascular surgery on the next day. Radiopaque epidural catheter position is checked by X-ray after insertion, since a certain number of position errors are confirmed by X-ray.

Materials and Methods: After approval of ethics committee, twenty-seven cases were studied retrospectively who requested for an epidural catheter insertion to the anesthesiology clinic from January 2018 to March 2019. All epidural catheters were inserted by an anesthesiologist with over 10 years of experience. Twelve cases were placed in the lumbar region for brachytherapy for prostate cancer in the urology department, and 15 cases were placed in the thoracic region for intraoperative analgesia for open prostatic angioplasty for abdominal aortic aneurysm on the next day. At the time of insertion, 3 ml of 1% lidocaine was injected as a test dose, and after 5 minutes, cold signs were confirmed and X-ray were checked for final confirmation. If a positional error is observed on the X-ray, catheter is reinserted.

Results: Of the 27 cases, 20 were correctly indwelled in the epidural space with X-ray. There were four cases of prolapse from the nerve root, and one case of not being able to follow the tip with X-ray but having an analgesic effect. In the 4 cases of prolapse, there were 1 thoracic and 3 lumbar region.

Discussion: Previous studies have showed the probability of intravascular placement of the epidural catheter, but the probability of prolapse from the nerve root has not been studied. We showed that a certain number of catheter prolapse from the nerve root. This pilot study suggests that lumbar catheter prolapse more often than thoracic region. Although the study could not evaluate the cause. Further study may reveal the technique to avoid prolapse of the catheter.
Effect of Clonidine on heart rate variability during spinal anaesthesia: randomized clinical trial

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Background and Goal of Study: Spinal anaesthesia blocks sensory, motor and autonomic nerve conduction from the periphery to the CNS. Adjuvants administered in combination with local anesthetics prolong its duration. Discharge from PACU is based on return of motor function and does not take into account recovery of autonomic activity. It is unclear in the literature whether motor block regression is accompanied by return of autonomic function. Heart Rate Variability (HRV) consists of a simple, noninvasive measurement of electrocardiogram RR intervals using mathematical methods, as well as the Chaos Theory, that represents the autonomic nervous system activity and may be useful in assessing postoperative autonomic recovery. The aim of this randomized, double-blind clinical trial is to evaluate autonomic function at the time of return of motor function in patients who received spinal anaesthesia.

Materials and Methods: The sample consisted of 71 ASA I to III patients who underwent surgery of the lower limbs and lower abdomen under spinal anaesthesia. They were randomized into 2 groups: group B, which received 20mg isobaric bupivacaine; and group C, which received 20mg of isobaric bupivacaine and 75mcg clonidine. HRV was evaluated at 3 moments: rest, 20 minutes after spinal block and at the time of motor function recovery, established as a grade II in the Bromage scale. Linear methods in the frequency domain and nonlinear methods, focusing in approximate entropy, were used. Data were collected using a Polar V800® HR monitor and subjected to analysis and filtering by Kubios 3.0® software.

Results and Discussion: Comparing the approximate entropy (p = 0.027) and frequency domain (p=0.028) of the C group HRV in T3 with T1, a significant difference was observed, indicating a persistence of sympathetic block even after return of motor function. There was no difference in the bupivacaine group when comparing the same moments.

Conclusion: The use of clonidine in spinal anaesthesia prolongs duration of sympathetic block, even after motor function recovery.

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Boundary prediction during epidural punctures based on OCT relative motion analysis

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Background and Goal of Study: Physicians mainly use their haptic impression when positioning a epidural Tuohy-needle (ETN). “Blind” techniques such as Loss-of-Resistance support the identification of the epidural space (ES). Alternatively, optical fibers are integrated in ETN to either measure forces at boundaries with embedded Fiber Bragg gratings1 or to facilitate optical coherence tomography (OCT) image based differentiation of tissue structures2. In this study, we present a concept to obtain both boundary interactions and tissue structures from a forward facing OCT probe. In addition to image analysis, we propose relative motion estimation based on the OCT phase data.

Materials and Methods: We integrate a forward facing optical fiber in an ETN and derive the relative motion in front from OCT phase differences of successively allocated A-scans3. While performing ex-vivo punctures in a pig cadaver we allocate OCT intensity and phase data, track the needle pose, and measure forces at the ETN-shaft (Fig. 1, left). In addition, the physician reports his haptic impression.

Results and Discussion: The intensity data (gray), estimated relative motion (red), and measured force in ETN direction (blue) for one of 12 punctures are compared exemplary (Fig. 1). Comparing the force and relative motion estimates it is obvious that both indicate the boundaries B, C, E, and F. While the external forces are also reflecting friction the relative motion is much more sensitive to the actual boundary penetration. Small ruptures of structures inside the ligamentum flavum and when entering the ES are more clearly visible in the relative motion signal. Using the relative motion, we are able to detect the tissue deformations and ruptures at boundaries. Furthermore, negative forces due to re-orientations lead to negative relative motion estimations.

Conclusion: Relative motion estimated from within an ETN tip allows detecting tissue boundaries. Using the gray values and the motion estimates may further the precision of ETN navigation.

References:

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Comparison between intrathecal morphine and Quadratus Lumborum block for postoperative analgesia in cesarean sections

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Background and Goal of Study: Cesarean section is one of the most commonly performed surgical procedures in the world, and has great potential for postoperative pain, especially in the first 24 hours. Severe pain in the early postoperative period is a risk factor for chronic pain. However, chronic pain following cesarean section is still the subject of a relatively recent study, with variable incidence depending on the study, from 1% to 18%. Over the past decade, new adjuvant forms of postoperative analgesia have become more popular, such as regional blocks, for instance the Transverse Abdomen Plane Block (TAP) and the Quadratus Lumborum Block (QL), having as benefits the prolonged analgesia they provide and the low incidence of side effects. Our goal is to test if QL block may offer postoperative analgesia equivalent to intrathecal morphine, with lower incidence of side effects.

Materials and Methods: Randomized, prospective, clinical, analytical study with blinded distribution for evaluators. It includes 75 patients scheduled for cesarean section under spinal anesthesia to be divided into 3 groups. The first group receives spinal anesthesia with intrathecal morphine; the second group receives morphine-free spinal anesthesia plus quadratus lumborum block, and the third group receives spinal anesthesia with intrathecal morphine plus quadratus lumborum block. The primary variable to be evaluated will be pain, through the numerical pain scale, and opioid consumption in the first 24 hours of the postoperative period.

Results and Discussion: To date, 43 patients have been included in the study. Partial analysis of the data shows that there was no statistical difference between anthropometric data, morphine consumption and pain scores in the first 24 hours. There was a statistical difference in higher urinary retention in the intrathecal morphine group. There was no difference between the groups in the incidence of chronic pain.
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The efficacy of Spinal anesthesia versus combined spinal-epidural anesthesia in vaginal hysterectomy surgeries
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Background and Goal of Study: The use of neuraxial anaesthesia methods in transvaginal hysterectomy surgeries has several advantages thanks to reliable protection against surgical stress with minimal systemic impact on the body [1]. The goal of this study is to compare Spinal anesthesia and combined spinal-epidural anesthesia for vaginal hysterectomy surgeries in terms of anesthesia, hemodynamic stability and postoperative analgesia.

Materials and Methods: 40 female patients were examined in the gynecology department of the «Lviv emergency hospital» who underwent a planned transvaginal hysterectomy for incomplete uterine prolapse of IInd and IIIrd degrees. Group 1 (n = 18) included patients who received a combined spinal-epidural anaesthesia (CSE); the 2nd group (n = 22) received a classical spinal anaesthesia. Cardiac output (CO) and cardiac index (CI) were monitored using an esCCO module (Life Scope Monitor by Nihon Kohden, Japan). In addition, blood pressure (BP), mean arterial pressure (MAP) and heart rate (HR) were measured. The postoperative pain intensity was evaluated using the VAS-scale.

Results and Discussion: In contrast to group 1, we observed a significant decrease in CO and CI after 30 minutes as well as a decreased MAP - after 60 minutes due to the need to reach superior dermatomes or for postoperative analgesia. In the remaining cases, the block was single-shot. The local anesthetic used was ropivacaine (concentrations from 0.375% to 0.5%), the administered volume ranged from 15 to 20 mL.

Results and Discussion: In the intraoperative period, intravenous opioids were required in 3 cases (8%). In the immediate postoperative pain assessment, 4 patients (11%) required supplemental systemic analgesics. The caudal epidural can be an analgesic alternative for many of the surgeries involving the sacred and/ or lower lumbar dermatomes. The placement of a catheter for repeated doses or an infusion is possible and may also be an alternative for patients with prior instrumented lumbar spine or severe kyphoscoliosis (as some of the cases in these series), and in opioid-free strategies.

Conclusion: Caudal epidural analgesia in the adult population may be an alternative to other anesthetic/analgesic techniques. The use of ultrasound to identify the sacral hiatus can be a tool for the future, to broaden the use of this technique successfully.

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Does documented interspinal level correlate appropriately to actual level in epidural for labour analgesia?: a pilot study
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Background and Goal of study: Tuffier’s (T) line is a transverse line connecting the top of iliac crests intersecting the spine at L4 spinous process. However, the vertebral level determined by palpatory method in sitting position may not be accurate. A pilot study was conducted to assess whether documented interspinal (IS) level correlates with actual IS level in epidural for labour analgesia as well as to assess deviation of T-line observed by palpation and by ultrasound (USG).

Materials and Methods: Patient’s consent and research department’s approval taken. Patients were divided into Gp A (BMI<35) & Gp B (BMI>40) who had single attempt for labour analgesia in sitting position. Documented IS levels of needle puncture marks were confirmed postnatally following normal delivery using Venue 50 GE USG machine with curvilinear probe. T-line palpated in sitting and lateral position postnatally & confirmed it’s intersecting IS level by USG.

Results and Discussion: In the intraoperative period, intravenous opioids were required in 2/34 cases (6%). In the immediate postoperative pain assessment, 2/34 patients (6%) required supplemental systemic analgesics. The caudal epidural can be an analgesic alternative for many of the surgeries involving the sacred and/ or lower lumbar dermatomes. The placement of a catheter for repeated doses or an infusion is possible and may also be an alternative for patients with prior instrumented lumbar spine or severe kyphoscoliosis (as some of the cases in these series), and in opioid-free strategies.

Conclusion: Caudal epidural analgesia in the adult population may be an alternative to other anesthetic/analgesic techniques. The use of ultrasound to identify the sacral hiatus can be a tool for the future, to broaden the use of this technique successfully.

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Caudal Epidural in adults: an "old school" technique with a fresh prospective – case series
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Background: Caudal epidural anesthesia/analgesia is a technique frequently used in pediatric surgery for treatment of perioperative pain, due to its ease of performance and high rate of effectiveness of the procedure. However, in experienced hands, this technique can be used in older children and even adults, with success rates of over 75%. We present a series of cases of caudal epidural analgesia in the adult population that proved to be an important alternative to other anesthetic/analgesic techniques, and to analyze possibilities for the future.

Materials and Methods: A total of thirty-four caudal epidural blocks were performed using anatomical references. The mean age of patients was 33 years old (ranging from 10 to 85 years old). Ten cases were female and 24 were male. 50% of patients were classified as ASA physical status classification I, 29% ASA II, 18% ASA III and 3% ASA IV. All patients weighted more than 30 kg. Surgeries in which this technique was used included circumcison (7 cases), testicular torsion/scrotal exploration (7 cases), perianal abscesses/ fistula (5 cases), lower limbs orthopedic surgery (10 cases) and 5 cases included vulvoplasty, sciotic ulcer, inguinal hernia, incarcerated inguinal hernia and appendectomy. In all cases, the technique was performed under deep sedation/general anesthesia. In 6 patients, an epidural catheter was placed due to the need to reach superior dermatomes or for postoperative analgesia. In the remaining cases, the block was single-shot. The local anesthetic used was ropivacaine (concentrations from 0.375% to 0.5%), the administered volume ranged from 15 to 20 mL.

Results and Discussion: In the intraoperative period, intravenous opioids were required in 3 cases (8%). In the immediate postoperative pain assessment, 4 patients (11%) required supplemental systemic analgesics. The caudal epidural can be an analgesic alternative for many of the surgeries involving the sacred and/ or lower lumbar dermatomes. The placement of a catheter for repeated doses or an infusion is possible and may also be an alternative for patients with prior instrumented lumbar spine or severe kyphoscoliosis (as some of the cases in these series), and in opioid-free strategies.

Conclusion: Caudal epidural analgesia in the adult population may be an alternative to other anesthetic/analgesic techniques. The use of ultrasound to identify the sacral hiatus can be a tool for the future, to broaden the use of this technique successfully.
Conclusion: We recommend USG should be the gold standard to identify IS level for epidural. However, in the absence of USG, we suggest that palpating T-line in lateral position is superior to sitting position for identification of IS level.

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Liposomal bupivacaine plus bupivacaine for interscalene brachial plexus block decreases opioid consumption for up to two weeks compared to bupivacaine alone in patients undergoing total shoulder arthroplasty

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Background and Goal of Study: In the United States, the FDA approved liposomal bupivacaine (Exparel) for interscalene nerve blocks in 2018. Although it is considerably more expensive than plain bupivacaine, its main purported advantage is its extended duration, which might allow for sustained pain control and early discharge without using a perineural catheter. We examined whether Exparel reduces opioid consumption and pain in adult patients undergoing primary total shoulder arthroplasty.

Materials and Methods: Fifty-nine adult patients were randomized to receive either 20 mL of liposomal bupivacaine 5 mg/mL (CTL; n = 30) or 10 mL of bupivacaine 5 mg/mL plus liposomal bupivacaine 133 mg (EXP; n = 29) for an interscalene nerve block. All patients received IV sedation in addition to the regional anesthetic. The primary outcome was opioid consumption, measured in MME (Morphine Milligram Equivalent), from 24 to 96 hours postoperatively. The secondary outcomes were cumulative opioid consumption on postoperative day 7, 14 and 30, pain scores using PROMIS Pain Intensity Scale, and length of stay.

Results and Discussion: Opioid consumption was significantly lower in the EXP group compared to CTL 24 to 96 hours post-surgery (28.79 ± 34.30 vs. 65.06 ± 33.71 MME; p < 0.001), during the first week after surgery (45.99 ± 57.05 vs. 95.35 ± 97.98 MME; p < 0.001), and during the second post-operative week (7.59 ± 23.70 vs. 20.50 ± 35.38 MME; p < 0.001), but not during the third or fourth weeks. Additionally, patients in the EXP group reported significantly less pain intensity one week after surgery when compared to CTL (45.90 ± 8.95 vs. 52.40 ± 6.60; p = 0.01) but not thereafter. There was no significant difference in length of stay between groups.

Conclusion: The addition of liposomal bupivacaine for an ISB significantly reduces opioid consumption during the 24-96 hours post-operative period and for up to two weeks after surgery. Additionally, it leads to reduced pain intensity during the first week after undergoing total shoulder arthroplasty surgery. As the length of stay was unaffected, further studies are needed to determine whether liposomal bupivacaine can replace perineural catheters.

References:
Does perineural dexamethasone reduce rebound pain following interscalene block in patients undergoing arthroscopic shoulder surgery?

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Background and Goal of Study: Rebound pain is a condition characterized by hyperalgesia after the peripheral nerve block wears off, which may reduce or even negative overall benefits of regional anesthesia. It is well known that dexamethasone added to local anesthetic prolongs the duration of a single-shot interscalene block (SSIB). However, whether perineural dexamethasone for the SSIB affects an occurrence of rebound pain is not clear. We aimed to investigate whether the use of low-dose dexamethasone as adjuvant for nerve block reduces rebound pain after arthroscopic shoulder surgery or not.

Materials and Methods: In a double-blinded trial utilizing SSIB, 23 patients who were diagnosed with rotator cuff tear and scheduled for arthroscopic shoulder surgery were randomized to either groups: Total 12 ml of 0.5% ropivacaine mixed with dexamethasone 5mg (DEX group, n=13) or normal saline (Control group, n=10). All patients underwent SSIB and followed by general anesthesia. The primary outcome was the incidence and severity of rebound pain. Rebound pain score (numeric rating scale; 0-10) was calculated as the lowest pain score during the first 12 h after the PNB wears off is subtracted from the highest pain score during the first 12 h after the PNB wears off.

Results and Discussion: Five of 13 patients (38.5%) in DEX group and 8 of 10 patients (80%) in control group had rebound pain with a significant difference (P=0.046) and overall incidence of 56.5%. It is observed 983.0 min (IQR 811.5-2050.5) in DEX group and 695.0 min (IQR 655.5-776.7) in control group after performing SSIB (P=0.006). Of patients experiencing rebound pain, rebound pain score was 8.0 (7.0-9.5) and 8.0 (7.0-8.0) (P=0.622) and its duration was 156.0±53.7 min and 107.5±85.6 min (P=0.284), respectively. The highest pain score after the time to first analgesic request was 4.6±2.33 in DEX group and 6.5±2.79 in control group (P=0.186). Overall, the time to first analgesic request from the time of performing SSIB was prolonged significantly in dexamethasone group 1130.0 min (IQR 842.0-2331.5) compared with control group 895.0 min (IQR 625.0-795.0) (P=0.004).

Conclusion: Perineural dexamethasone demonstrated significant beneficial effects on the incidence of rebound pain as well as duration to the first analgesic request after SSIB for arthroscopic shoulder surgery.
Comparison of continuous infusion and intermediate bolus applications in patient controlled epidural analgesia

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Background and Goal of Study: Postoperative pain control is important for patient comfort, wound healing and awareness of surgical complications. During this stage, many combinations of drugs in different ways are used for therapeutic purposes. Epidural space has an important role in reducing the dose of drug used and allowing for much more effective analgesia. In this study, we aimed to compare the efficacy of two different methods (continuous infusion + intermittent bolus vs high volume intermittent bolus) for postoperative epidural analgesia.

Materials and Methods: After the approval of University Research and Ethics Committees, records of patients who underwent elective orthopedic surgery under combined spinal-epidural anesthesia in Baskent University Ankara Hospital between January 2017 - November 2018, were reviewed from patient files and electronic medical record system and patient controlled analgesia forms of patients retrospectively. Patients were divided into two groups as continuous infusion + intermittent bolus (Group 1) and high volume intermittent bolus (Group 2). Between two groups, patient pain scores, drug doses, and side effects were compared. Student’s t-test was used to compare parametric values, and Pearson’s chi-square test was used to compare quantitative data. P < 0.05 was considered statistically significant.

Results and Discussion: The groups were similar in terms of age, ASA scores, and surgical type (p>0.05), while the number of female patients were slightly higher in the infusion + bolus group (p = 0.041). The groups were similar in terms of nausea-vomiting, pruritus, hypertension and urinary retention. Ramsay sedation scale scores did not differ. Postoperative Bromage scores were lower in the bolus group at the 6th hour but were similar in the following hours. Pain scores of the patients in the first 48 hours were similar in all visits except for the 24-hour visit (significantly lower in infusion + bolus group, p <0.05), while the drug doses was significantly lower in the bolus group only.

Conclusion: When patient controlled analgesia is provided by postoperative epidural catheter, similar analgesic effect can be achieved by using less medication by giving only bolus at higher volume instead of infuson and bolus coexistence. Further prospective studies will be needed to draw definitive conclusions.

Evaluation of the electrophysiological effects of the maximal concentration of ropivacaine after ultrasound-guided serratus intercostal fascial block. Study in a porcine experimental model

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Background: Breast surgery is one of the most common surgical procedures. The serratus-intercostal fascial block (SIFB) is an alternative to paravertebral block. This block requires large volumes of local anesthetics (LA), however, despite increasing many combinations of drugs in different ways are used for therapeutic purposes. Epidural space has an important role in reducing the dose of drug used and allowing for much more effective analgesia. In this study, we aimed to compare the efficacy of two different methods (continuous infusion + intermittent bolus vs high volume intermittent bolus) for postoperative epidural analgesia.

Materials and Methods: After the approval of University Research and Ethics Committees, records of patients who underwent elective orthopedic surgery under combined spinal-epidural anesthesia in Baskent University Ankara Hospital between January 2017 - November 2018, were reviewed from patient files and electronic medical record system and patient controlled analgesia forms of patients retrospectively. Patients were divided into two groups as continuous infusion + intermittent bolus (Group 1) and high volume intermittent bolus (Group 2). Between two groups, patient pain scores, drug doses, and side effects were compared. Student’s t-test was used to compare parametric values, and Pearson’s chi-square test was used to compare quantitative data. P < 0.05 was considered statistically significant.

Results and Discussion: The groups were similar in terms of age, ASA scores, and surgical type (p>0.05), while the number of female patients were slightly higher in the infusion + bolus group (p = 0.041). The groups were similar in terms of nausea-vomiting, pruritus, hypertension and urinary retention. Ramsay sedation scale scores did not differ. Postoperative Bromage scores were lower in the bolus group at the 6th hour but were similar in the following hours. Pain scores of the patients in the first 48 hours were similar in all visits except for the 24-hour visit (significantly lower in infusion + bolus group, p <0.05), while the drug doses was significantly lower in the bolus group only.

Conclusion: When patient controlled analgesia is provided by postoperative epidural catheter, similar analgesic effect can be achieved by using less medication by giving only bolus at higher volume instead of infuson and bolus coexistence. Further prospective studies will be needed to draw definitive conclusions.
at a variety of time intervals up to 30 minutes. Statistical: area under the curve (AUC) for the first 10 minutes (AUC-10) or the 30 minutes (AUC-30). Blood samples were taken for R determinations.

Results: R affected several parameters: PR interval by 17% (P=0.0001), HV by 56% (P=0.001), sinus QRS duration increased by 56% (P=0.0001), paced QRS at 150 bpm by 257% (P=0.0001), and at 120 ms by 143% (P=0.0001). The AUC-10 of the sinus rhythm QRS duration was significantly different among the 3 groups (P=0.003). The B group underwent a faster recovery than the C group (AUC-10: P=0.001) and with the LE group (AUC-10: P=0.015). During the first minute, 87% of the B group vs 25% in the LE or 0% of the C group had recovered more than 30% of the sinus rhythm QRS duration (P=0.001). In contrast, the trend towards a faster recovery in the LE vs the C group did not reach significance (AUC-10: P=0.16) There were not differences in the recovery on the groups for paced QRS duration at 150 bpm and at 120 bpm.

Conclusions: In a closed-chest swine model, B was an effective treatment for the EP alterations due to established R toxicity. Restoration of most EP variables was faster in the B-group than in the C-group. B ameliorated R electrocardiographic toxicity faster than LE. Use-dependent effects of R as disclosed by ventricular pacing were prominent, however, no differences in its recovery were observed among groups.

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Does intraoperative administration of bupivacaine with adrenaline into the epidural space during major oncological surgery lead to more frequent incidence of circulatory insufficiency requiring noradrenaline infusion?

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Background and goal of study: Epidural analgesia is routinely used in our institution to enhance both intra- and postoperative pain treatment during major oncological surgery. The goal of study was to investigate whether the intraoperative administration of 0.5% bupivacaine with adrenaline to epidural space relates to more frequent events of hypotension requiring noradrenaline infusion as compared with a different approach when the epidural drugs were administered only after the completion of surgery.

Materials and Methods: We conducted a retrospective analysis of 73 patients (27 women, 46 men, age 22-83; mean age 57 years; 63 ASA 2; 10 ASA 3) who underwent major oncological surgery between 1st March and 31th August 2019. During each operation anaesthesiological procedures included both general anaesthesia and epidural analgesia: 36 patients (49.3 %, group A) were given bupivacaine with adrenaline intraoperatively, 37 patients (50.7%, group B) received bupivacaine with adrenaline injection. Ten patients required noradrenaline administration just to reach adequate analgesia.

Results and Discussion: Hypotension requiring noradrenaline administration occurred in 14 patients (19,2%). Among 4 patients from group A (11,1%) it was necessary to begin the noradrenaline infusion less than 30 minutes after bupivacaine with adrenaline injection. Ten patients required noradrenaline administration just after the induction of general anesthesia: 8 from group B (21,6%) and 2 patients from group A (5,6%). Two patients from group A received bolus of bupivacaine with adrenaline regardless of simultaneous noradrenaline infusion.

Conclusion: In our observational study we failed to find correlation between administration of bupivacaine with adrenaline to epidural space intraoperatively and more frequent circulatory insufficiency requiring noradrenaline infusion. Clinical problems of oncological surgery patients are multifaceted and it would be essential to consider them in further study regarding the topic.

References:

6156

Clavipectoral fascia block: a true alternative

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Background: The most common technique used in clavicular fractures is the general anesthesia, with or without a plexus block(1)(2). The clavipectoral fascia is located under the clavicular head of the pectoralis major muscle, which occupies the space between the pectoralis minor muscle and the subclavian muscle, to shield the axillary vein, artery and nerve(2)(3). This is an unprecedented block, in which the dispersion of the local anesthetic reaches the clavicular periosteum to anesthetize the structures that are responsible for its enervation. This block provides a great anesthetic technique for clavicular surgeries and avoids the complications associated with other regional techniques(3).

Case Report: Male, 52 years-old, history of arterial hypertension, smoking habits with COPD moderate/severe and obesity, proposed for osteosynthesis of a clavicular fracture, under regional anesthesia with a mild sedation. The fascia block was performed perpendicularly to the clavicular plan. A quick scan was made to localize the fracture. An 80mm needle was placed in plane, first internally to the clavicular fracture and then externally. Local anesthetic was injected between the clavicular periosteum and the clavipectoral fascia, with an acute angle to facilitate the opening of the plan. The patient remained hemodynamically stable, without any anesthetic intercurrence. He remained painless until the night of the surgery, when 1g of paracetamol was administered.

Discussion: With this case report, we want to emphasize the clavipectoral fascia block as a true alternative to general anesthesia with plexus block, for patients undergoing clavicular surgery(3). The clavipectoral fascia block allows a better post-operative pain management and a faster rehabilitation, since it’s not associated with motor blockade. The respiratory complications associated with phrenic nerve block, a common consequence of the interscalene block, are also avoided.

References:

Learning points: This block allowed an adequate anesthetic technique to clavicular surgeries without the complications of a general anesthesia and interscalene block.

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Anesthetic management of a pregnant woman undergoing exploratory laparotomy surgery — a case report

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Background: Non-obstetric surgery during pregnancy posts additional concerns to anaesthesiologists. The main goal is to preserve maternal safety and achieve the best possible fetal outcome. Regional anaesthesia is usually preferred in pregnancy when it is practical for the medical and surgical condition. A multidisciplinary team approach is recommended to ensure an adequate standard of care.

Case Report: We report a case of a 24-year-old pregnant woman with 105 Kg, who presented with progressive abdominal pain at 15 weeks and 5 days gestational age. Nuclear magnetic resonance showed an abdominal mass with 16 cm from the uterus to the mesenteric root. She was scheduled for an exploratory laparotomy and a loco- regional anaesthesia was planned. Lombar subarachnoid block (SAB) followed by epidural catheter placement were performed. A mixture of 11mg of hyperbaric bupivacaine and 2 mcg of sufentanil was used for SAB, and bolus of 0.375% ropivacaine were administered to extend the duration of neuraxial block. Besides antibiotic prophylaxis and occasional phenyleprine bolus no other drugs were used. Complete surgical excision of a 20x17x12 cm size tumor (desmoid type fibromatosis tumor) with a xifo-pubic incision was successfully done. She remained hemodynamically stable during the 4 hours of surgery. Fetal vitality assessment was performed and fetus showed no signs of distress. The postoperative period was uneventful, and she was discharged 6 days after surgery.

Discussion: When a pregnant patient requires abdominal surgery, the major issues are the optimal perioperative management and the best anesthetic/surgical approach. Our case presents to demonstrate a rare surgical condition in a pregnant woman performed under neuraxial anaesthesia and successfully managed for both the mother and the fetus, without conversion to general anesthesia.

References:

Learning points: The choice of anaesthetic technique and the selection of appropriate anesthetic drugs should be guided by indication for surgery, and site of the surgical procedure. Anaesthesia management should be well planned to preserve the pregnancy and to ensure the safety of the mother as well as the fetus.
Effective Spinal Erector Plane Block at the Level of T5 for Lower Abdominal Surgery – A Case Report

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Background: Spinal erector plane block (ESPB) has been used for analgesia in a growing number of thoracic and lumbar surgical procedures. However, there are few reports of abdominal surgeries, with considerably variable levels of anesthetic dispersion. We report a case of ESPB at the level of T5 for postoperative analgesia to a percutaneous nephrostomy.

Case Report: A 15 years-old male, with a past medical history of myelomeningocele and neurogenic bladder, was admitted to nephrectomy due to complicated pyelonephritis. Venous accesses were secured, followed by intravenous anesthetic induction with propofol, fentanyl, and atracurium. Ultrasound-guided ESPB was performed. A solution with 18mL of Ropivacaine 0.375% was administered through a 16G Tuohy needle at the level of T5, bilaterally. Next, both puncture sites were catheterized and successfully tested for local anesthetic dispersion. General anesthesia was maintained with 0.5 MAC of sevoflurane during 8 hours of surgery, which ended up being converted to bilateral nephrostomy. No additional local or venous anesthetics were required. The procedure was concluded without complications and the patient was extubated in the operating room. At PO1 the patient was asymptomatic, allowing both catheters to be removed.

Discussion: The literature on ESPB analgesia for abdominal surgeries is limited, however, an RCT of ESPB at L1 level in a pediatric population demonstrated effective lower abdominal analgesia. In a series of 11 cases of patients undergoing different abdominal surgeries, Navarro et al described that ESPB between T7-T9 levels enabled 99 patients to maintain minimum postoperative pain. A solution of Bupivacaine 0.5% and Ropivacaine 0.16% achieved analgesia extending up to 48 hours when a catheter was inserted. Thus, ESPB may be a viable anesthetic alternative for lower abdominal surgeries in patients where neuraxial anesthesia is potentially unsafe.


6201
Distal sciatic combined with saphenous nerve block in a high risk patient with lower limb ischemia.
A case report

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Background: Patients with vascular disease pose a challenge for the anaesthesiologist regardless of the type of intervention. Lower limb ischemia is a common presentation for vascular surgery. We report the case of an ASA V class patient undergoing emergent transmetatarsal amputation to highlight the potential benefits of peripheral nerve block (PNB) use.

Case Report: A 72 year old male presented in the emergency department with lower limb ischemia and indication for transmetatarsal amputation. The patient reported limited physical activity -NYHA III- for the past year, he was a heavy smoker and his medical history was significant for kidney failure under hemodialysis, untreated chronic obstructive pulmonary disease, hypertension and dialled cardiomyopathy. He had a permanent pacemaker and a recent echocardiography described an EF=30% and mitral valve regurgitation. Furthermore, the patient was under therapeutic dose of Low Molecular Weight Heparin. Taking all these into consideration, we decided to perform a PNB. Because of extensive foot infection an ankle block was not feasible. After informed consent of the patient, a distal sciatic combined with a saphenous nerve block was implemented with success. Under ultrasound guidance, 15ml of Ropivacaine 0.5% were injected just before the bifurcation of the sciatic nerve and 10ml Ropivacaine 0.5% in the adductor canal to target the saphenous nerve. The patient recovered uneventfully and no postoperative complications occurred.

Discussion: PNBs offer high risk patients fast track anesthesia and should be preferred for transmetatarsal surgery. However, performance on anticoagulated patients should be individualized. The increasing use of ultrasound improves block safety and effectiveness. We also consider choosing distal blocks may provide another safety point in this group of patients.

References:

6312
Anaesthetic approach to a patient with McArdle syndrome – a rare metabolic disease

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Background: McArdle disease or glycogen storage disease type V is a rare metabolic myopathy (1:100,000) characterized by glycogen deficiency in skeletal muscles. This disease has the potential for creating perioperative anaesthetic challenges, such as hypoglycaemia, rhabdomyolysis, myoglobinuria, acute renal failure and malignant hyperthermia. This is a case report about a patient with McArdle disease and his anaesthetic management.

Case Report: A 63-year-old male, ASA II, BMI 30, with hypertension and diagnosed in 2017 with McArdle disease submitted to an umbilical hernia repair. The patient described severe muscular pain and lack of strength during light exercise preventing an accurate evaluation of functional capacity. Patient had a Mallampati IV, chronic hoarseness and no neurological or kidney damage. We performed spinal anesthesia with a 27G needle, 2.5 mcg sufentanil and 12.5 mg levobupivacaine. Active heating was maintained during the surgery and in the recovery room. The motor block was completely reversed after 4 hours with no alterations in muscle strength. Myoglobin and CK testing in the postoperatively were similar to the preoperative period. ICU care was considered although this wasn’t necessary as no complications were recorded perioperatively.

Discussion: Patients with McArdle disease are rare and rise several anaesthetic concerns. Using regional techniques, we avoid complications such as malignant hyperthermia, metabolic alterations and hypermetabolism. In addition, it allows the patient to adapt his positioning decreasing the risk of rhabdomyolysis. We should avoid shivering in these patients since muscle damage and increase in oxygen consumption can lead to important metabolic changes. Monitoring temperature and active patient warming during the surgery are also important measures.

References:

Learning points: Patients with rare muscular diseases like McArdle syndrome are an anaesthetic challenge and demand a tailored anaesthesia. Regional techniques are the main option when the procedure allows it. Adequate monitoring and postoperative follow up also prevent complications. Choosing a spinal anaesthesia, we guaranteed the safety of our intervention without aggravating disease and without prolonging hospital stay or recovery.
Ultrasound-guided combined interscalene-cervical plexus block with low volume for clavicle surgery analgesia – safe and opioid sparing technique

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Background: Although peripheral nerve blocks are commonly used for a wide variety of surgical procedures on the upper extremity, there are very few reports regarding regional anaesthesia for surgery of the clavicle. The sensory innervation of the clavicle has been attributed to either the cervical or brachial plexus. We report the anaesthetic management of a case involving a clavicle surgery performed under ultrasound-guided superficial cervical plexus block (SCB) combined with an interscalene block (ISB), along with general anaesthesia.

Case Report: A 55 years-old-male, ASA III, required a surgery repair of an acromioclavicular joint dislocation. The patient had heart failure (NYHA II), ischemic cardiomyopathy with history of acute myocardial infarction, dyslipidaemia, smoking and obesity. Considering his comorbidities, we opted for a combined regional and general anaesthesia. After adequate sedation, an ultrasound guided ISB was performed, the approach was within-plane technique targeting the upper trunk, roots C5 and C6, with an injection of 8 ml of ropivacaine 0,375%. Then, with the same needle puncture, the SCB was performed with 2 ml of ropivacaine 0,375%.

General anaesthesia was administered and intraoperative analgesia included only paracetamol 1 g. The surgery lasted for approximately 70 min. Surgery and anaesthesia were uneventful. In the Post-Anaesthesia Care Unit, the patient had no pain and therefore no other analgesia was required. In the postoperative period, up till hospital discharge (24 hour after), the patient had no pain at rest or movement with paracetamol 1 g 8-hourly, no motor, or sensitive blocks nor neurological complaints.

Discussion: Low volume and low local anaesthetic concentration ultrasound-guided upper trunk ISB and SCB provided effective analgesia in both intraoperative and postoperative periods with no side effects or complications. This method reduced the need for perioperative opioid analgesia without compromising the patient’s comfort.

References:

Learning points:
Combined ultrasound-guided superficial cervical plexus block and interscalene block (C5 and C6 roots) was a successful analgesic technique for surgery of the clavicle. This method had no reported complications, with no need for rescue analgesia, allowing the reduction of opioid consumption.

Opioid sparing anesthesia associated with continuous Quadratus Lumborum Block as an alternative to neuroaxial blockade for abdominal surgery

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Background: Neuroaxial blockade is considered the gold standard for open abdominal surgery. When the patient presents contraindication or an anatomy difficulties, another regional anesthesia or improvement of intravenous analgesia may be performed. Interfacial blocks, such as quadratus lumborum (QL), has been gaining space in this scenario, due to its visceral and somatic analgesia.

Case Report: A 89 year-old male patient (60Kg, 1,65m), presenting a bladder cancer, with a history included gastric cancer operated in 2016 and traumatic leg amputation. After general anesthesia was induced with fentanyl 150 µg, ketamine, MgSO4 and lidocaine were used as adjuvants; 22G Quinck needle was used to evaluate pain. NRS were 2, 0 and 0, in the immediate post-op, 12h and 24h after.

Surgical time was 240 minutes, 90 min under neuro-axial anesthesia and 150min after, respectively. After 24h, patient walked and was discharged to ward with good patient's comfort.

Discussion: QL has an important role and has since been frequently used in multimodal anesthesia in abdominal procedures. QL block can be divided into 4 different techniques and there is no superiority between then in the literature. Catheter insertion enables effective postoperative pain control. The association between these regional anesthesia technique and opioid sparing in a multimodal approach has demonstrate benefits in abdominal surgeries.

References:

Learning points: Cotinous Quadratus Lumborum Block as an opioid sparing anaesthetic technique alternative to neuroaxial analgesia.

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Quadratus Lumborum Block type 3 as a rescue technique for a converted urological surgery

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Background: Neuroaxial anaesthesia is still the gold standard technique for Transurethral resection. However, when a change during surgery is needed and the surgical time may increase, it may not be enough. In urological procedures requiring open abdominal surgery, robotic or videoendoscopic resections, interfacial blocks are an adequate alternative due to its visceral and somatic analgesia.

Case Report: A 89 year-old male patient (60Kg, 1,65m), presenting a bladder cancer, scheduled for a transurethral resection (TURP) under spinal anaesthesia. Medical history included gastric cancer operated in 2016 and traumatic leg amputation. After standard monitoring, spinal anaesthesia was performed with 12mg of hyperbaric bupivacaine 0,5% by 25G Quinck needle. Sedation was made with 2mg midazolam and 40µg of fentanyl IV. It was necessary to convert the surgical procedure due to a bladder lesion. Facing a possibility of a long surgical time, we decided to convert our technique to general anaesthesia. Induction was made with 60mg lidocaine, 150 µg fentanyl, 70mg propofol, 70mg rocuronium and subsequent endotracheal intubation. At the end of the procedure, Quadrusom lumborum block type 3 (QL3) was performed, bilaterally, with US by the upper trunk, 22G Quinck needle and patient in lateral decubitus position. After hydrodissection with 10ml saline 0,9%, 20ml 0,25% bupivacaine with 4mg Dexamethasone were injected each side. Surgical time was 240 minutes. 90 min under neuro-axial anesthesia and 150min after general. Patient was removed to the ICU. Numerical Rating Scale (0-10) was used to evaluate pain. NRS were 2, 0 and 0, in the immediate post-op, 12h and 24h after, respectively. After 24h, patient walked and was discharged to ward with good pain control and no rescue opioid needed.

Discussion: Interficial blocks have been gaining space as an analgesic technique, both as a tool of sparing opioids, and as an effective postoperative analgesia. Firstly described in 2007, QL can be divided into 4 different techniques currently. QL3 was chosen due its visceral and somatic analgesia.

References:

Learning points: This work aims to show that interfacial blocks can be a good technique for post-operative analgesia.
Unilateral erector spinae plane block combined with multimodal analgesia for treatment of chronic pain after open inguinal hernia repair: a case report

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Background: The erector spinae plane block (ESPB) is interfascial plane block which is successfully used for treatment of acute and chronic neuropathic pain in thoracoabdominal region.1 Chronic pain after inguinal hernia repair surgery is major clinical problem and can in influence patients’ quality of life. The rate of chronic pain in this type of surgery is 51.6% of the cases.

Case Report: We report one case of single-shot unilateral ESPB for management of chronic pain after open inguinal hernia repair surgery. A 68-year old male patient (weight 76 kg, height 167 cm) was admitted to the Post Anesthesia Care Unit (PACU). His comorbidities included hypertension which was well treated with enalapril, and insulin-dependent diabetes mellitus. In past three years he had three open right-sided inguinal hernia repair. One year ago pain was treated with right-sided transversus abdominis plane block (TAPB), which was ineffective. In past two years he received analgesic drugs every day (Doretal, Tramadol, Ketoprofen and Paracetamol) and all the pain time on numeric rating scale (NRS) was ranged from 8 to 10. After giving premedication with midazolam (2 mg intravenously), we gave dexamethasone 0.1 mg/kg i.v. and performed ultrasound guided right-sided ESPB with 20 ml 0.5% bupivacaine at level of Th11. After the block, we gave i.v. continuous infusion of lidocaine 2 mg/kg, magnesium sulfate 40 mg/kg and ketamine 0.2 mg/kg for one hour. After 2 hours patient was discharge home and the pain score from 8-10 fell to 2-3 on NRS. Follow up check up after three and six months showed no persistence of the pain and pain score of 2-3 on NRS.

Discussion: Erector spinae plane block can be successfully used in treatment of chronic neuropathic pain after an open one-sided inguinal hernia repair. Also, multimodal treatment of giving single dose of dexamethasone, lidocaine, magnesium sulfate and ketamine has been shown effective in treatment of chronic pain.

References:

6322

Atypical complicated post-dural headache syndrome

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Background: Post-dural headache (PDH) is a possible complication after spinal anesthesia with a typical clinical syndrome. It’s diagnosis is commonly based on the clinical findings after a neuroaxial anesthesia technique. Although considered benign and self-limited, it can be very life limiting, prolonged and followed by serious complications.

Case Report: 85-year-old man with clinical history of ocular myasthenia well treated and controlled who underwent an inguinal hernia repair on an outpatient basis. The patient (weight 76 kg, height 167 cm) was admitted to the Post Anesthesia Care Unit (PACU). His comorbidities included hypertension which was well treated with enalapril, and insulin-dependent diabetes mellitus. In past three years he had three open right-sided inguinal hernia repair. One year ago pain was treated with right-sided transversus abdominis plane block (TAPB), which was ineffective. In past two years he received analgesic drugs every day (Doretal, Tramadol, Ketoprofen and Paracetamol) and all the pain time on numeric rating scale (NRS) was ranged from 8 to 10. After giving premedication with midazolam (2 mg intravenously), we gave dexamethasone 0.1 mg/kg i.v. and performed ultrasound guided right-sided ESPB with 20 ml 0.5% bupivacaine at level of Th11. After the block, we gave i.v. continuous infusion of lidocaine 2 mg/kg, magnesium sulfate 40 mg/kg and ketamine 0.2 mg/kg for one hour. After 2 hours patient was discharge home and the pain score from 8-10 fell to 2-3 on NRS. Follow up check up after three and six months showed no persistence of the pain and pain score of 2-3 on NRS.

Discussion: Erector spinae plane block can be successfully used in treatment of chronic neuropathic pain after an open one-sided inguinal hernia repair. Also, multimodal treatment of giving single dose of dexamethasone, lidocaine, magnesium sulfate and ketamine has been shown effective in treatment of chronic pain.

References:

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Perioperative management os an acute ischemia in pluripatological patient with multiple medication allergy

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Background: Decide the type of anesthesia in acute ischemia in a pluripathological patient, performing ilioinguinal block.

Case Report: A 86-year-old woman is allergic to NSAIDs, penicillin, aminoglycosides, AAS, pyrazolones, acetaminophen and onomeprazole with a history of obesity, AHT, anticoagulated AF, ischemic ACOVA without sequelae, OSA in treatment with CPAP, global respiratory failure with home oxygen, bilateral glabela, congestive heart failure with preserved LVEF, pulmonary HT, IIIB chronic kidney disease and stable anemia pectoris. The patient goes to the emergency department with coldness and pain in left leg being diagnosed with acute ischemia there. This situation was evaluated by vascular surgery, and an urgent surgical intervention is accepted to perform an iliofemoral implant. An inclined approach provided in the opposite leg was chosen for iliofemoral implant. After the implant was performed, we observed a clear light-yellow CSF flow and chose not to inject the local anesthetic, converting into general anesthesia. Both intra and postoperative periods occurred without incidents and the patient never developed any neurological nor meningeal signs.

Discussion: Xanthochromia is classically associated with subarachnoid haemorrhage within 12 hours and it was the probable cause in this case. Following haemorrhage into the CSF, red blood cells undergo lysis and phagocytosis; the liberated oxyhaemoglobin is converted in bilirubin. Bilirubin may be detected in CSF by spectrophotometry or by visual inspection for the yellow discoloration of CSF. Other causes include a blood traumatic tap, jaundice, high CSF protein concentration. In case of detecting abnormal CSF appearance in the course of lumbar puncture done for spinal anesthesia, CSF samples should be sent to biochemistry and microbiology laboratories. However, no samples were collected at the time.

References:

6038

Why did it turn out yellow? - Incidental finding of xanthochromic cerebral spinal fluid during spinal anesthesia

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Background: Spinal anesthesia provides excellent operating conditions for surgery below the umbilicus. Usually, after placing our spinal needle in the desired interspace and reaching the subarachnoid space, a flow of clear-transparent Cerebral Spinal Fluid (CSF) is usually observed. Xanthochromia is caused by pigment in CSF and it is classically associated with subarachnoid haemorrhage.

Case Report: A 59-year-old woman, victim of a run over accident, presented with fracture of the tibia and minor cranial subarachnoid haemorrhage and was proposed for intramedullary nailing of the tibia. All routine investigations were within normal limits. Spinal anesthesia was the chosen anesthetic plan. After spinal tap and stylet removed, we observed a clear light-yellow CSF flow and chose not to inject the local anesthetic, converting into general anesthesia. Both intra and postoperative periods occurred without incidents and the patient never developed any neurological nor meningeal signs.

Discussion: Xanthochromia is classically associated with subarachnoid haemorrhage within 12 hours and it was the probable cause in this case. Following haemorrhage into the CSF, red blood cells undergo lysis and phagocytosis; the liberated oxyhaemoglobin is converted in bilirubin. Bilirubin may be detected in CSF by spectrophotometry or by visual inspection for the yellow discoloration of CSF. Other causes include a blood traumatic tap, jaundice, high CSF protein concentration. In case of detecting abnormal CSF appearance in the course of lumbar puncture done for spinal anesthesia, CSF samples should be sent to biochemistry and microbiology laboratories. However, no samples were collected at the time.

References:

Learning points: In a trauma patient, even with minor subarachnoid haemorrhage, xanthochromia can be found during spinal anesthesia without the development of neurological signs.

6039

Atypical headache doesn’t discar PDH syndrome. MRI Imaging can help in its diagnosis.
Asymptomatic subcutaneous abscess at epidural catheter insertion site - Clinical Report

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Background: Skin and subcutaneous abscess after epidural catheterization are extremely rare events(1). The length of epidural analgesia may increase the risk for local infection(2).

Case Report: A 29-year-old female presented with fractures of the left 4th-12th ribs, left hemopneumothorax and left pulmonary contusion following high kinematics trauma. On arrival at the local hospital, an epidural catheter was placed in T5-T6 for thoracic wall analgesia. The patient was transferred to our hospital four days after the trauma and in the 6th day following epidural catheter placement was referred to the Acute Pain team due to analgesia inefficacy. After attempting to optimize analgesia without success, it was decided to perform a new epidural block. While removing the catheter, a subcutaneous abscess was detected in the puncture site. No symptoms or neurological deficits were identified and the abscess was promptly drained. The following day MRI revealed subcutaneous inflammation at the level of T5-T6 with left paravertebral spreading without neuroaxial spread. There was suspicion for concomitant respiratory infection and intravenous antibiotics, which covered the bacteria identified on the swab collected from the abscess, were prescribed. With informed consent, a continuous left BRILMA (Block of the branches of the intercostal nerves in the midaxillary line) at the level of the 7th rib was performed with effective pain control. On follow-up the patient remained asymptomatic.

Discussion: Infection following epidural puncture presents with possibility for significant complications. As it may present without symptoms, frequent observation of the insertion site is key for diagnosis. Meningeal signs should be looked for frequently and the catheter should be removed immediately if inflammatory signs are present as there is the risk of spreading to the epidural space. Abscess drainage is indicated and antibiotics should not be prescribed unless there are meningeal signs, increasing inflammatory markers or fever.

References:

Learning points: Even though local infectious processes following epidural techniques are rare, frequent examination of the insertion site of the catheter is key in identifying complications as they can present asymptptomatically.
Regional Anaesthesiology

ULTRASOUND-GUIDED BLOCKADE OF THE SUPERIOR LARYNGEAL NERVE FOR LARYNX BIOPSY IN SPONTANEOUS VENTILATION IN A PATIENT WITH SEVERE PULMONARY HYPERTENSION

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Background: Pulmonary arterial hypertension (PAH) is a high-risk pathology in which multiple options and interventions can lead to dangerous situations. Therefore, alternatives to general anaesthesia (GA) should be considered. We present the case of a patient with severe PAH who underwent laryngeal nerve block with ultrasound guidance for a bilateral superior laryngeal nerve (SLN) block under spontaneous ventilation.

Methods: A 65-year-old female patient with PAH and a history of mitral valve disease and pulmonary hypertension, with a body mass index of 35 kg/m² and New York Heart Association class III, was scheduled for a laryngoscopy and biopsy due to a tracheal diverticulum. The patient was premedicated with midazolam 1 mg and fentanyl 0.05 mg. Monitoring was done according to the ASA standards.

Results: The procedure was performed without any complications. The patient was discharged home on the day after.

Discussion: In patients with PAH, general anaesthesia should be avoided if possible, as it can lead to dangerous situations. Therefore, alternatives to general anaesthesia should be considered. Ultrasound-guided SLN block offers greater comfort by decreasing the nociceptive response and achieving great hemodynamic stability. It should be considered as an alternative or as a complement to GA. It provides good analgesia from tongue-base to the vocal cords, and associated with topical anaesthesia, ventilation with less hemodynamic alterations, good tolerance and rapid recovery.

References:
Incidence of iatrogenic pneumothorax after ultrasound guided supraclavicular nerve block for upper limb surgery: a single centre experience of 3641 blocks

Background and Goal of Study: An ultrasound guided supraclavicular nerve block is one of the techniques to perform anaesthesia and postoperative analgesia for upper limb surgery. However, the presence of the subclavian artery and pleural cavity in the vicinity of the brachial plexus results in a possible risk for hematoma and pneumothorax. The incidence of iatrogenic pneumothorax after a supraclavicular nerve block has been reported to be around 0.7% to 1.6% and 6 percent. However, the overall incidence of pneumothorax diminishes with increasing experience and is further reduced with the use of ultrasound to an overall incidence of 0.05%. This audit aims to demonstrate the incidence of iatrogenic pneumothorax after ultrasound guided supraclavicular nerve block in a high volume centre.

Materials and Methods: A retrospective analysis was performed on all supraclavicular nerve blocks for upper limb surgery in our hospital between January 1, 2016 and November 31, 2019. All supraclavicular nerve blocks were performed at the discretion of the attending anaesthesiologist. The overall incidence of clinically significant pneumothorax (suspected by symptoms of dyspnea or chest pain from altering the performance of the block and confirmed by chest X-ray) was documented.

Results and Discussion: Between 01-01-2016 and 31-11-2019, 3641 supraclavicular nerve blocks were performed for upper limb surgery. All blocks were performed using ultrasound. 2870 blocks were performed by graduated anaesthesiologists with a variable expertise in regional anaesthesia. 771 were performed by residents. No cases of a clinically significant pneumothorax could be identified in our database. Supraclavicular nerve blocks provide excellent analgesia for upper limb surgery and are frequently used for day case surgery. Accidental pleural puncture and pneumothorax could however delay hospital discharge and increase hospital costs. The overall incidence of pneumothorax has been reported in recent years to be decreased by the use of ultrasound. Incidences lower than 0.05% have been reported (1). Our data indicate that real incidence could be even lower.

Conclusion: Retrospective analysis of 3641 ultrasound guided supraclavicular nerve blocks indicate that this is a safe procedure and confirm previous studies indicating that the overall incidence of pneumothorax is very low (< 0.05%).

References:

Diaphragmatic paralysis and horner syndrome by supraclavicular nerve block

Background and Goal of Study: Supraclavicular nerve block (SNB) is a commonly used technique for surgery on the upper extremities. Complications of SNB are pneumothorax, temporary (palliative diaphragmatic paralysis (by blockade of the phrenic nerve) and Horner syndrome (by blockade of the stellate ganglion). Research in partial and complete diaphragmatic paralysis and Horner’s syndrome report a variance in incidence (0-44%). This observational study was conducted to assess the incidence and influence of local anasthesic volume in daily practice.

Materials and Methods: 75 patients undergoing upper extremity surgery with SNB were approached and included in the study. Exclusion criteria were pre-existent dysfunction of the diaphragm, dyspnea and ptosis of the ipsilateral eye. The executing anaesthesiologist or resident decided on injecting location, needle movements and local anaesthetic volume. Functionality of diaphragm was assessed pre- and post SNB by echography with a 2.5 mhz curved probe, transversally between the mid-axillary and mid-clavicular line. Diaphragm movement of less than 2 cm movement caudally or paradoxical movement with deep inspiration was considered paralytic. Pulse-oximetry, dyspnea and Horner syndrome pre- and post SNB were also registered.

Results and Discussion: The volume of local anesthetic used ranged between 13-35 ml. 13 patients (17%) had an ipsilateral diaphragmatic paralysis. 8 of these patients had a desaturation of more than 3%. 2 of these patients had dyspnea. None of the patients had severe hypoxemia which required supplemental oxygen. 22 patients (29%) had Horner syndrome, of which 13 without diaphragmatic paralysis. 9 patients had horner and diaphragmatic paralysis. The proportion of diaphragm paralysis increased with increasing volumes of local anesthetic. No diaphragm paralysis was present with local anesthetic volumes below 20 ml. Conclusion: Horner syndrome seems more frequent than diaphragmatic paralysis (29 vs. 17%), and Horner syndrome and diaphragm paralysis can concur independently. Paralysis rarely causes dyspnea (15%). The incidence of paralysis seems to increase with greater volumes of local anesthetic.
Implementation of regional anesthesia guidelines in clinical practice, does it happen in real life?

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Background and Goal of Study: Clinical practice often lags behind evidence presented in the literature. Current guidelines advocate the use of low volumes of local anesthetics during peripheral nerve blocks (PNB), accept the safety of PNB performance under general anesthesia (GA) and recommend the use of combining ultrasound (US) and nerve stimulation (NS) during PNB. This audit aims to evaluate if clinical practice has changed according to guidelines.

Materials and Methods: An audit was performed on all supraclavicular (SCB) and interscalene blocks (ISB) for upper limb surgery executed in a single centre in 2016 and 2019. All blocks were performed at the discretion of the attending anesthetist. Statistical analysis using Student’s t tests and Chi square tests was performed on the volume used, the combined use of US and NS and the performance of PNB under sedation or GA.

Results and Discussion: In 2016 and 2019, 826 and 866 SCB were performed. There was a significant reduction of the mean volume used from 35 to 26mL (p<0.05). In 2016 both US and NS was used in 76% of cases where in 2019 this was only 37% (p<0.05). Only a small minority of patients received a PNB under GA (4 in 2016, 5 in 2019), there was a significant reduction in the use of sedatives from 2016 to 2019 (90% in 2016 vs 15% in 2019, p<0.05). In 2016 and 2019, 576 and 645 ISB were performed. There was no difference in the volume used (19.4mL vs 18.6mL). The use of NS and US increased from 2016 to 2019 (20% vs 50%, p<0.05). ISBs were performed under general anesthesia in 46 patients in 2016 and 7 in 2019 (p<0.05), there was a significant reduction in the use of sedatives (45% vs 12%, p<0.05). Acceptance of guidelines in clinical practice is diverse. There was a significant reduction of the mean volume used from 35 to 26mL (p<0.05). In 2016 both US and NS was used in 76% of cases where in 2019 this was only 37% (p<0.05). Only a small minority of patients received a PNB under GA (4 in 2016, 5 in 2019), there was a significant reduction in the use of sedatives from 2016 to 2019 (90% in 2016 vs 15% in 2019, p<0.05).

Conclusion: Our audit demonstrates that in a high volume centre adoption of clinical guidelines is slow or even non-existent. Further research is necessary to detect the barriers that prevent implementation of clinical guidelines.

Assessment Of Main Complications Of Regional Anaesthesia

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Background and Goal of Study: Regional anaesthesia, due to the scientific evidence of its advantages, has been increasingly used. Although this is a technique with a low number of complications described, some are associated with devastating morbidity. The aim of the study is to evaluate the incidence of postoperative complications associated with the use of regional techniques, such as neuroaxial block (NB) and peripheral nerve block (PNB).

Materials and Methods: After approval by the São João Hospital Health Ethics Committee, the clinical data of patients referred to the Acute Pain Functional Unit (APFU) were retrospectively collected from 1st January, 2011 to 31st December 31, 2017.

Results and Discussion: Out of a total of 10838 patients referred to APFU, 1093 had side effects or complications. 1039 (11.4%) underwent NB and the most common side effects were: sensory (39.7%) or motor deficits (11.6%), nausea or vomiting (21.8%) and pruritus (6.4%). There were 3 cases (0.03%) of subcutaneous tissue hematoma, 3 (0.03%) of epidual abscess and 1 (0.01%) of arachnoiditis. 204 of these patients maintained need for follow-up through telephone and/or external consultation due to persistent sensory or motor deficits after hospital discharge. 54 (5.2%) patients underwent PNB, and sensory deficits were also the main complaints of these patients (51.9%). 21 of them maintained the deficits after hospital discharge, requiring also follow-up in consultation.

Conclusion: Side effects of regional anaesthesia are common, but the most serious complications, such as epidural abscess or hematoma and permanent peripheral nerve damage, are rare, as found in this study. All candidates for regional anaesthesia should therefore be rigorously evaluated and informed of possible complications, making a high index of suspicion essential for their diagnosis and timely treatment.

Comparison The Prophylactic Administration Of Pregabalin And Acetaminophen On Post-Dural Puncture Headache After Spinal Anesthesia - a randomised double-blind, placebo controlled study

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Background and Goal of Study: Post-dural puncture headache (PDPH) is a known complication of neuroaxial anesthesia and may be associated with significant morbidity. To avoid the need for invasive methods of treating PDPH such as blood patch, the search for novel pharmacological agents to manage PDPH continues. Our prospective, randomized, double-blind, placebo-controlled study was planned to compare the preventive effect of pregabalin, acetaminophen and placebo on relative frequency and intensity of PDPH after spinal anesthesia.

Materials and Methods: After obtaining Ethics Committee approval and written informed consent, 84 patients (ASA I-II) aged between 18 and 50 years, admitted for the lower extremities orthopedic elective operation under spinal anaesthesia, were included in the study. The patients were randomly divided into three groups (n=28, in each group) to receive an hour before spinal blocking, either 500 mg acetaminophen (group A), 100 mg oral pregabalin (group B) or placebo tablets (the control group, group C). Headache was evaluated using visual analog scale (VAS), at the time which PDPH symptoms began and was followed 6,12, 24, 48 and 72 h after it. The pain scale consisted of a 10 cm horizontal line marked from 0 (denoting no pain) to 10 (denoting worst possible imaginable pain). Student’s t-test and Chi-square test were used for analysis.

Results and Discussion: Patients in group B had lower incidence of PDPH (3,57% vs. 14,28% for group A and 17.85 % for group C with P < 0.05), the highest incidence of complete response, and also, less analgesic requirement compared with groups A and C, throughout 6-72 h (1.2 ± 0.4 vs. 2.3 ± 0.75 for group A and 3.3 ± 1 for placebo group with P < 0.05).

Conclusion: A single pre-operative dose of 100 mg of pregabalin reduced PDPH better than using acetaminophen in patients who underwent lower extremity surgery under spinal anesthesia.
4916
Damage control regional anaesthesia
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Background: The desirable respiratory and cardiovascular effects of regional anaesthesia makes it suitable technique in patients who are unfit for general anaesthesia due to severe physiological derangements. This can facilitate interim surgery to save life and improve physiology prior to definitive surgical intervention under general anaesthesia.

Case Report: A 58 years old patient presented with Takotsubo cardiomyopathy with left ventricular ejection fraction of 14%. This type of cardiomyopathy was developed as a result of septicaemia from infected collection at humeral fracture site, which was sustained by a mechanical fall prior to hospital admission. She was in decompensated cardiopulmonary state with pulmonary oedema, bilateral septic empi and atrial fibrillation. She was on 5L/min oxygen via facemask with respiratory rate of 35 cycles/minute and SPO2 of 96%, Blood pressure of 93/50 mmHg and atrial fibrillation rate of 92bpm on aminophylline infusion. She was on broad-spectrum antibiotics with a CRP of 300 mg/L and WCC of 13 x 10^9/L. Under ultrasound guided interscalene and infracclavicular brachial plexus with intermediate cervical plexus block a deltopectoral and inferolateral surgical approach of humerus was performed for abscess washout and debridement. Vancomycin loaded beads insertion at fracture site and into humeral shaft, surgical drain placement, tissue biopsy and glenohumeral joint aspiration for microscopy, culture and sensitivity. The patient vital signs remained unchanged throughout the procedure, which lasted for 70 minutes from knife to skin.

Discussion: Within one week after surgery there was marked clinical improvement. Vital signs stabilised and left ventricular ejection fraction improved to 46% on repeated ECHO. CRP dropped down to 39 mg/L and WCC to 6.2 x 10^9/L. The patient is currently awaiting ORIF of humeral fracture once infection is completely cleared.

Learning points: Damage control regional anaesthesia is valid anaesthetic option for damage control surgery

4868
Practice of Regional Anaesthesia in Belgium – A National Survey
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Background: National surveys are useful to assess the state of regional anaesthesia (RA). They can serve as a basis to implement new guidelines. Given that such information is lacking in Belgium, we conducted a survey to evaluate our practice of peripheral nerve block performance (PNB), with a particular focus on safety aspects.

Methods: A survey was sent by email to Belgian anaesthesiologists using national society and university mailing lists. Respondents completed the survey anonymously through the SurveyMonkey® platform. Data were collected between September 2019 and October 2019.

Results: Among the 1600 anaesthesiologists to whom the survey was sent, 324 responded. Among the 278 questionnaires which could be used for analysis, 30% were completed by practitioners working in a university hospital and 70% working in a non-university hospital. 85% of responders said that they perform a PNB more than once a week. Almost all anaesthesiologists (99%) placed a venous access before performing the block. More than 90% of patients were monitored with peripheral pulse oximetry and 55% with NIBP, ECG and peripheral pulse oximetry. The huge majority of patients remained monitored for at least 30min after injection. However, 8% remained under visual observation in the vicinity of the surgical room. Ultrasound-guided RA was performed in 89%. The neurostimulator was totally abandoned in 20%. For those who used a neurostimulator, 44% sought for a motor response and 56% kept it as sentinel (with mean minimal intensity 0.46mA (95% CI 0.40-0.44)). Monitoring of the injection pressure was considered in 21%. More than 50% of responder use complete sterile measures (combining sterile gloves, surgical drapes, mask). Concerning local anaesthetics (LA), 52% never mixed LAs and the adjuvant use varied between 10% (never) and 15% (always) with dexamethasone being the most popular one (IV and in LA-solution). Most practitioners (97%) knew where intralipid was located in case of local anaesthetic systemic toxicity and a flash card was accessed (83%) nearby, 93% of the responders stated that this medication can be found in the operating room or in its vicinity.

Conclusions: This survey suggests a correct level of safety in the practice of PNB in Belgium according to recent French guidelines[1]. This survey can serve as a benchmark for future comparisons and evaluation of RA techniques.

References:

4858
What is the impact of unilateral diaphragm paralysis on obstructive sleep apnea? A scoping review
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Background and Goal of Study: Unilateral diaphragm paralysis (UDP) occurs in all patients undergoing interscalene brachial plexus block (ISB), and may result in worsening of obstructive sleep apnea (OSA). Current guidelines recommend ISB for shoulder surgery in patients with OSA, but the impact of UDP in this population is unknown. This review aims to evaluate the effects of UDP on OSA severity as the most popular one (IV and in LA-solution). Monitoring of the injection pressure was considered in 21%.

Materials and Methods: We searched the US National Library of Medicine (MEDLINE), Embase and Cochrane Database of Systematic Reviews for studies evaluating OSA severity in adults with UDP. Our primary outcome was OSA severity as measured by the apnea-hypopnea index (AHI) or respiratory disturbance index (RDI). We hypothesized that UDP worsens the severity of OSA.

Results and Discussion: Six studies with a total of 100 patients with UDP were included. Compared to controls (no DP), UDP was associated with increased RDI. Moreover, compared to controls, UDP was associated with a higher rapid eye movement (REM) sleep and supine sleep RDI, and lower mean SpO2% during all sleep stages and body positions. Compared to controls, UDP was associated with a restrictive pattern on the PFTs.

Conclusion: The available evidence suggests that OSA severity and nocturnal oxygenation is worse in patients with UDP, particularly during REM sleep and while sleeping in the supine position. Future findings should help to inform the risk-benefit discussions when considering ISB for patients with OSA.
Effects of ultrasound-guided bilateral suprazygomatic maxillary nerve block on postoperative pain after elective orthognathic monomaxillary osteotomy in adult patients

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Background and Goal of Study: Maxillary osteotomy is a surgery procedure of the orthognathic surgery field for correction of dental and facial abnormalities. The anesthetic management of these patients is a challenge because of the difficult airway management and the peroperative pain control. Multimodal approach for pain control is a fact, and the use of local and regional anaesthesia techniques (LRA) is mandatory. The researchers propose ultrasound-guided bilateral suprazygomatic maxillary nerve block (USMNB) for a proper control of postoperative pain after orthognathic maxillary osteotomy (OMO).

Materials and Methods: In this clinical trial, after ethical committee approval patients were randomly assigned to 2 groups to receive (study group) or not (control group) the USMNB (4ml Ropivacaine0.5%) together with local infiltration with Lidocaine (10ml Lidocaine2%) and general anesthesia. The main objective was the consumption of opioids. Pain, postoperative nausea-vomiting (PONV) and complications derived from USMNB were also recorded.

Results and Discussion: The researchers present the preliminary results of 39 patients who received USMNB presented better results in terms of: lower intraoperative opioids consumption (p=0.029), lower rate of patients who demanded methadone (100% control vs 0% study, p=0.029) and lower dose of methadone administered (4mg control vs 0mg study, p=0.029) at 2 hours postoperatively, lower level of pain at any time of the first 8 hours postoperatively (p=0.029), and lower incidence of PONV (75% control vs 0% study, p=0.048). No complications derived from the USMNB were reported.

Conclusion: The results obtained suggest that the USMNB is a promising LRA technique to decrease opioid consumption and greater patient comfort for OMO. The small size of the sample prevents generalization, and may involve risks of overinterpretation and publication bias. Larger studies need to be conducted to corroborate the efficacy of this LRA.

References:

Materials and Methods: Data from the peroperative period of patients who underwent elective HOLEP under spinal anesthesia were retrospectively collected from June 2016 to June 2018. A sensor to measure core body temperature (Spoton™ Temperature Monitoring System) was placed on the patient’s forehead before initiation of spinal anesthesia. Distilled water for irrigation was kept warmed at 38°C using a heated cabinet in the operation room (OR). Core temperature, noninvasive blood pressure, heart rate, oxygen saturation and electrocardiogram were monitored continuously. Additionally, the anesthesiologist noted the core temperature during surgery and amount of irrigation fluid used. Hypothermia was considered if the postoperative temperature decreased to below 36°C.

Results and Discussion: Seventy-six patients met the inclusion criteria. Of these, 18 (24.3%) patients experienced hypothermia after surgery. We compared this group with patients who did not experience hypothermia, and found the following: preoperative temperature (36.2°C vs 36.6°C) and BMI (21.7 kg/m-2 vs 24.0 kg/m-2) were both statistically significantly different (p=0.001 and p=0.02, respectively).

Conclusion: Our study suggests that preoperative core temperature and BMI are associated with postoperative hypothermia. Warming before surgery might prevent postoperative hypothermia in patients undergoing HoLEP.
Peripheral nerves localization using strain elastography: a pilot study

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Background and Goal of Study: Ultrasound elastography (UE) tends to improve the ultrasound diagnosis accuracy. The strain elastography (SE) depicts the pathological tissue loss of elasticity in response to an external pressure applied by the operator (pure color code-based visual assessment) It is now recommended for benign/malignant parenchymal process differentiation and for muscle and nervous rigidity assessment & follow-up. We postulated, the SE was able to differentiate the normal nerves from their muscle-vascular environment based on their different own elasticity to facilitate the preliminary nerve location.

Materials and Methods: 30 healthy ASA-II adult patients (lower limb surgery) were included into this prospective observational study. The femoral (F) and the popliteal sciatic (PS) nerves were studied using B&W 2D sonography (S) and SE (Fig.1). About the SE, first, the colorimetric scale (CS) goes from red (stiffer) to blue (softer) differentiating 6 main colors at the visual assessment (Fig.1). Second, the CS was transformed into a 3 points tissular classification related to F & PS stiffness for easier reading (Fig.1). Results are presented as percentages (Fig.2).

Results and Discussion: F & PS stiffness was in all the patients confirming the different morphology of each kind of nerve with a high level of patient-to-patient reproducibility. SE detected as «stiff» the F & PS in respectively 87 and 83% of the patients (Fig.2). Finally, a superposition between sonogram and elastogram revealed a greater than 50% was observed in 54 & 70% of the patients.

Conclusion: SE represents a promising technique that may complement S to try to improve the quality of nerve localization. Further studies are needed for a better understanding.
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perioperative analgesia, and helps rapid mobilization and discharge.

invasive lumbar spine surgery seems to be safe and feasible as a part of multimodal consumption for abdominal surgery.

Conclusion:

Morphine consumption was significantly reduced with QLB during the first 24 h (MD, -8.23 mg; 95% CI, -15.03 to -1.43) after abdominal surgery.

Results and Discussion:

Where possible, meta-analytic techniques were used to synthesize data, presented for postoperative recovery after abdominal surgery. Previous clinical studies have identified. QLB significantly reduced 24-h pain scores during movement (MD, -1.27; 95% CI, -2.51 to -0.03), but no at rest (MD, -0.52; 95% CI, -1.43 to 0.4).

Conclusion: QLB can improve postoperative pain control, reduce opioid consumption for abdominal surgery.

5740

Ultrasound-guided thoracolumbar interfascial plane (TLIP) block and intrathecal fentanyl: A feasible choice for Enhanced Recovery After Spine Surgery (ERAS) and early deambulation

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Background and Goal of Study: ERAS pathway is a multidisciplinary, multimodal approach to improve expedited functional recovery and early postoperative mobilization. There is a paucity of literature regarding the implementation of ERAS in spine surgery with the use of regional anesthesia. We present a case series of 15 patients undergoing minimally invasive (endoscopic) lumbar spinal surgery in which TLIP block and fentanyl intrathecal were performed as a part of the multimodal analgesia into the ERAS protocol. The aim was to determine the percentage of patients who mobilized at 6 hours of P.O, hospital-length of stay (LOS) and readmission at 30-90 days.

Materials and Methods: A retrospective study included 15 patients (60 to 85 y.o) undergoing lumbar spine surgery following ERAS protocol. Premedication: Midazolam 2mg, dexketoprofen 50 mg, paracetamol 1 gr, ondansetron 8 mrs. MgSO4: 1.5g i.v. Intrathecal Fentanyl 25 mg (sitting position) and US-guided bilateral TLIP were performed in all patients (prono position) with bupivacaine 0.25% and dexamethasone 8mgs (20ml each side). General anesthesia: fentanyl 2.0 mcg/kg i.v, propofol 2.0-3.0 mcg/ml (TCI) following BIS, ketamine 0.15 mg/Kg/h, rocuronio 0.4 mg/kg. Normotermia and euvolemia were maintained. Foley catheter and drains were avoided.

Results and Discussion: No: i.v. fentanyl was needed during surgery. Time of surgery 3.5±0.5 hrs. Rescue of methadone P.O : 21±mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O): 0/10-1/10-1/10. VAS at movement (6-12 P.O. hrs):3/10-2/10. 100% of the patients started deambulation at 6 hrs without complications. 90% of the patients began oral intake at 4 hrs P.O. Nauseas : 1 patient . Hospital-LOS:15±6 hrs. All cases were discharged at 24 hrs. No readmission at 30-90 days.

Conclusion: The combination of fentanyl intrathecal and TLIP block for minimally invasive lumbar spine surgery seems to be safe and feasible as a part of multimodal analgesia into ERAS pathway. Regional analgesia can improve the quality of perioperative analgesia, and helps rapid mobilization and discharge.

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Quadratus lumborum block for postoperative analgesia after abdominal surgery: a systematic review and meta-analysis

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Background and Goal of Study: Adequate postoperative analgesia is important for postoperative recovery after abdominal surgery. Previous clinical studies have shown that quadratus lumborum block (QLB) could not only stop somatic pain but also inhibit visceral pain. This systematic review was conducted to assess the analgesic utility of QLB following abdominal surgery.

Materials and Methods: PubMed, Embase, the Cochrane Library were searched from inception until October 2019. Trials were eligible if comparisons of QLB were made against no block and placebo. Pain scores at 24 h was primary outcome. Postoperative opioid consumption and side-effects were secondary outcomes. Where possible, meta-analytic techniques were used to synthesize data, presented as mean difference (MD) with 95% confidence interval (CI).

Results and Discussion: Eleven studies with a total population of 672 patients were identified. QLB significantly reduced 24-h pain scores during movement (MD, -1.27; 95% CI, -2.51 to -0.03), but no at rest (MD, -0.52; 95% CI, -1.43 to 0.4).

Conclusion: QLB can improve perioperative pain control, reduce opioid consumption for abdominal surgery.

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Comparison between crystalloid colloid ondansetron administration and crystalloid colloid to prevent spinal anesthesia induced hypotension, a randomized controlled trial

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Background and Goal of Study: Spinal anesthesia-induced hypotension is the most common cardiovascular complication after performing spinal anesthesia. Many studies suggested crystalloid colloid to have lower incidence of spinal anesthesia induced hypotension than preload in non-obstetric surgery. There are studies suggested efficacy of ondansetron administration before performing spinal anesthesia to reduced incidence of hypotension but lack of evidence in non-obstetric surgery and with coload administration. The purpose of this study was to compare the efficacy of prevention of spinal anesthesia-induced hypotension in non-obstetric surgery between ondansetron with coload administration and coload administration.

Materials and Methods: 49 patients (ASA classification I-II, aged 18 – 50 years) undergoing orthopedics surgery, general surgery, gynecologic surgery, receiving spinal anesthesia were randomized to receive ondansetron 4 mg and coload with lactate Ringer’s solution 10 ml/kg (O group, n=47) or NSS 2 ml and coload with lactate Ringer’s solution 10 ml/kg (N group, n=47). SBP, DBP, MAP, heart rate, oxygen saturation and nausea and vomiting symptoms were measured at baseline (T0) and 5, 6, 9, 12, 15, 20, 25, 30, 35, 40,45 minutes (T3, T6, T9, T12, T15, T20, T25, T30, T40, T45) after performing spinal anesthesia. The incidence of hypotension, rescue drugs, nausea and vomiting were measured.

Results and Discussion: There was no statistically significant difference between two groups in demographic data, and operation. The incidence of hypotension in ondansetron group (O group) was 34.04% and normal saline group (N group) was 29.79% with no statistically significant (p = 0.658). There was also no statistically significant difference in SBP, DBP, MAP, heart rate, nausea vomiting symptoms, and adverse effects along the time of observation between two groups. Although stimulation of serotonin receptor (5HT-3 receptor) may be associated with stimulation of Bezold-Jarisch reflex (BJR) that can cause spinal anesthesia-induced hypotension, the effect of level of sympathetectomy by spinal anesthesia may be negligible.

Conclusion: Ondansetron administration before spinal anesthesia with lactate Ringer’s solution coload was not superior than coload in prevention of spinal anesthesia-induced hypotension.

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Ultrasound assessment of diaphragmatic function after VATS for pulmonary biopsy in interstitial lung disease: a single center preliminary study

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Background and Goal of Study: In patient with suspect of interstitial lung disease (ILD), non-intralbud surgical biopsy has proven to be feasible (1). Despite physiopathological likelihood of increased risk for pulmonary complication after general anesthesia (GA), there is no evidence of superiority of locoregional techniques (LR). In our center, type of anesthesia is agreed with the patient according to clinical condition case-by-case. We decided to assess pulmonary and diaphragmatic function in patient undergoing VATS for pulmonary biopsy under GA or with LR anesthesia (usually thoracic epidural).

Materials and Methods: Our study was observational: patient scheduled for lung biopsy were prospectively enrolled and data regarding pre-op arterial blood gas analysis (ABG) and spirometry gathered. Diaphragm function was evaluated through ultrasound: both Thickening Fraction (TF%) and Diaphragmatic Inspiratory Amplitude (DIA) were measured. Data regarding anesthesia were recorded. 12h after surgery ABGs was checked and spirometry and diaphragm ultrasound repeated. NRS was also evaluated. According to type of anesthesia (GA or LR), patients were dived in two groups. Data were analyzed comparing the percentage decreased between pre and postop value. Analysis was conduct with STATA software.

Results and Discussion: 26 patients were enrolled in a 11-month period. Of these, 4 were lost to follow up. Of the remaining 22, 16 were in the LR group and 6 in the GA group. We observed no statistical differences between groups in term of percentage decrease of FVC, FEV1 and FEV1/FVC. TF post was increased by 15% on the left in the LR group and decreased by 35% in the GA (p=0.02). On the right, site of the surgical incision, TF was decreased of 4% in LR and of 20% in GA. Concerning involvement of diaphragm function in patient undergoing VATS for pulmonary biopsy under GA or with LR anesthesia (usually thoracic epidural).

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DIA, on the left it was 80% of the preop in LR and 62% in GA. On the right it was 90% and 53% respectively (p=0.01). There was a trend towards a smaller reduction in P/F in the LR group (10% vs 23%) and better pain control (mean NRS 2 in LR and 3.8 in GA) but statistical significance was not reached. From these preliminary data, LR anesthesia preserves diaphragmatic function significantly better than GA. According to our results, ultrasound was more sensitive in assessing such benefit.

Conclusion: In ILD patients, LR anesthesia for VATS biopsy preserves diaphragmatic function in greater extent than GA.

References:

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Uterotonic drug usage in a tertiary hospital in Athens Greece

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Background and Goal of Study: Postpartum hemorrhage continues to be one of the leading causes of maternal morbidity and mortality worldwide. Uterotonic drugs are used to prevent and treat postpartum hemorrhage. The aim of this study was to determine how doctors in our hospital, both obstetricians and anesthesiologists, use uterotonic drugs for vaginal deliveries and cesarean sections and to investigate decision making process and prioritization when managing postpartum hemorrhage.

Materials and Methods: 65 questionnaires where handed out to obstetricians and anesthesiologists in our hospital, both trainees and specialists. They were asked to answer anonymously about their preferences and use in practice of uterotonic drugs, dosages, way of administration and timing for cesarean sections and vaginal deliveries for women at low and high risk for postpartum hemorrhage. 44 completed anonymous questionnaires where collected and statistical analysis was performed using matlab toolbox.

Results and Discussion: 33 obstetricians and 9 anesthesiologists completed the questionnaires. The majority of the obstetricians had less than 5 years of clinical experience (70%), while most of the anesthesiologists were very experienced (78%). Oxytocin was reported as the first line uterotic drug for vaginal delivery while the most commonly used dose was 5 IU intravenous bolus plus maintenance infusion 1% for 2 hours. Ergonovine was also used routinely as 0.2mg intravenously without any monitoring. For low risk for postpartum hemorrhage cesarean sections oxytocin was the first line uterotic drug. Intravenous doses ranged from 3 to 10 IU followed by oxytocin infusions. For high risk for postpartum hemorrhage cesarean sections almost half of the participants (45%) use carboplatin usually as a bolus dose of 100mcg. Amongst the second line uterotic drugs ergonovine was used by most of the doctors, 0.2mg given slowly or rapidly bolus, with variable timing intervals. Mispotestol was also used at 200-800mcg. Most of the participants use 400 mcg per rectum. The choice of second line uterotic was mainly based on perceived efficacy.

Conclusion: There is lack of a unified approach to the use of uterotonic drugs for postpartum hemorrhage management in our hospital. To improve the management of postpartum hemorrhage due to uterine atony literature update is needed.

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A comparison of volatile anesthetics and propofol on hemorrhage during dilatation and curettage: A systematic review and meta-analysis

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Background and Goal of Study: Volatile anesthetics are known to decrease contractility of uterine muscle. Thus it may induce more bleeding during gynecologic procedures. There have been several studies comparing volatile anesthetics to intravenous drugs such as propofol to clarify the effects on blood loss. Some of them suggests the possibility of less blood loss when maintained by propofol, but it still remains unclear. We conducted a meta-analysis to compare the effect of propofol and volatile anesthetics on the amount of hemorrhage during dilatation and curettage.

Materials and Methods: A search was conducted of published literature in MEDLINE, EMBASE, Web of Science, and Cochrane Central Register of Control Trials databases. Randomized control trials that compared volatile anesthetics with propofol for patients undergoing dilatation and curettage were included. Continuous data were summarized using mean difference with a 95% confidence interval (CI). If the 95% CI included a value of 0, we considered the difference not to be statistically significant. We used the random effect model (DerSimonian and Laird method) to combine the results. Heterogeneity was quantified with the I2 statistic. The primary outcome from the present meta-analysis was blood loss during procedure. The secondary outcome was the number of patients with excessive bleeding.

Results and Discussion: Four trials (343 patients) were included with 173 patients receiving volatile anesthetics. Use of volatile anesthetics was associated with increased blood loss compared with propofol (mean difference of 97.6 ml, 95% CI
Materials and Methods: We enrolled women in a randomized, double-blind, placebo-controlled, parallel-group study to compare intravenous injections of high-dose oxytocin (10 IU) with low-dose oxytocin (5 IU) bolus of oxytocin with a 10 IU bolus of oxytocin for the effectiveness of adequate uterine contraction and adverse effects. Power calculation was performed. CMT2-study, including 240 women, is now conducted to answer if there are group differences in release of Troponin I.

Results and Discussion: QTC increases significantly with time, reaching maximal values within 6-9 minutes after administration of study drug, P<0.001. No difference in QTC was found between treatment groups, P=0.13, Fig 1. A tendency of more pronounced ST-depression (OR 5.71) and tachycardia (67% vs 57%) was found in the oxytocin group, Fig 2. Comparison of different dosage of oxytocin for uterine function and release of myocardial biomarkers. Change in Troponin I from baseline is most pronounced ST-depression and stimulate release of myocardial biomarkers. We therefore decided to investigate if there are group differences in release of Troponin I.

Background and Goal of Study: Uterotonic agents and adverse effects of a 5 IU bolus of oxytocin with a 10 IU bolus of oxytocin for the effectiveness of adequate uterine contraction and adverse effects. Power calculation was performed. CMT2-study, including 240 women, is now conducted to answer if there are group differences in release of Troponin I.

Comparison of different dosage of oxytocin for initiating uterine contraction during cesarean delivery

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Background and Goal of Study: Oxytocin is used for initiating uterine contraction and preventing postpartum hemorrhage during cesarean delivery. Using the lower dosage of oxytocin may cause effective initial uterine contraction and lower adverse effects than the higher dosage. We evaluated the uterine contraction, additional uterotonic agents and adverse effects of a 5 IU bolus of oxytocin with a 10 IU standard bolus of oxytocin during Cesarean delivery.

Materials and Methods: We enrolled women in a randomized, double-blind, comparing intravenous injections of high-dose oxytocin (10 IU) with low-dose oxytocin (5 IU) administered after clamping of the umbilical cord. There were two primary outcomes: the proportion of women with adequate uterine contraction during the first 3 minutes and the use of additional uterotonic agents.

Results and Discussion: A total of 155 women underwent randomization, 78 women in the low-dose group and 77 women in the high-dose group. The proportion of women with adequate uterine contraction during the first 3 minutes was 84.6% in the low-dose and 77.9% in the high-dose group (relative risk, 1.09; 95%CI, 0.93 to 1.26). The frequency of use of additional uterotonic agents was 28.2% in the low-dose and 36.4% in the high-dose group (relative risk, 0.78; 95%CI, 0.49 to 1.23). The estimated blood loss ≥ 500 mL, interventions to stop bleeding, neonatal outcomes, and adverse effects did not differ significantly between the two groups.

Conclusion: The 5 IU bolus of oxytocin was comparable to the standard 10 IU bolus of oxytocin for the effectiveness of adequate uterine contraction and adverse effects did not differ significantly between the two groups.

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Management of a severe postpartum hemorrhage in a patient with Glanzmann’s thrombasthenia

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Background: Glanzmann Thromboasthenia(GT) is a rare autosomal recessive haemorrhagic disorder characterized by platelet aggregation dysfunction. In this disorder, the main defect occurs in platelet's fibrinogen receptors(GPIIb/IIIa).During pregnancy, there is an increased risk for miscarriage and haemorrhage.

Case Report: A 28y/o primigravid mother, known case of GT, with 7 years history of infertility was reported. She was admitted with hematuria at 37 weeks of gestational age. Laboratory findings were acceptable, urinary tract ultrasonography was normal. Platelet & tranexamic acid and FVII were administered; however, because of fetal macrosomia and reduced amniotic fluid on ultrasonography, emergency cesarean section was planned. Under general anesthesia a well being baby with agapar score:8-10 and 4200 gr weight was born. No extraordinary bleeding occurred intraoperatively. and she was transferred to PACU. Two hours later the obstetrician noticed a massive vaginal hemorrhage and uterine atonia. Because of massive hemorrhage despite medical interventions (platelet, Factor Vila, Tranexamic acid, Fibrinogen, PRBC & FFP transfusion), Hysterecomy was performed. Five days later she was discharged with good condition.

Discussion: There are not frequent reports about pregnancy in GT. In a report the outcome of 40 pregnancies in 35 women with GT showed antenatal bleeding in 50% of cases, primary and secondary postpartum hemorrhage in 34% and 24% respectively(1). In previous researches different therapeutic agents were introduced to manage these patients such as platelet transfusions, recombinant factor Vila, desmopressin, prednisolone, large doses of uterotonic as well as plasmapheresis. The efficacy of these treatments are only reported in a few series. In our case, although we try to minimize her postoperative bleeding, but it continued. We believed that the macrosomic baby in combination with to some extend coagulopathy and hysterecomy led to abortion, continuous bleeding and an emergency life-saving hysterecomy despite our aggressive medical treatment.

References:

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Is it neurogenic or hemorrhagic? – Shock management in a puerperal uterine inversion – Case report

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Background: Uterine inversion (UI) is a rare, complex emergency. While a neurogenic shock can play a major role in the first stage, with placental delivery and increased blood loss the shock can become hemorrhagic.

Case Report: After an eutocic delivery, a healthy 38 year-old developed a complete uterine inversion and shock. The placenta was in situ. Minutes after, the patient entered the OR hypotensive, bradycardic and unresponsive. Crystalloids, noradrenaline and general anesthesia induction with ketamine were initiated. An arterial line was placed. Manual uterine reinsertion was achieved under sevoflurane maintenance. After manual placental removal, there was a blood loss of 1000mL and an increase in pulse pressure variation (PPV). Anesthesia was then changed to a propofol infusion. Oxytocin, sulprostone and tranexamic acid were initiated. An intraterine balloon was left in place. Blood transfusion was necessary. The patient was extubated at the end of procedure and discharged after 5 days.

Discussion: Puerperal UI occurs in 1/20000 deliveries, with para-literate regarding its management. At first, (a neurogenic) shocked patient requires anesthesia and tocolysis for intrapelvic repositioning; then a major post-partum bleeding requests uterine contraction, hemodynamic, metabolic and coagulation management. Although the neurogenic component might be controversial, as the shock could just reflect underestimation of blood loss, in this case the hypotension and bradycardia appear to be indicators of parasympathetic stimulation. Later, however, there was an increase in the PPV, reflecting an hypovolemic shock. Although a continuous cardiac output monitoring might have been ideal, given its unavailability in our maternity ward, we had to rely on the clinical signs and minimally invasive pulse wave analysis to guide our anesthetic approach.

References:
Use of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) in management of Morbidly Adherent Placenta

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Background and Goal of Study: Obstetric hemorrhage is the leading cause of maternal morbidity and mortality, at highest risk are women with Placenta Accreta Spectrum. The prevalent approach is cesarean hysterectomy with the placenta left in situ after delivery. Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a minimally invasive procedure used as an alternative to surgical aortic cross clamping for temporary control of bleeding arising below the diaphragm. Used predominantly in the setting of trauma, recently it has been used during Cesarean Section to control obstetric hemorrhage and improve patient outcome. It can be deployed rapidly for use in smaller centers.

Materials and Methods: This retrospective study evaluates all patients underwent Cesarean Section with an antepartum diagnosis of Invasive Placentation from January 2018 to November 2019 at Shaare Zedek Medical Center. In March 2019 we’ve introduced REBOA as a new treatment modality in CS with a high suspicion of invasiveness which was diagnosed in US or MRI before surgery. Since then it was used in 5 cases, including one emergency CS. We compare patient outcome to Standard Approach (SA) in prior 11 cases. A vascular surgeon inserted REBOA under US, with balloon inflation after clamping of the cord. Inflation time mean was 15.2 minutes with Standard Deviation(SD) ±6.05. We’ve analyzed data such as blood loss, transfusion, urinary tract injury, hysterectomy rates, procedure duration and ICU admission in both groups. Descriptive statistics were performed.

Results and Discussion: Blood loss (ml) and transfusion rates were significantly higher with SA, mean ± SD: 640 ± 296.6 vs 4400 ± 2787.0, P =0.01. In the REBOA group no blood products were given while in SA, RBC units given median ±4 with 6 patients (54.5%) receiving ≥4 units. FFP, Cryoprecipitate and PLT units (mean) given in the SA group were 3.63, 6 and 3.62 respectively. 10 patients (90.9%) in SA had hysterectomy and none in the REBOA group. 5(45%) patients in the SA group required post-surgical ICU admission vs none with REBOA. Bladder injury occurred in 5 cases (45%) of SA vs 1(20%) with REBOA. NO significant difference in surgery time P =0.11, or anesthesia P =0.34.

Conclusion: Use of REBOA during CS with invasive placentation is an effective, uterus preserving treatment modality. It reduces bleeding, enables better operating conditions and improves patient outcome.

Use of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) in management of Morbidly Adherent Placenta

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A retrospective study of prophylactic arterial occlusion balloon catheter for abnormal attachment of the placenta

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Background and Goal of Study: Placenta accreta and placenta previa may cause massive bleeding during delivery, leading to life threatening. In the case of massive bleeding, it is unavoidable to have a hysterectomy. Recently, in cases where massive bleeding is expected, balloon catheter is placed prophylactically. But there is no firm consensus on where to place the balloon (Internal iliac artery, common iliac artery or Abdominal aorta).

Materials and Methods: From April 2014 to March 2019, 11 women with placenta accreta or placenta previa were examined. Demographic data, preoperative diagnosis, anaesthetic induction, duration of anaesthesia/operation, position of balloon, blood loss, complication, with or without hysterectomy, pathological diagnosis were recorded.

Results and Discussion: The mean age of 11 patients is 34.5 years old. Preoperative diagnosis were placenta accrete (5 cases), placenta previa (5 cases), placenta accrete and previa (1 cases). Anesthetic techniques were 1 case of spinal anesthesia and 10 cases of combined spinal-epidural (CSE). Of these patients, 4 patients added general anaesthesia. The average of blood loss was 2352 ml. All of the patients was received the occlusion balloon in internal iliac artery. There were 2 patients who had ischemia-reperfusion injury. Of the cases, 5 patients had massive obstetric hemorrhage and had to undergo a hysterectomy. In these 5 cases, the pathological diagnosis were placenta accrete. Preoperative internal iliac artery balloon occlusion (IIABO) has been widely performed to minimize blood loss for an abnormal attachment of the placenta. Pelvic organs blood flow is mainly from common iliac artery but partly from ovarian artery and inferior mesenteric artery. Also, the development of collateral circulation has large individual difference. In some cases, only preoperative internal iliac artery balloon occlusion cannot control massive bleeding. It should be considered Intra-aortic occlusion balloon or transcatheter arterial embolisation.

Conclusion: Prophylactic arterial occlusion catheter for placenta accrete may be insufficient for successful conservative management. It is needed propriate preparation for massive blood loss.
An opioid free sedation approach for manual placental removal after vaginal delivery: Is Ketodex a viable option?

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Background: Retained placenta is the second leading cause of significant and even fatal bleeding in the obstetric population. Once the diagnosis is made, the placenta is usually extracted manually. Because this procedure is painful, adequate anaesthesia must be obtained prior to a manual extraction attempt.

Case Report: A 30-year-old female patient, 70kg, without comorbidities, was referred to the operating room for manual placental removal after vaginal delivery. Without previous fasting, arrived with heavy bleeding and hypotension. It was decided to perform sedation with Dexmedetomidine + Dextroketamine (1:1), 0.5mg/0.5mg/kg intravenous bolus. When the procedure was about to start, it was decided to associate Propofol 0.5mg/kg (underdose) to assure hypnosis. Patient remained hemodynamically stable, in spontaneous ventilation without supplementary oxygen throughout the whole process, woke up 30min after sedation, VAS (Visual Analog Scale) 0/10, collaborative and without memory of the procedure.

Discussion: There is no evidence suggesting an ideal anesthetic regimen for this procedure. Considering the hypotension that most patients present, neuroaxial block seems not to be a good option for some cases. Among sedation processes, the most commonly used regimen in Brazil is the combination of propofol with fentanyl, however, high doses of propofol can only be used in patients with complete fasting due to the risk of bronchoaspiration, not to mention the fact that it is a powerful hypotensive agent, also the use of opioids during the procedure increases the incidence of complications such as urinary retention, nausea and vomiting. Thus, the association of Dexmedetomidine with Dextroketamine: called Ketodex, balances the sympatholythic effects of Dexmedetomidine, while concomitantly attenuates the undesirable effects caused by Dextroketamine on the central nervous system, seems to be a viable choice for manual placental removal in cases where hypotension is a significant morbidity factor.

References:
2. Learning points: There is no evidence suggesting an ideal anesthetic regimen for manual placental removal, but opioid free sedation reduces morbidity. Ketodex seems to be an alternative and viable option specially in cases where hypotension is a significant morbidity factor.

Labour analgesia in a patient with argininosuccinic aciduria: a case report

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Background: Argininosuccinic aciduria (ASAuria) is an inborn metabolic disorder caused by deficiency of argininosuccinic acid lyase, an enzyme of the urea cycle, resulting in intermittent hyperammonemia postprandially or during catabolic states. 1 Main symptoms of uncontrolled disease include anorexia, lethargy, vomiting and there is risk of cerebral edema. The authors present a case of successful combined spinal-epidural analgesia for labour in a patient with ASAuria.

Case Report: A 27-year-old woman, diagnosed with ASAuria at age 15, was on her first pregnancy. She had regular following by obstetrics, metabolic disorders and nutrition teams and was controlled with low-protein diet, arginine and sodium benzoate. She was thoroughly assessed by an anesthesiologist at 38 weeks and neuraxial analgesia techniques were discussed. At 40 weeks, she presented in spontaneous labour with 5 cm dilation and a combined spinal-epidural technique for analgesia was safely performed and maintained with patient controlled epidural analgesia and mandatory intermittent boluses of ropivacaine and sufentanil. Her blood screen at admission revealed hyperammonemia (199 μmol/L). She was asymptomatic, with no signs of metabolic encephalopathy, and started hydration with normal saline and 10% dextrose infusions at 2 mL/kg/h per protocol. 8 hours after admission, shortly before delivery, ammonium levels were 62 μmol/L and dextrose infusions rate was increased to 4 mL/kg/h. The delivery required vacuum extraction and the infant weighted 3325g with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. The postpartum period went uneventfully with close monitoring of plasma ammonium. She was discharged 4 days after delivery.

Discussion: Successful therapy and genetic counseling has allowed women with ASAuria to consider pregnancy. There are 3 case reports in the literature of uneventful pregnancies and deliveries in such patients. However, none of them refer to any kind of intervention by the anesthesiologist.1,2,3

References:

Learning points: Early preanesthetic evaluation along with careful multidisciplinary management are important factors in the prevention of perinatal metabolic decompensation. Good metabolic control allows for effective epidural labour analgesia.

The effect of thromboembolism prophylaxis on prenatal and postnatal complications in patients with pregnancy-related hypertensive disorder

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Background and Goal of Study: Hypertension is the most common maternal complication in pregnancy and its incidence is 1/10. Hypertensive disorders during pregnancy include gestational hypertension and preeclampsia. They increase cardiovascular diseases, associated hemodynamic disturbances and also maternal and fetal morbidity and mortality. Especially in patients with preeclampsia, the risk of thromboembolism in pregnancy and puerperal period is higher compared to those without preeclampsia. Pulmonary embolism is still one of the leading causes of maternal mortality. Low molecular weight heparin (LMWH) has been proven to be effective and safe in prophylaxis and treatment of venous thromboembolism. The aim of this study is to determine the effect of thromboembolic prophylaxis on the occurrence of thromboembolic event in pregnant patients with hypertensive disorder.

Materials and Methods: This retrospective study included 386 patients with preeclampsia undergoing cesarean section between 2012 and 2018 at the Obstetrics Clinic of our hospital. The patients were divided into two groups as without (Group 1) and with thromboembolism prophylaxis (Group 2). Demographics, thromboembolic event rate, amount of blood transfusion, laboratory values, the length of hospital stay and mortality were recorded.

Results and Discussion: There was no statistically significant difference in demographics (p>0.05). The duration of hospital stay was significantly lower in patients receiving anticoagulants compared to patients not using them (p<0.05). Eleven thromboembolic events were observed in 210 patients without thromboprophylaxis, whereas thromboembolic events were detected in only two (1%) of 176 patients with thromboprophylaxis. Although the rate of blood product use in patients with embolism was higher than in patients without embolism, no statistically significant difference was observed (p>0.05). The length of hospital stay and arrhythmias were significantly higher in patients with embolism than those without embolism (p<0.05).

Conclusion: Hypertensive diseases of pregnancy increase the susceptibility to thromboembolism. We concluded that prophylaxis for thromboembolism significantly reduces morbidity.
I'm stuck! – how to manage an entrapped epidural

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Background: Entrapped epidural catheters are a rare but worrisome complication due to uncertainty surrounding its management. We present a case where removal of a catheter during labour was not possible.

Case Report: A 38-year-old multiparous woman, with a BMI of 40 kg/m2, requested epidural analgesia for labour. Loss of resistance was felt at 8cm and the catheter was introduced until the 11cm mark, when blood started flowing through it. When trying to remove it, resistance to traction was felt at the 8cm mark. Several attempts of removal were performed after lumbar flexion, injection of saline and positioning in left lateral decubitus, all with no success; the catheter was taped in place. There were no neurological symptoms. A final attempt was performed 1 h after delivery in left lateral decubitus with extreme lumbar flexion and removal was possible. As seen in Figure 1, the catheter’s tip was only attached through the embedded wire (on top, normal catheter on the bottom). The patient was discharged after 3 days of an otherwise uneventful stay.

Discussion: The mechanism underlying this complication is often the formation of knots or aberrant trajectories. This didn’t seem to be the case, as resistance to traction was felt at approximately the same distance as the epidural space was found. We hypothesise that the catheter was stuck in the ligament or surrounding bony structures. Whether the catheter’s defect was a cause or consequence is unclear. A recent article proposed an algorithm for management of entrapped catheters.1 In retrospect, the recommendations were followed and a scan for CT was underway. A particularity of this case was the fact that the complication arose during labour, and our success highlights the need to consider repeating lumbar flexion manoeuvres after delivery, as the reduction in uterine size may allow optimal flexion.

References:

Learning points: Entrapped epidural catheters have an uncertain management. During labour, removal should be tried after delivery.

4448

Changes in intracocular pressure after central nervous blocks: Comparison between epidural and spinal anesthesia in caesarean section

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Background and Goal of Study: Epidural and spinal anesthesia are well-known anesthetic techniques for caesarean section (CS). The aim of this study is to compare the changes in intracocular pressure after the conduction of both techniques.

Materials and Methods: We studied 36 parturients between 38 and 40 week of gestation who were admitted for CS in our hospital. Their age was between 18 and 42 years old (mean age: 30.3). Exclusion criteria were: Arterial hypertension due to gestation (preeclampsia-eclampsia), diabetes mellitus, refractive disorders of the eye, neurological diseases, such as multiple sclerosis, cardiac diseases, therapy with corticosteroids and pulmonary infections. We divided the parturients in 2 groups: Group A, which consisted of 18 women who underwent CS under spinal anesthesia with ropivacaine 10mg and fentanyl 20y and Group B, which consisted of 18 women who underwent CS under epidural anesthesia with ropivacaine 120mg and fentanyl 50y. All CSs started at the same time of the day, at 10.00 AM. We calculated the intracocular pressure before the induction of anesthesia and after 48 hours postoperatively. We used the method of tonometry with the help of Goldmann tonometer. During the study period we evaluated the vital signs of the parturients , the volume of the fluids been given and possible complications, such as cough, vomiting or headache.

Results and Discussion: From the 36 parturients, we excluded one from Group A, because she suffered from headache after the first 24 hours. We conducted a statistical analysis and we found no statistical significance in the changes of intracocular pressure in both eyes between spinal and epidural anesthesia (p>0.45).

Conclusion: Intracocular pressure is not affected by significant changes after the conduction of either spinal or epidural anesthesia in parturients who will undertake CS.

4660

Management of accidental spinal administration of high-dose morphine

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Background: Spinal morphine (SM) analgesia is common in c-section patients. Generally the dose used is 50-200mcg added to local anaesthetic. Larger doses result in higher incidence of side effects with minimal analgesia benefit.1 We described a case of accidental injection of 2mg of SM.

Case Report: A healthy 32 year old patient underwent an elective c-section procedure. The anaesthetic plan was to perform a spinal block with levobupivacaine 8.5mg and morphine 200mcg. Surgery went uneventful. Newborn's Aggar score was 10/10/10. Patient was taken to post anaesthesia care unit (PACU). During her stay, a review of the drugs administered detected an error in morphine’s dilution: instead of 200mcg the anaesthetist administered 2mg of SM. Immediately, the team decided to keep the patient in the PACU for at least 24h for surveillance and added capnography and capnometry to the standard II ASA monitoring. No supplemental oxygen was given. Propylhylactic ondanestron 4mg was administered. Patient already had a urinary catheter. When patient reported pruritus a bolus of naloxone 0.2mg was given, followed by an infusion at a rate of 0.2-0.3mg/h maintained during 36h. Patient remained a total of 48h in the PACU. Her vital signs were stable and conscious state fluctuated between fully awake and sleepy but easily arousable. She reported pain 21h after the spinal injection.

Discussion: Morphine was a slow onset but longer duration of action with greater risk of delayed respiratory depression (RD). Other side effects include pruritus, nausea/vomiting and urinary retention. SM doses >300mcg pose greater risk of RD.1 Other cases of accidental SM overdose have been described resulting from drug/ampoules swaps or wrong route administration. Management include vigilance, cerebrospinal aspiration and naloxone infusion.2,3

References:

Learning points: Avoiding mistakes completely is virtually impossible. Therefore it’s crucial to report and discuss error with colleagues so that everyone can learn from them and improve clinical practice. The discussion of this sentinel case report in the department led us to the creation of the SM administration protocol.
Confirmation of epidural catheter location by epidural pressure waveform recordings by the CompuFlo Epidural instrument

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Background and Goal of Study: Pulsatile waveforms originating from the spinal cord and transmitted through the dura in synch with heart rate have been used to confirm the epidural location of the catheter. Objective lumbar epidural space identification using the CompuFlo epidural computer controlled instrument have been reported and validated.2,3 The aim of this preliminary study was to evaluate the new CompuFlo instrument which allows pulsatile waveform recordings by the CompuFlo epidural computer controlled instrument.2,3

Materials and Methods: We tested 30 epidural catheters previously successfully used for obstetric anesthesia or analgesia and about to be removed. All patients were given 5 mL saline to test the catheter before its removal. After priming with 5 mL saline, the catheter was connected to the CompuFlo to record the occurrence of pulsatile waveforms and/or their disappearance during its removal. The epidural catheter was marked at the skin level to record the distance between the skin at the time of measurements. The power analysis required a sample of 30 observations to set 80% test power and 95% significance level.

Results and Discussion: Pulsatile waveforms were observed in all the catheters properly located in the epidural space (confirmed by the occurrence of L2-3 sensory block after the test dose) and disappeared when the catheter was extracted from the epidural space (28/28). The mean length of epidural catheter withdrawal associated with its exit from epidural space was 3.56 cm (CI95% 3.12-4.01) and this can be considered as the cut-off value (P=1.27e-15). No waveforms were recorded in 2 cases in which no sensory block occurred after the test dose (catheter dislodgement). The pulsatile waveform analysis through the epidural catheter had a sensitivity of 100%, a positive predictive value of 100%, a specificity of 100% and a negative predictive value of 100%.

Conclusion: This preliminary trial pulsatile pressure waveform recording with CompuFlo through the epidural catheter resulted in high sensitivity and positive predictive value. This adds further value to the CompuFlo epidural instrument which, in addition to accurately identifying the epidural space, has also now proved capable of identifying the correct positioning of the epidural catheter. Further and larger confirmatory studies should be performed at the time of catheter insertion to confirm this preliminary finding.


Evaluation of labour epidural analgesia through ultrasound in Asian parturients: A pilot analysis

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Background and Goal of Study: Lumbar lordosis during pregnancy may interfere with surface estimation for epidural insertion. More than 40% of clinical estimations for epidural insertion in caesarean delivery are ≥1 vertebra higher than those determined using ultrasound for Caucasian parturients in a sitting position. However, differences between surface epidural insertion estimation and ultrasound localization among Asian populations, who often receive labour epidural analgesia in a lateral position, remain unclarified.

Materials and Methods: This was a single-centre prospective pilot observation study. Pregnant women who received labour epidural analgesia by clinical surface estimation for normal spontaneous delivery were enrolled after obtaining informed consent. Participants were asked to maintain a lateral decubitus position similar to that during labour epidural insertion during ultrasound examination, which was performed by a clinician who was blind to clinical estimation for epidural insertion. The labour epidural involved patient-controlled epidural analgesia with a programmed intermittent bolus setting and a regimen of 0.66 mg/mL bupivacaine and 1.75 mg/mL fentanyl.

Results and Discussion: Results for 48 parturients, including 37 with nulliparity, were analysed. The median (interquartile range) age and body mass index were 34 (31–37) years and 26.1 (24.3–28) kg/m2, respectively. Ultrasound measurements of the level of the intercristal line at L3, L3–4, and L4 ranged from 31.6% to 26.3%, and 36.8%, respectively. Clinical estimates agreed with the ultrasound measurements 58.3% of the time (95% confidence interval: 51.2%, 65.4%) and were one vertebra lower than the ultrasound measurement 29.2% of the time. The concordance rate between clinical estimation and ultrasound localization was higher than that in previous reports among Caucasian women in the sitting position. This may be because of lower body mass index as well as the lateral position considered in this study. Furthermore, some anaesthetists in our institute considered the intercristal line to be L3. Mean (SD) dosage consumption during the first stage of labour for the two most common ultrasound-confirmed epidural levels, namely L3–4 and L4–5, were 11.8 (3.9) and 13.3 (5.7) mL/h (p = 0.35).

Conclusion: The accuracy of clinical estimates of epidural levels was approximately 60% among Asian parturients in the lateral position.

Zikv and analgesia technique for labour

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Background: Zika virus (ZIKV) is a Flaviviridae, RNA virus. It is transmitted through infected Aedes mosquito bites, producing significant alterations in multiple organs. In 2016, WHO declared Zika a public health emergency of International concern. Case Report: A 36-year-old Brazilian, in the 39th week of pregnancy comes to our hospital due to labour dynamics. She has 4cm cervical dilation and regular uterine contractions. No controls during pregnancy. It is consulted to perform an analgesic technique. Patient’s medical history: normal analysis and coagulation. Technique: IV, HHV, HBV, HCV negative, positive ZIKV. We weren’t able to know if it was a current or past infection. She had arrived in Spain just before pregnancy. Talking about risk/benefits, we finally decided to perform an intravenous remifentanil patient controlled analgesia (PCA). Discussion: ZIKV can be transmitted mother-child (placenta, breastfeeding), sexual, blood transfusion. The worst effects can be Guillain Barre Syndrome (GBS) to the mother and microcephaly in the newborn(2). It is suggested that this virus, because of its nature, the iatrogenic brain-blood crossover during neuraxial anaesthesia (NA) is negligible. Each case must be individualized, since ZIKV has been associated with alterations in inflammatory states of the central nervous system (CNS). Literature indicates NA can be done when patient does not report any active symptoms: fever, maculopapillary rash, dehydration, headache, haematological anomalies. It is important blood, coagulation and liver tests prior to any punctures. ZIKV is associated with thrombocytopenia (TP), leukopenia and elevation of transaminases, TP may increase bleeding risk and neuropathic complications. There is an association between acute ZIKV and GBS. Therefore after NA placement surveillance should be maintained for signs of greater sensitivity to local anaesthetics, airway obstruction, fever and coagulopathies(3).


Learning points: Global warming, ZIKV, labour analgesia.
24% (CSE) administered to women. In Group LDE, 64% reduction in immediate pain (VAS score from 7.2 to 2.6) was observed and in the Group CSE, the reduction was 78% (VAS score from 7.9 to 1.72), p=0.03. Total length of mobility was 240±132 minutes in Group LDE and 202±84 minutes in group CSE (p=0.49). Normal vaginal, instrumented and caesarean delivery rate was 69%, 11% and 20% in Group LDE and 73%, 9% and 18% in Group CSE respectively. Patient satisfaction with LDE and CSE was 78% and 79% respectively. Type of delivery and patient satisfaction showed no significant differences between both techniques.

**Conclusions:** High patient satisfaction was achieved with MRA. While CSE gives significantly less important immediate pain scores compared with LDE, the study found no statistical differences in the length of mobility, mode of delivery and patient satisfaction between both techniques.

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**Materials and Methods:**

**Identify the epidural space.**

**Determine if there is any patient or technique factors that could be associated with headache and trauma to neural structures.** We designed this retrospective study to provide labour analgesia. Multiple attempts at needle placement are associated with patient dissatisfaction, higher incidence of spinal haematoma, postdural puncture headache and trauma to neural structures. We designed this retrospective study to determine if there is any patient or technique factors that could be associated with difficult epidural placement (DEP). DEP is defined as more than one attempt to identify the epidural space.

**Materials and Methods:** 10970 patients were included in the study, consisting of all pregnant women submitted to epidural block, in a tertiary hospital, from January 2013 to December 2017. 6080 of those patients were excluded due to missing data. From the final 4890 enrolled population, we collected age, body mass index (BMI), gestational age, gravity, cervix dilation and attended/missed labour analgesia appointment status. Regarding the technique, we studied the patient position during the procedure (lateral decubitus vs sitting), the spinal level (L2-L3, L3-L4, or L4-L5), the loss of resistance approach (with saline or air), the performer’s experience (resident/consultant physician) and time of the day the technique was performed (morning vs afternoon/night shift).

**Results and Discussion:** The characteristics that we found to be independent risk factors for DEP were BMI (odds ratio (OR) of 1,06), gestational age (OR 0,968), sitting position of the pregnant woman (OR 0,776), and L2-L3 level of puncture (OR 2,488). A higher patient’s BMI was found to be associated with multiple epidural punctures to accomplish success. On the other hand, the advanced gestational age correlates with less epidural attempts. Interestingly, an upper level of epidural puncture (L2-L3) and pregnant lateral position during the technique were found to be associated with DEP. It is important to note that analgesia records of the technique usually describe the successful last attempt. Therefore, interpreting these results accordingly, they suggest that the last attempt is performed in L2-L3 rather than lower spaces. Regarding the position, we don’t have data to inform us if the position was altered during the attempts.

**Conclusion:** In our population, higher BMI and lower gestational age are independent risk factors for DEP. Further study need to be done in order to confirm L2-L3 puncture and lateral position during the technique as risk factors.

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**Rare but Deadly: Management of a Parturient with Guillain-Barre Syndrome**

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**Case Report:** 33yo G5P4 parturient at 32 weeks presents with progressive upper and lower extremity weakness following Epstein-Barr virus (EBV) mononucleosis. CSE revealed complete conduction block to motor and sensory levels. The patient was transferred to a tertiary centre for a demyelinating polyneuropathy. The results along with history of EBV lead to a diagnosis of Guillain-Barre Syndrome (GBS). Over 10 days, she developed SVE episodes that were treated with labetalol. She progressed to bulbar weakness and was intubated for respiratory failure. She was treated with intravenous immunoglobulins (IVIG) 400mg/kg and plasmapheresis. At 33+5 weeks gestation, preterm contractions began, quickly progressed to 10cm cervical dilation, and was brought to the OR for vaginal delivery. She had 4 previous vaginal deliveries without neuraxial analgesia. Standard ASA monitors were placed and she was connected to a ventilator. IV fentanyl 25mcg was given intermittently. Esmolol and nitroglycerine were readily available for dysautonomia episodes. Vacuum-assisted vaginal delivery was successful with APGAR scores 7 and 9.

**Discussion:** GBS is a progressive peripheral demyelinating disease, beginning in the lower extremities and advancing proximally. Rarely occurs in pregnancy with neuraxial analgesia. Standard ASA monitors were placed and she was connected to a ventilator. IV fentanyl 25mcg was given intermittently. Esmolol and nitroglycerine were readily available for dysautonomia episodes. Vacuum-assisted vaginal delivery was successful with APGAR scores 7 and 9.

**References:**


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**Does lunar phases influence number of births per day? A time series analysis**

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**Background and Goal of Study:** Contradictory results regarding the influence of lunar phases have been found concerning the time of births. In general, the influence of the lunar cycle on deliveries is considered as a not evidence based myth. A Fourier Transform (FT) can show us what the frequencies of the seasonal components of our data are. In a retrospective study of 2480 births throughout 2014, we performed a time series analysis of the number of births per day, aiming to find out any lunar phase influence. This are preliminary results of a broader study gathering data over a decade.

**Materials and Methods:** We created a fully anonymized database registering number of births for each day of 2014 at our hospital. We used our latitude (-34.60) and longitude (-58.42) along with OCE (Analysis of Oceanographic Data) package to remove seasonal trends in our data. FT was applied to our data, so we were able to decompose our dataset, eliminating the seasonal component of the frequency we’ve found. Then we plotted overlapped births per day series with moon illumination sinusoidal wave (Figure 1-b).

**Results and Discussion:** ADF test (p-value: 0.01) confirmed our data to be stationary (read: steady over time). A visual exploratory analysis suggested that number of births was approximately two fold higher at 0%-25% and 75%-100% moon illumination groups than the others (Figure 1-a). FT showed a relevant seasonal frequency at 3.5 days. We used decomposing methods in order to remove seasonal trends in our data. FT was applied to our data, so we were able to further decompose our dataset, eliminating the seasonal component of the frequency we’ve found. Then we plotted overlapped births per day series with moon illumination sinusoidal wave (Figure 1-b).

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**Risk factors associated with difficult epidural placement: a retrospective study**

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**Background and Goal of Study:** Neuroaxial block is used by anaesthesiologists to provide labour analgesia. The number of births was approximately two fold higher at 0%-25% and 75%-100% moon illumination groups than the others (Figure 1-a). FT showed a relevant seasonal frequency at 3.5 days.

**Conclusion:** lunar phases might have a relationship with the number of births per day at a maternity ward. Time series analysis methods might be further explored on this matter.

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**6325**

**5992**
Prevalence of Aspiration During General Anesthesia Induction for Cesarean Delivery: Is METOCLOPRAMIDE a Necessary Prophylaxis?

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Background and Goal of Study: Parturient was found to be a risk factor for aspiration during induction of GA and intubation due to numerous causes such as difficult airway, increased intra-abdominal pressure, and delayed gastric emptying time due to pregestational effect. Thus, there is a recommendation in the literature for aspiration prophylaxis with prokinetics and/or antacid for parturient prior to intubation with emphasis on close to term parturient before CS. In this research we want to question the necessary of prokinetics and/or antacid for the prophylaxis of aspiration in parturient.

Materials and Methods: We retrospectively investigated the use of pramline prophylaxis for aspiration in a cohort of 48,609 parturient undergoing cesarean section between November 2007 to December 2016 in Soroka and Shaare Zedek, two major medical centers in Israel.

Results and Discussion: The amount of cesarean deliveries in Soroka and Shaare Zedek was somewhat similar (26529 vs 22080 respectively). However, a significant difference in the percentage of general anesthesia was observed (5% vs 81.3% respectively). We found six cases of clinical aspiration with significant pulmonary sequelae in the cohort, out of them only three occurred during induction (1:10793). In the statistical analysis we found no significant benefit for routine use of pramine prophylaxis in parturient undergoing cesarean section.

Conclusion: The usage of routinely aspiration prophylaxis in parturient undergoing cesarean section is questionable. We found that clinical aspirations is linked to the type of anesthesia (general vs. neuroaxial) and urgency of the procedure, and not to the use of pramine prophylaxis.

How to avoid perineal pain and pruritus following intravenous bolus of dexamethasone before Caesarean section?

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Background and Goal of Study: Dexamethasone becomes increasingly popular in obstetric anesthesia because of its anti-inflammatory and anitresic properties. Single intravenous (IV) dose of 8 mg dexamethasone reduces antiemetic and analgetic requirements in the postoperative period. Preaneesthetic IV administration may cause exacerbating pain, and/or pruritus in the perineal region. The aim was to investigate whether unpleasant effects could be avoided if intravenous bolus of dexamethasone was administered after spinal anesthesia.

Materials and Methods: After ethics committee approval and written consent, 60 pregnant women, aged 28±4.7 years, ASA II-III, scheduled for elective cesarean section under spinal anesthesia, were included in this prospective randomised study. Group A (30 patients) received 8mg of dexamethasone IV, 15 minutes before spinal anesthesia. Group B (30 patients) received 8mg of dexamethasone, immediately after performing spinal anesthesia. All patients received 2.2 ml of 0.5% hyperbaric bupivacaine with fentanyl 20µg and morphine 0.2 mg intrathecally. Presence of pain or pruritus, time of onset, quality and duration of pain were investigated, as well as incidence of nausea and vomiting and postoperative pain 4h, 12h and 24h postoperatively. Statistical analysis was conducted using Student’s t test and Chi-squared test.

Results and Discussion: Results showed no significant difference regarding age and BMI between groups. Difference in incidence of nausea and vomiting and postoperative pain was not statistically significant 4h, 12h and 24h postoperatively. The onset of pain and pruritus in group A was after 23.4±7.7 sec and duration was 16.9±8.0 sec. Most of the patients felt mild pain 85%, while 15% had pruritus in perineal region.

Perineal pain or pruritus

<table>
<thead>
<tr>
<th>Group A (No 30)</th>
<th>Group B (No 30)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>0</td>
<td>&lt;0.001</td>
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Conclusion: Incidence of perineal pain and/or pruritus is significantly higher in pregnant women if IV bolus dose of dexamethasone is administered before spinal injection. This side effect can be completely avoided, if dexamethasone is given following spinal anesthesia.

Circadian effects on neural blockade of intrathecal administration of levobupivacaine and fentanyl for caesarean section

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Background and Goal of Study: Circadian variation in biological rhythms has been identified as affecting the pharmacological properties of many anaesthetic agents such as local anesthetics. There is a growing body of evidence suggesting circadian patterns of LAs activity in the fields of local, dental anesthesia and labour pain analgesia with important differences among diurnal and nocturnal phases. A recent study demonstrated that ropivacaine and lidocaine were mostly investigated. The purpose of this study is to examine whether a rhythmic variation of the effect of intrathecal levobupivacaine exists throughout the day period.

Materials and Methods: 60 parturients presenting for urgent or elective caesarean section were assigned to 5 groups (16 patients in each group) according to the time of day of spinal drug administration. The same dose of levobupivacaine and fentanyl was given intrathecally in all patients at different times: group A (08:00am - 12:00am), group B (12:00am - 4:00pm), group C (4:00pm - 8:00pm), group D (8:00pm - 12:00am), group E (12:00am - 08:00am). Pinprick or cold, the four-point modified Bromage scale (0-3) and the numerical scale (NRS 0 - 10) were used respectively for the assessment of the sensory blockade, motor blockade and pain. The duration of sensory and motor blockade, analgesia duration and pain scores at first analgesic request were recorded.

Results and Discussion: Statistical significant differences were found among the studied groups in the duration of motor and sensory blockade and in the intensity of pain at first postoperative analgesic request. Prolonged duration of motor blockade (p<0.005) and sensory blockade (p<0.005) and increased duration of sensory blockade and analgesia in groups A, B (08:00am - 4:00pm) (p<0.001) were observed. Higher pain scores at first postoperative analgesic request have been recorded in group E (12:00pm - 08:00am) (p<0.001).

Conclusion: The time of day of intrathecal administration of levobupivacaine influences the duration of spinal anesthesia and the intensity of pain after anesthesia's regression.

How to avoid perineal pain and pruritus following intravenous bolus of dexamethasone before Caesarean section

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Background and Goal of Study: Universal protocol of spinal anaesthesia with hyperbaric bupivacaine for caesarean section (CS) is still lacking. Despite effective intrathecal dose (ED95) of hyperbaric bupivacaine described as 11.5 - 12.0mg, a number of dosing regimens were proposed. We performed randomized, double-blind study to compare effectiveness and safety of spinal anaesthesia using high dose of hyperbaric bupivacaine and dosing regimen of relatively high doses adjusted to parturient's height. We hypothesized that using fixed dose will result in better effectiveness and similar ratio of anaesthesia-related complications.

Materials and Methods: After ethics committee approval (65/PB/2017) and trial registration (ClinicalTrials no. NCT 03231436), 140 healthy (ASA <3), term singleton parturients were enrolled between July 2017 and July 2019. Fixed-dose group (FD) received spinal block with 12.0mg of hyperbaric bupivacaine and 25mg of fentanyl, whereas women randomized to adjusted-dose group (AD) received bupivacaine dose adjusted to their height (9-13mg) and 25mg of fentanyl. Sensory block of at least T5 within 10 minutes following intrathecal injection and no need for supplementary anaesthesia during CS were set as composite primary outcome. Secondary outcomes were frequency of anaesthesia-related complications and postoperative opioid requirement.

Results and Discussion: Parturients were enrolled and final data were available for 134 cases. There was no difference in primary outcome measure. Spinal anaesthesia was successful in 64 out of 67 patients in FD group and 65 out of 67 in AD group (95.5% vs 97%, respectively, p>0.05). Five patients required analgesia during CS (3 in FD and 2 in AD group, p>0.05), of which 1 patient in FD group and 2 in AD group required i.v. analgesics despite sensory block of T5 or higher. Similarly, no differences were noted in terms of complications between FD and AD groups (all p>0.05): hypotension (59.7 vs 53.7%), bradycardia (3% vs 5%), nausea (28.4 vs 29%), vomiting (4.5 vs 0%), as well as in postoperative morphine requirement (median 20 vs 20mg).

Conclusion: Spinal block using 12.5mg of bupivacaine regardless of parturient's height for CS provided effective and safe anaesthesia, and was associated with a low incidence of adverse events.
height when compared to height - adjusted dose regimen based on relatively high doses of bupivacaine does not appear to increase the risk of complications, which may aid clinical decision-making process in elective, as well as non- elective cases.

5002

Incidence and determinants of failed epidural for emergency caesarean section: a retrospective analysis

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Background and Goal of Study: Epidural analgesia remains the most efficient pain relief for labour. Around 25% of parturients in the UK receive epidural catheter. The epidural failure rate is reported to be as high as 21% while the conversion rate to general anaesthesia should not exceed 3% according to the Royal College of Anaesthetists. The main objective of this study was to find out the percentage of patients on epidural analgesia who required conversion to spinal or general anaesthesia for all but category I caesarean sections.

Materials and Methods: A retrospective study was performed in our hospital after approval from local audit committee. The data was collected over 18 months from May 2018 to November 2019 and included patients who underwent emergency caesarean section with epidural in situ.

Results and Discussion: A total number of patients who required caesarean section on epidural accounted for 319, whereas 22 cases were converted to general anaesthesia and 2 cases to spinal anaesthesia (overall conversion rate is 7.52%). The risk factors noted for failure were insufficient epidural analgesia in the ward and short time from dose administration to incision. Moreover the results showed the diversity in doses and volumes for epidural top-ups among anaesthetists (Table 1). Of note, a significant number of cases were converted intraoperatively after baby delivery.

Conclusion: The conversion to GA may increase both maternal and fetal risks. In our audit we found that the incidence of conversion is two times higher than recommended. Uniformity among clinician top-up and early recognition of inadequate analgesia remain crucial.

References:

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Augmentation of Labour Epidural for emergency Caesarean Section

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Background: The Augmentation of epidural analgesia for caesarean section has clinical and legislative implications. The Audit performed to observe the current practice of augmentation of labour epidural for emergency caesarean sections in regional teaching hospital of Ireland.

Methods: A total of 80 patients were included in a period of 6 months. Data was collected on proforma immediately following surgery. Total of (53/60) 88% of patients received the full dose of the local anaesthetic mixture in the labour ward, while (07/60) 7% of patients were topped up in operation theater with simultaneous application of AAGBI monitoring.

Results: The average time for the transfer of the patient from labour ward to theatre was 11 mins following epidural top-up in the delivery suit. All Patients (53/60) who received epidural augmentation in labour ward were brought to the theatre without AAGBI standard monitoring along with absent fetal monitoring (CTG). Total of (37/60) 62% of patients were reported having a drop-in blood pressure of more than 20% between NIBP reading taken before epidural top-up and first NIBP reading in the theater. Only of (03/60) 5% of patients were accompanied with emergency drugs. None of the patient was reported high blocks/local anaesthetic toxicity. Only (01/60)2% of total patient was converted to general anaesthesia due to inadequate sensory block after epidural top-up.

Conclusions: Epidural top-ups for emergency caesarean section are used frequently but routinely performed in the delivery suite. Drugs, doses, and volume used differ greatly among anaesthetists. During transport, available equipment and drugs used were limited.

Recommendation: Lack of monitoring during transfer can lead to adverse maternal and fetal outcomes. We highly recommend epidural top-up and transfer under AAGBI monitoring accompanied with emergency drugs.
Anesthetic techniques for C-section in morbidly obese pregnant patients. A retrospective observational study in University Hospital

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Background and Goal of Study: Obesity represents a worldwide epidemic. Maternal overweight increases the risks of preeclampsia, gestational diabetes, labor induction, cesarean section, postpartum hemorrhage, puerperal infections and maternal death. General anesthesia is undesirable regarding the risks of difficult airway (obesity and pregnancy) and maternal mortality. Anesthetic management of obese parturient is challenging and requires adequate planning. We did a retrospective observational study describing the best neuraxial technique for woman with BMI ≥ 40 who underwent C-section in terms of lower complications, block failure and safety.

Methods: Ethical Committee approval (CAAE: 0454.0.146.000-08), we did a retrospective analysis (Jan 2016 - Dec 2017), where 200 pregnant woman with BMI > 40kg/m² had C-section with neuraxial techniques: single spinal, intermittent epidural (I-ED), continuous epidural analgesia (CEA). We collected demographic variables: Age, weight, height, BMI, anesthetic technique, technical difficulties, hemodynamic instability, use of vasopressors, total spinal block, block failure. Statistical significances were analyzed using Fisher’s exact test, Mann-Whitney test, Chi-square test. We defined hemodynamic instability as 10% increase in mean arterial pressure or 20% increase in heart rate as compared to preoperative levels.

Results: 200 patients analyzed with BMI ≥ 40 were submitted to C-section. 123 (61.5%) had BMI 40-45, 54 (27%) 45-50 and 23 (11.5%) >50. There was statistical significance between BMI for: anesthetic technique (more frequency for single spinal in BMI 40-45 and 45-50 (obesity class 3) and CSE in BMI > 50 (super obesity). The more frequent vasopressor utilized were metaraminol with BMI 40-45 and >50. Overweight in woman with CSE and intermittent epidural. There was no statistical significance regarding hypotension and failure.

Discussion and Conclusion: Obesity is a multisystem disease with several associated comorbidities, significant maternal and fetal complications. It is of extreme importance to perform an anesthetic technique with great effectiveness, safety and without complications. In our study, we showed that CSE for C-section in super obese woman was a good choice because of faster onset associated with maintenance of an epidural catheter to infusion LA in small increments, to complement or improve the block, avoiding hypotension, total spinal block and allowing better postoperative pain control.

5077

Spinal tumor and pregnant women: neurosurgery and caesarean delivery dilemma

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Background: Pregnant women have different pathophysiological changes, and often current diseases. We present a rare case of a pregnant women suffering from spinal tumor diagnosed during her second pregnancy. The progressive neurological deficit makes inevitable the tumor removal in the 29-th week of pregnancy.

Case Report: A 21 years old pregnant women was diagnosed in the 29-th week of pregnancy of spinal tumor based on two clinical signs: backache, and progressive neurological deficit of her legs) and on MRI examination. These examinations revealed a spinal tumor on TH10-L1 level. The progressive motor deficit of her legs makes the surgery inevitable. A multidimensional team (neurologist, neonatologists, anaesthesiologists, and neurosurgeons) consulted the patient, concluding of neurosurgical approach and strict fetal monitoring in perioperative period. This conclusion was appreciated by the women which did not permit to deliver the baby prior of term. Betamethasone, rifilidine, and magnesium sulfate) were started. Careful positioning of pregnant women in prone position was realized. Fetus monitoring was peripherically realized taking care of maintaining fetal heart rate over 120. The procedure was uneventful, and the women discharged from hospital without deficits and normal pregnancy course.

Discussion: This rare case presents an unusual situation of a pregnant women undergoing non-obstetrical surgery. Being in 29-th week of pregnancy minimize the risk of anesthetic effects on organogenesis, and the anesthesiologist must take care about fetal monitoring, maternal hemodynamic, and tocolysis.

5958

The effects of preoxygenation with the application of high current nasal oxygen on newborn in the cesarean operations

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Airway management
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Background and Goal of Study: During the induction of anesthesia, pregnant patients have high risk of hypoxemia due to the physiological changes in the respiratory system and significant hypoxemia may directly affect the newborn. The effective preoxygenation is routinely recommended by Obstetric airway guidelines. High-Flow Nasal Oxygen (HFNO) administration is a new approach that is increasingly used for this purpose (1.2.3). In this study, we aimed to compare the effects of preoxygenation on mother and newborn following the use of traditional method with face mask or high-flow nasal oxygen treatment during induction of general anesthesia for cesarean section.

Materials and Methods: Following the Ethics Committee approval and written informed consents were taken from 100 patients who undergoing the elective surgery are included in the study. Patients were randomized into two groups: preoxygenations were performed with HFNO (Group 1, n=50) and face mask (Group 2, n=50). The newborn APGAR scores in first and fifth seconds, umbilical cord venous blood gas and pO2 and pCO2 values, time to clamp umbilical cord were recorded.

Results and Discussion: Demographics of the mother were similar in groups (Table 1). Although the umbilical cord clamping times and neonatal birth weight were similar between groups, the APGAR scores in first and fifth seconds in POINT group were statistically significant (Table 1). There was no statistically significant difference in umbilical cord blood gas values (Table 2).

Conclusion: We are in the opinion that, the application of preoxygenation with HFNO might be a preferable technique to improve the APGAR values of newborn in the cesarean operations.

Clinical trial registration: NCT03903003

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Anesthetic management in a spinal muscular atrophy type III parturient cesarian section: a case report

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Background: Anesthetic management in parturients with spinal muscular atrophy (SMA) is challenging and requires some strategies to deal with the anatomical and physiological alterations presented by this patients. We report a case of a successful technique, with satisfactory analgesia and safe delivery.

Case Report: A 22-years-old woman, 33 weeks pregnant with spinal muscular atrophy type III, hypothyroidism and pregnancy induced hypertension was schedule to undergo cesarian section due to hypertensive peaks. The patient, which was followed by the obgyen team, presented a severe lung restriction, a strong hypopnoea, besides no neck extension and 2.3cm distance beetween incisives. Due to the difficulty to perform regional anesthesia and the impossibility of laringoscophy, it was planned a general anesthesia with awake intubation by optical fibroscopy. After explanation about the procedure, we provided analgesia with fentanyl 2mcg/kg and dexmedetomidine 0.3mg/kg/h intravenous and topical analgesia with lidocaíne 2% through the nose and mouth. A nasal intubation with optical fibroscope was performed with the patient colaboration, and after the correct placement of the tube, the induction was made with fentanyl 10mcg/kg and propofol 2mg/kg. After 2 minutes and 45 seconds, the baby was born alive with agar score 2/3/10. The general anesthesia was maintained with propofl (TCI of 2.2-2.5) and dexametomidine 0.5mg/kg/h. At the end of surgery, the patient was stable, intubated and receiving an Dexmedetomidine infusion. Due to the long time waiting for an ICU room, after 2 hours and the full recovery of general anesthesia, the patient was extubated in the operating room, and did not present any sign of muscular weekness. proceeded to the UCI, awake and with no more complains.

Discussion: Parturients patients with SMA may present challenges to anesthesiologist due to severe scoliosis and difficult positioning of the patient on operation table that makes it difficult and unpredictable the realization of neuraxial anesthesia. General anesthesia also presents many challenges to be done because of the intubation anatomy unfavorability (fibroscopic IO is the most frequent described in case reports) and due to severe restrictive lung disease that is often present in SMA.

References: [Corti S., Corti S., Pregnancy outcomes in women with spinal muscular atrophy: A review.

Learning points: Special approach of parturients with SMA it’s challenges.
Optimization with levosimendan prior to cesarean section in a patient with left heart failure and severe pulmonary hypertension

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Background: Heart failure and pulmonary hypertension (PHT) in the pregnant population is associated with historically high morbidity and mortality for both mother and child (30-56% and 11-28% respectively). Women with known PHT are therefore recommended to avoid pregnancy but undiagnosed cardiopulmonary disease can debut during pregnancy due to the increasing cardiovascular stress of pregnancy1. Case Report: We report a 33y.o G3P*1A1 woman. Past medical history of systemic lupus and antiphospholipid syndrome. The patient was asymptomatic until week 27 when she sought medical attention due to abdominal pain. Investigations revealed PHT (SPAP 100mmHg), severe mitral valve prolapse and atrial fibrillation. Due to clinical deterioration and rapidly increasing p-BNP at week 34 (max value of 10900ng/l), a multidisciplinary team recommended a sub-acute cesarean section. The patient received a levosimendan infusion of 0.1mcg/kg/min over 24h prior to surgery with marked clinical and biochemical improvement (post p-BNP 5640ng/l). Surgery was performed under invasive blood pressure and a central venous catheter at an operating room with possibility for cardiopulmonary bypass. The patient received a combined spinal-epidural (5mg hyperbaric bupivacaine + 100mcg morphine + 10mcg fentanyl in the spinal room) and a slow epidural titration with ropivacaine for a total dose of 124mg over 30 minutes to achieve a T4 level. A phenylephrine infusion of 0.25mcg/kg/min was needed (total dose 2.28mg). Surgery went uneventful, with minimal blood loss (300ml) and spontaneous conversion from atrial fibrillation to sinus rhythm shortly after extraction of a healthy baby.

Discussion: Recent case series indicate a decrease in maternal mortality to 16%, specially during postpartum and directly related to the degree of PHT2. Pregnancy is still considered contraindicated, but if the pathology develops later, specific treatments should be promptly initiated. The use of levosimendan proved to be an excellent choice in optimizing the patient prior to surgery.

References:

Learning points: Optimization with levosimendan prior to cesarean section can be a viable option in optimizing the patient prior to surgery.

Anesthetic patient management with congenital cardiopathy type «single ventricle» on a case

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Background: Most patients with single ventricle (SV) congenital heart disease are expected to survive to adulthood, but they are habitually councised against pregnancy.

Case Report: We present the case of a 31-year-old woman diagnosed at birth of congenital heart disease left ventricular type with double entry with normalized vessels, being intervened within a few months of life of pulmonary artery banding technique, at 6 years intracardiac Fontan surgery is performed using bicavopulmonary technique (De Leval) and closure of the banding area. Since then he has followed periodic controls by Cardiology presenting good functional class NYHA I, although it has presented some episode of «palpitaciones» self-limited. She is referred to our anesthesia service for assessment before the scheduled completion of a voluntary termination of pregnancy (10 weeks gestation) because it is considered a high-risk pregnancy, at that time she is undergoing treatment with LMWH 60mg/sc/12h (previously I was in treatment with Eliquis 5/12), as well as oral iron and alprazolam. After a multidisciplinary session, it was decided to enter the gyneco-obstetric resuscitation unit a few hours earlier to monitor PVC, Pulsiometry, continuous ECG and control of PAI, VVS, RSV with a non-invasive “Clearsight” system, being transferred to the operating room a few hours after administration of Misofar intrarectally. It is also monitored with external defibrillated blades. The anesthetic technique of choice was intradural A at the L3-L4 level with an N25 needle AL medication, Bupi isobara 0.5% 7mg + Fentanyl 20migrograms and light sedation with midazolam. The anesthetic technique of choice was intradural A at the L3-L4 level with an N25 needle AL medication, Bupi isobara 0.5% 7mg + Fentanyl 20migrograms and light sedation with midazolam. The patient remained hemodynamically stable at all times (requiring specific doses of «phenylephrine»), the procedure proceeded without incident, going to the resuscitation room to monitor its evolution, being discharged at the plant 24 hours.

Discussion: This type of patients require multidisciplinary approach from the pregestational advice, clinical management, income in a thrid line hospital, and invasive monitoring in a obstetric intensive care unit for postoperative control.

References:

Learning points: If a multidisciplinary team takes care of patients and child and the functional class of the mother is good, pregnancy should not be discouraged in this patient.

Onset of pulmonary arterial hypertension due to congenital heart disease (PHTN-CHD) after cesarean delivery

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Background: Acute respiratory failure (ARF) during the peripartum period is a possible situation due to different disorders related to pregnancy-specific conditions or an increased risk of other medical conditions due to changes of gestational maternal physiology. We report a case of an ARF, with a final diagnosis of PHTN due to a congenital defect occurring after cesarean delivery.

Case Report: We report a case of a 35 year old woman, who was admitted for an induced labor. An emergency c-section was indicated due to a fetal sustained bradycardia. At the recovery room she developed ARF. An angiotomography went uneventful, with minimal blood loss (300ml) and spontaneous conversion from atrial fibrillation to sinus rhythm shortly after extraction of a healthy baby.

Discussion: The prevalence of CHD in adults is unspecified but it is estimated around 0.01% in the population in Europe (1). It is reported that 5-10% of adults with CHD develop PHTN. The continued exposure of a high pulmonary blood flow due to systemic to pulmonary shunts and high pressure, could cause an obstructive lung artery disease which results in high pulmonary vascular resistance. PHTN during pregnancy is a high risk situation and it is considered a contraindication of pregnancy due to high maternal mortality and morbidity (2). The goal of this article is to present an unusual cause of ARF during the peripartum period and rule out an interesting differential diagnosis, including PHTN-CHD.

References:

Learning points: Onset of PHTN-CHD as ARF at peripartum period is an unusual situation and it should be taken into account in the differential diagnosis. The morbidity and mortality is high so the need of interdisciplinary collaboration is key as well as the management in a tertiary multidisciplinary Hospital.
5016

C-Section in Single Ventricle Patient. Case report, anesthetic considerations
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Background: In functional single ventricle (FSV) patients blood flow into the pulmonary arteries is passive with no intervening pump, resulting in systemic venous congestion and limited capacity to increase cardiac output. This abnormal condition might be further challenged by pregnancy, with its described increases in plasma volume and cardiac output. (1) Women with significant cardiac pathology are best cared during pregnancy by a multidisciplinary approach, in experienced specialised centres. (1) FSV patients are advised against becoming pregnant because of higher peripartum mortality or occurrence of persistent heart failure. Successful pregnancy and delivery have been reported in the United States, Japan and Korea, none have been reported in Argentina. (2)

Case Report: A 37 y/o woman with 34 weeks' gestation with a single ventricle with pulmonary valve surgery at six months old, scheduled for c-section and tubal ligation. She'd had one at 31 weeks' gestation in, followed by postpartum hemorrhage, giving birth to a 1700 gr live child. She was advised not to get pregnant again. In 2013 she'd had a pacemaker placement due to a complete auriculoventricular block. She'd had also a breast implant surgery. In a cardiac catheterization at that time, right and left atrium pressure was 15 mmHg, unique ventricle pressure was 110 mmHg, pulmonary artery measured 29/14/20 mmHg and aortic systolic pressures were 110/70 mmHg. At 2017 a new catheterization study along with angiocardiography stated that she had a single left ventricle with pulmonary valve rupture and barey restrictive biventricular foramen, mild pulmonary hypertension and good ventricular function. SatO2 was between 85% to 88%. A combined spinal epidural anesthesia (CSE) was performed with hyperbaric bupivacaine (10mg) and fentanyl (25μcg) administered intraetherally. An epidural catheter was placed. Post operative care was provided at our hospital cardiac intensive care unit.

Discussion: Reports of single ventricle patients giving birth are scarce. This was an extremely rare and anesthesiologist challenging event, being her second child. CSE might be a good anesthetic technique for c-section in high cardiac risk patients. It allows lower spinal dose of anesthetics and using epidural catheter if needed.

References:

5064

Perioperative management of cesarean section in pregnant patients with pulmonary arterial hypertension
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Background and Goal of Study: Maternal mortality in pregnancy with pulmonary arterial hypertension (PAH) is high, and perioperative management during cesarean section (CS) in pregnant patients with PAH must be performed carefully. However, appropriate anesthesia or perioperative management is unknown yet. Concerning appropriate anesthesia and perioperative management is still controversial. Therefore, we investigated past CS cases in pregnant women with PAH at our hospital and examined anesthesia and perioperative management according to the patient’s condition.

Materials and Methods: The study was approved by the ethics committee of our hospital. This is a retrospective observational study for pregnant patients with PAH or at risk of developing PAH among the CS cases performed at our hospital from January 2009 to March 2019. We investigated the causative diseases of PAH, preoperative PAH, anesthesia, perioperative management, hemodynamic changes, and maternal prognosis.

Results and Discussion: There were 2231 CS performed from January 2009 to March 2019, of which 2 cases were complicated with PAH and 4 were at risk of developing PAH during the perinatal period. Maternal mean age was 34.7 ± 6.7 years and gestational week was 29.7 ± 7.0 weeks. The causative diseases of PAH were 3 cases of mixed connective tissue disease (MCTD), 2 cases of congenital unilateral absence of a pulmonary artery (UAPA), and 1 of ventricular septal defect (VSD). In 3 MCTD patients, 2 patients had complicated with PAH, and 1 had hypoxemia without PAH. All 3 cases with MCTD were managed under general anesthesia during CS, and pulmonary artery catheters were inserted into 2 cases with PAH, in whom PAH worsened after CS. There was no perioperative maternal death, but one died within 5 years. 2 cases of UAPA and 1 of VSD, who were at risk of developing PAH, were managed under regional anesthesia. 2 patients of UAPA were inserted pulmonary artery catheters, there was no development of PAH during the peripartum period.

Conclusion: In CS of pregnant patients with PAH, a pulmonary artery catheter was useful for monitoring pulmonary artery pressure, and general anesthesia was selected because of the wide safety range. Patients at risk of developing PAH could be managed with regional anesthesia. We managed the patients safely according to the preoperative risk of each patient.

6276

Can a pregnant woman with Hypertrophic Cardiomyopathy be a problem to the anaesthesiologist's coronary arteries?
Silva M.1, Ribeiro C. R. R. D.1, Vaz L.1, Milheiro A. S.1
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Background: The number of pregnant women with cardiovascular disease is increasing.1 In fact, cardiovascular disease is the leading cause of maternal mortality in much of the developed world. Some cardiac diseases hold significant risk of mortality during pregnancy but there are strategies to reverse this trend. A multidisciplinary team must work together to manage these complex patients.

Case Report: A 36-year-old pregnant woman, ASA II, with severe Hypertrophic Cardiomyopathy (HCM) was admitted due to preeclampsia and the labor was induced. Non Cardiology specialist, was decided that her heart condition did not contraindicate pregnancy and delivery. In 2013 she had a pacemaker placement due to complete auriculoventricular block. She'd had also a breast implant surgery. In a cardiac catheterization at that time, right and left atrium pressure was 15 mmHg, unique ventricle pressure was 110 mmHg, pulmonary artery measured 29/14/20 mmHg and aortic systolic pressures were 110/70 mmHg. At 2017 a new catheterization study along with angiocardiography stated that she had a single left ventricle with pulmonary valve rupture and barely restrictive biventricular foramen, mild pulmonary hypertension and good ventricular function. SatO2 was between 85% to 88%. A combined spinal epidural anesthesia (CSE) was performed with hyperbaric bupivacaine (10mg) and fentanyl (25μcg) administered intraetherally. An epidural catheter was placed. Post operative care was provided at our hospital cardiac intensive care unit.

Discussion: Reports of single ventricle patients giving birth are scarce. This was an extremely rare and anesthesiologist challenging event, being her second child. CSE might be a good anesthetic technique for c-section in high cardiac risk patients. It allows lower spinal dose of anesthetics and using epidural catheter if needed.

References:

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intraovascular fluid therapy. Our case report illustrates the importance of preparing complications to allow for an effective execution of care.

References:

Learning points: Although women with cardiomyopathy have more risks, with an experienced multidisciplinary team, they can be successfully managed throughout pregnancy and delivery.

Can a pregnant woman with Hypertrophic Cardiomyopathy be a problem to the anaesthesiologist's coronary arteries?
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References:
Case Report: A 36-year-old pregnant female, classified as ASA III, presented with history of mitral valve prolapse and CPVT triggered by exercise but with no recent episodes. Although she was aware of her condition, a non-planned pregnancy occurred and in order to decide how to manage the patient, a multidisciplinary team was brought together. Cardiologists, in order to understand if she was a candidate for an implantable cardioverter - defibrillator or if maintaining her regular beta-blocker throughout pregnancy was enough; anaesthesiologists and maternal-fetal specialists to decide the optimum timing, mode of delivery and anaesthetic technique. At 39 weeks she was admitted for a programmed C-section with an epidural technique. No complications were reported.

Discussion: A possible arrhythmia during pregnancy can be fatal for the mother or, even when the treatment is successfully managed to the mother, jeopardize the fetus. An hemodynamic compromise of placental blood flow may occur or even expose the fetus to adverse effects of the drugs used, having in mind their potential teratogenic effects. Also, as the literature shows and this case acknowledges, pregnancy and post-partum arrhythmic risk in CPVT patients does not appeared to be elevated compared with the nonpregnant period; although more studies are needed. Our case report illustrates how an interdisciplinary approach is critical balancing the emotional consequences of avoiding a pregnancy and the risk of major cardiac events. An experts team was required to ensure safety throughout pregnancy, labour and delivery.

5949

Maternity in women with pulmonary arterial hypertension: what is the anaesthetist’s role?

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Background and Goal of Study: Pulmonary arterial hypertension (PAH) is an uncommon disease that affects mostly women in childbearing age. Despite all advances in PAH therapy, maternal mortality remains high. The aim of this study is to review the anesthetic management and outcome of these patients.

Methods: A retrospective descriptive study of 10 pregnant women with idiopathic or heritable PAH treated in a tertiary referral hospital between 2011 and 2017 was performed.

Results and Discussion: PAH was diagnosed before pregnancy in 8 out of 10 patients. Another patient was diagnosed during the first trimester and the last one during the puerperium. Three of them decided to terminate pregnancy due to high maternal risk. The 6 women who decided to continue the pregnancy were followed up by a multidisciplinary pulmonary hypertension team. All of them were responders to acute vasoactivity tests. An elective cesarean section in week 34 to 37 was performed in all cases. In 5 of them under epidural anesthesia, and in the 6th one under a low dose combined spinal-epidural anesthesia. They were monitored in an ICU for 24-48 hours. The hospital stay was between 4 and 11 days. No major morbidity occurred. NYHA functional status remains stable nowadays. Reviewing the 3 patients who decided to terminate pregnancy, one is in lung transplantation list after a deterioration of her disease during pregnancy. The only death registered corresponds to the patient diagnosed during puerperium who had a vaginal delivery without any special care and died of a refractory cardiogenic shock. Pregnancy represents a cardiovascular challenge for women with PAH due to physiological changes during gestation which increase the risk of right ventricular failure[1]. Clinical guidelines suggest that termination of pregnancy should be offered to every patient due to high maternal risk. When pregnancy is continued, multidisciplinary management and planning are essential. Epidural anesthesia with slow and incremental loading or low-dose combined spinal-epidural anesthesia seems to be an acceptable choice.

Conclusion: A pregnant woman with PAH represent a challenge for the anaesthesiologist. In selected patients, with good functional status and an adequate treatment response, regional anesthesia could be the best option.

References:

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Anaesthesia for caesarean section in women with sarcoidosis induced pulmonary hypertension

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Background and Goal of Study: Pulmonary hypertension (PH) is a complication of advanced sarcoidosis [1] is associated with increase risk of perioperative complications and adverse outcome in pregnant women[2]. The aim of this case report is to report anaesthesia for caesarean section and management of postpartum complications of patient with sarcoidosis induced PH.

Materials and Methods: 39 years old pregnant woman at 35 weeks of gestation age with known sarcoidosis diagnosis was admitted to Pauls Stradiņš Clinical University Hospital (Riga, Latvia) with dyspnea, lower limb edema, acrocyanosis. On admission – hemodynamics was stable, but EchoKG showed right ventricle systolic pressure 110mmHg. On the 2nd day caesarean section was performed under epidural anaesthesia. Required level of anaesthesia was achieved using Sol. Bupivacaini 0.5%15ml combined with fentanyl 50mkg. After surgery she was admitted to the cardiac ICU. For postoperative analgesia continuous epidural infusion of Sol. Bupivacaini 0.125%, 5ml/h was used. On the 3rd day patient was discharged to the maternity ward. On the day 14 she was readmitted to general ICU with rapidly progressing septic shock due to pelvic abscess. Cardiorespiratory failure progressed and on the day 15 patient had negative outcome.

Results and Discussion: Epidural anaesthesia is advocated for caesarean section to the patients with severe PH, because lower risk of cardiopulmonary compromise. General anaesthesia decreases venous return and increases pulmonary vascular resistance. Spinal anaesthesia was avoided because of the risk of sudden decrease in the systemic vascular resistance. [3] Treatment of sarcoidosis usually includes systemic immunosuppressants which increase the risk of infection. [1]

Conclusions: Epidural anaesthesia during caesarean section is a method of choice for patients with PH. Underlying causes of PH that require additional treatment can even more increase mortality.

References:
Mechanism of pregnancy bidirectional effect on the pulmonary circulation in rats with pulmonary hypertension

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Background and Goal of Study: To observe the changes in the tension of pulmonary artery rings and the morphology of pulmonary arterioles and discuss the pathogenesis of pulmonary arterial hypertension and the effect of pregnancy on pulmonary arterial hypertension.

Materials and Methods: 55 female 6-week-old SD rats were randomly divided into 4 groups: Blank control group, (n=10), monocrotaline (MCT) group (n=13), pregnancy group (n=12) and pregnancy MCT group (n=20). After successful modeling, hemodynamic data were collected by internal jugular catheterization and femoral artery catheterization. Subsequently, the third-stage pulmonary artery rings of the rats were taken to observe the changes in pulmonary artery tension for the rats in all groups. At the same time, lung tissue specimens were collected to observe the damage to pulmonary arterioles.

Results and Discussion: Compared with pregnant group, MPAP was significantly increased in pregnant MCT group (p<0.05); the Ach-induced endothelium-dependent arterial diastole rate in the MCT group was significantly lower than that in the blank control group (p<0.05), and the Ach-induced endothelium-dependent arterial diastole rate in the pregnant MCT group was significantly lower than that in the pregnant group or MCT group (p<0.05). There was no significant difference in pulmonary endothelium-dependent diastolic function between the pregnant group and the blank control group (p>0.05). In the MCT group and the pregnant MCT group, the thickness of the rats' pulmonary artery wall and pulmonary arterioles increased, and the inner diameter gradually narrowed, hemorrhage capillaries was formed in the pulmonary arterioles, and some small blood vessels were obviously occluded.

Conclusion: Pregnancy further reduces pulmonary endothelium-dependent diastolic function of PAH rats and promotes the damage to pulmonary arterioles.

References:

5225

Anaesthetic management of a case of early onset severe preeclampsia with HELLP syndrome for hysterotomy – TEG guided management: A case report

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Background: HELLP syndrome, a complication of severe pre-eclampsia occurs in 10–20% cases of severe pre-eclampsia1 and represents an advanced clinical state of pre-eclampsia. It can lead to significant maternal (up to 24%) and perinatal mortality (up to 40%).2 Onset earlier than 28 weeks is rare and there is little published data on maternal and perinatal outcome.3 Anaesthesia management of these cases for emergency surgery can be challenging and TEG can play an important role in perioperative management of these cases.

Case Report: 36-year-old lady, GSP3 previous one caesarean section, gestational age 21 weeks, was admitted to labour ward with hypertensive crisis (180/100 mm Hg) and HELLP. She was taken up for emergency hysterotomy because of uncontrolled blood pressure despite of IV antihypertensive and prophylactic magnesium sulphate. Given the case severity and contraindications to neuraxial blockade, we opted for general anaesthesia with arterial line for continuous BP monitoring. Hysterotomy through classical uterine incision was done. Thromboelastogram done cooperatively showed findings consistent with thrombocytopenia and early coagulopathy. Estimated blood loss was 1100ml. We transfused 2 units of PRBC, 6 units of pooled platelets and 4 units of fresh frozen plasma along with 2gm fibrinogen and 1gm injection tranexamic acid guided by the TEG findings. At the end of surgery, patient was extubated in the operating room and shifted to ICU.

Discussion: Emergency surgery with a triad of uncontrolled blood pressure, ongoing DIC changes and haemorrhage makes anaesthesia for patient with HELLP challenging. TEG demonstrate the global interaction of platelets in the coagulation cascade (aggregation, clot strengthening, fibrin cross-linking, and fibrinolysis) and can guide transfusion strategy.4 Based on TEG analysis, correction can be provided with specific blood product administration We managed our patient with same principles and had smooth anesthesia and post-operative recovery.

References:

Learning points: Early onset severe Preeclampsia and HELLP is a challenge for anaesthetist. General anaesthesia if indicated needs careful planning. TEG can go a long way in successful outcome in such cases.

5024

Use of deep neuromuscular blockade in intrauterine myelomeningocele correction surgery.
Series of seven cases

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Background: Adzick et al demonstrated the benefits of surgical correction of the neural tube defect in prenatal period.1 Maintenance of deep neuromuscular block (PTC ≤ 5) was performed to guarantee intraoperative immobility. This case series describes the use of deep neuromuscular block for this type of fetal surgery.

Case Report: A series of seven cases is reported in which deep neuromuscular block was used in the management of neuromuscular relaxation in intrauterine myelomeningocele correction surgery. The data are presented in table 1. The aim of relaxation was PTC ≤ 5 responses. To maintain deep neuromuscular block, a bolus of rocuronium 0.3 mg/kg (1x ED98) was given if needed. Sugammadex was used for reversal in all patients. Fetal surgery and anaesthesia occurred uneventfully.

| Deep Neuromuscular Blockade (n=7) |
|-----------------|-----------------|
| weight (kg) | 3.57 ± 1.19 |
| height (cm) | 167.57 ± 4.98 |
| age (years) | 34 ± 3.6 |
| surgical time (min) | 201.42 ± 37.27 |
| anesthesia time (min) | 272.14 ± 49.31 |
| rocuronium (mg) | 147.17 ± 26.15 |
| sugammadex (mg/kg) | 3.54 ± 1.08 |
| reversal time (sec) | 2.5 ± 4.72 |
| reversal time (sec) (mg/kg) | 112.5 ± 47.2 |

Discussion: The level of neuromuscular block at the diaphragm has a major impact on surgical conditions, especially during abdominal and thoracic procedures. We hypothesize that surgical correction of intrauterine myelomeningocele also fits this definition. Thus, maintenance of deep level of neuromuscular block might reduce adverse surgical events, improve the outcome of this procedure and may contribute to an increased safety during surgical correction of intrauterine myelomeningocele. Further studies are needed to confirm this hypothesis.

References:

Learning points: Neuromuscular management in intrauterine myelomeningocele correction surgery.
Ex utero intrapartum bronchoscopy and selective intubation followed by delivery and neonatal pneumonectomy. A case report

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Introduction: Minimally invasive fetal surgery is an accepted treatment for prenatal repair of neural tube defects (NTD) and seems to be associated with less maternal hemodynamic changes than open repair. Myocardial depressant effects of anesthesia, fetal stress and/or compromised placental or umbilical blood flow can lead to significant alterations in the intraarterial cardiovascular state of the fetus. One of the most important parameters in surgical monitoring is fetal heart rate (FHR), which allows hemodynamic alterations to be quickly diagnosed and treated. Few studies have addressed fetal hemodynamic monitoring in MMC correction, and most focus on open surgery. The objective of our study is to evaluate the fetal and maternal wellbeing during fetoscopic repair of NTD, by describing FHR at specific times of surgery.

Methods: A prospective cohort study was carried out at VH Barcelona Hospital Campus between 2015 and 2019. 26 Pregnant women undergoing intraterine fetoscopic repair of NTD were recruited. A single 0.25% bupivacaine peridural bolus was administered prior to general anesthesia. Maintenance was made with sevoflurane (MAC 0.4 to 1.9%) and remifentanil. Drugs for fetal anesthesia were given by injection into the fetal glucose before surgery. FHR was monitored by Doppler ultrasound (DU) as shown in Table 1. Normal FHR range was 110-160 bpm. Linear mixed-effects model fitted by maximum likelihood was used to assess the differences of each variable. Multiple comparisons of means were by Tukey contrast. The statistical software R was used for the analysis of the data.

Results and discussion: FHR during the surgery was recorded in all cases. A case of fetal bradycardia was reported. FHR did not undergo significant changes during fetoscopic surgery (p=0.882). This contrasts with the decrease observed during open surgery where uterine manipulation and umbilical cord compression appear to be related to bradycardia. Other invasive ways to monitoring fetal wellbeing (umbilical venous blood gases) can lead to devastating effects.

Conclusion: FHR measurement by DU its a safe and reliable method of measuring fetal wellbeing during fetoscopic surgery.

| Table 1. Fetal heart rate at specific moment of the surgery |
|-------------------|-------------------|---|---|---|
| Moment of surgery | Before anesthesia | After | | |
| | | | | |
| | 110-160 | 110-160 | 110-160 | 110-160 |
| | 110-160 | 110-160 | 110-160 | 110-160 |
| | 110-160 | 110-160 | 110-160 | 110-160 |

5011

Management of post-dural puncture headache in prepartum period after fetal surgery. A case report

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Discussion: Our in hospital PDPH standard treatment protocol is related to the postpartum period only. Non-steroidal anti-inflammatory drugs (NSAIDs) should be given in pregnancy only if the maternal benefits outweigh the potential fetal risks. 3 Their use is associated with premature closure of the fetal ductus arteriosus and oligohydramnios when used after 30 weeks’ gestation. NSAIDs prenatal exposure might affect brain, kidney, lung, skeleton, gastrointestinal tract and cardiovascular system, as it has been reported. PDPH protocols should be modified to not only refer to the postpartum period and take this considerations that might affect fetus health into account.

References:
4. Obstetric Anaesthesiology

4888

Monitoring of fetal heart rate during fetoscopic surgery of intrauterine repair of neural tube defects as a sign of maternal and fetal wellbeing

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Introduction: Minimal invasive fetal surgery is an accepted treatment for prenatal repair of neural tube defects (NTD) and seems to be associated with less maternal hemodynamic changes than open repair. Myocardial depressant effects of anesthesia, fetal stress and/or compromised placental or umbilical blood flow can lead to significant alterations in the intraarterial cardiovascular state of the fetus. One of the most important parameters in surgical monitoring is fetal heart rate (FHR), which allows hemodynamic alterations to be quickly diagnosed and treated. Few studies have addressed fetal hemodynamic monitoring in MMC correction, and most focus on open surgery. The objective of our study is to evaluate the fetal and maternal wellbeing during fetoscopic repair of NTD, by describing FHR at specific times of surgery.

Methods: A prospective cohort study was carried out at VH Barcelona Hospital Campus between 2015 and 2019. 26 Pregnant women undergoing intraterine fetoscopic repair of NTD were recruited. A single 0.25% bupivacaine peridural bolus was administered prior to general anesthesia. Maintenance was made with isoflurane or sevoflurane (MAC 0.4 to 1.9%) and remifentanil. Drugs for fetal anesthesia were given by injection into the fetal glucose before surgery. FHR was monitored by Doppler ultrasound (DU) as shown in Table 1. Normal FHR range was 110-160 bpm. Linear mixed-effects model fitted by maximum likelihood was used to assess the differences of each variable. Multiple comparisons of means were by Tukey contrast. The statistical software R was used for the analysis of the data.

Results and discussion: FHR during the surgery was recorded in all cases. A case of fetal bradycardia was reported. FHR did not undergo significant changes during fetoscopic surgery (p=0.882). This contrasts with the decrease observed during open surgery where uterine manipulation and umbilical cord compression appear to be related to bradycardia. Other invasive ways to monitoring fetal wellbeing (umbilical venous blood gases) can lead to devastating effects.

Conclusion: FHR measurement by DU its a safe and reliable method of measuring fetal wellbeing during fetoscopic surgery.
Optimizing multimodal uterine relaxation for laparoscopic myelomeningocele repair guided by EEG spectrogram

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Background: Myelomeningocele (MMC) is a neural tube defect that affects approximately 5-10 pregnancies per 10,000 in the United States. There is evidence showing that prenatal repair might be the best choice. New surgical techniques like laparoscopic MMC repair have been developed.

Case Report: A 34 y/o woman scheduled for laparoscopic MMC repair surgery at 23+5 weeks’ gestation was admitted to our hospital. A latent free environment was provided from admission to discharge. Magnesium sulfate infusion protocol was administered for fetal neuroprotection. A combined spinal epidural anesthesia was performed. Hyperbaric bupivacaine (10 mg) with fentanyl (25 μg) was administered intraintracranially. An epidural catheter was placed for postoperative pain management.

Results: Thirteen cases of MMC were performed in this study. The median (IQR) sensory block level prior to the procedure was Th8 (4-10). Maternal ETCO2 gradually increased in proportion to the concentration of remifentanil (1). The aim of this study was to evaluate the effect of remifentanil on maternal respiratory status in proportion to the concentration of remifentanil (1). The aim of this study was to evaluate the effect of remifentanil on maternal respiratory status. The median (IQR) sensory block level prior to the procedure was Th8 (4-10). Maternal ETCO2 gradually increased until 15 mins after the infusion of remifentanil, then remained constant level.

References:

Discussion: Sevofofurane has been widely used as an effective uterine relaxant, but there is an increasing concern about an FDA warning about neurodevelopmental issues in children exposed to certain general anesthetics. Taking that into consideration, we aimed to lower exposure to general anesthetics with a MUR approach guided by EEG spectrogram for achieving both, an effective uterine relaxation and an optimal depth of anesthesia. It captures the effectiveness of individual agents in optimal dosages that maximize efficacy and minimize side effects.

Learning points: EEG spectrogram is a useful tool for lowering MAC. MUR should be considered for open or laparoscopic MMC repair.

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The effect of remifentanil infusion on respiratory status in pregnant women undergoing fetal surgeries

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Background and Goal of Study: Since remifentanil undergoes extensive placental transfer, maternal administration has been used for fetal immobilization and/or maternal sedation during fetal therapies. Generally, remifentanil is known to induce respiratory depression in proportion to the concentration of remifentanil (1). The aim of this study was to evaluate the effect of remifentanil on maternal respiratory status during fetal surgeries.

Materials and Methods: We examined obstetric and anesthetic data in pregnant women with twin-to-twin transfusion syndrome who underwent fetoscopic laser coagulation in our hospital between November 2018 and November 2019. The patient received combined spinal–epidural anesthesia with intrathecal injection of hyperbaric bupivacaine 7.5 mg, and local anesthetics were administered epidurally as necessary to obtain an adequate sensory block level. After confirming fetal conditions by obstetricians, remifentanil infusion was initiated at 0.1 μg/kg/min just prior to surgical procedure. When the fetal movement was observed by obstetricians, infusion rate of remifentanil was increased to attain optimal operative conditions.

Results and Discussion: Thirty patients were enrolled in this study. The mean (SD) age, BMI, and gestational weeks at the were 33 ± 4, 24 ± 4 and 21 ± 2, respectively. The median (IQR) sensory block level prior to the procedure was Th8 (4-10). Maternal RR gradually decreased until 10 mins after the initiation of remifentanil infusion and then remained constant level, and maternal ETCO2 gradually increased until 15 mins after the infusion and then remained constant level (Fig.1). Serious respiratory depression was not observed in any patients.

Conclusion: In our study, maternal RR decreased until 10 mins and ETCO2 increased until 15 mins after the infusion of remifentanil, then remained constant level.

References:
5804

Factors Associated with Unsuccessful Fetal Immobilization in Anesthetic Management with Remifentanil Infusion during Fetoscopic Surgery

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Background and Goal of Study: Fetoscopic laser photoacoagulation (FLP) is a procedure used to treat twin-to-twin transfusion syndrome (TTTS). We perform this procedure under a combined spinal epidural anesthesia (CSEA) where the maternal administration of remifentanil is used to provide fetal immobilization and analgesia. Although remifentanil infusion is shown to attain adequate operative condition during fetal surgery (1), it is not always effective and produces insufficient fetal immobility. Herein, we investigated the factors associated with unsuccessful fetal immobilization in anesthetic management with remifentanil infusion during FLP for TTTS.

Materials and Methods: Pregnant women with TTTS who underwent FLP in our hospital between January 2018 and April 2019 were included in this study. Patients were divided into 2 groups: pregnant women with successful fetal immobilization (Movement group) and unsuccessful fetal immobilization (Non-movement group). After CSEA and local anesthesia, intravenous propofol 5 mg/kg and remifentanil 7.5 mg/kg remifentanil infusion was initiated at 0.1 µg/kg/min just prior to surgical procedure. We retrospectively compared obstetric and anesthetic data between the two groups. Data were presented as median (IQR).

Results and Discussion: Maternal age was 35 (34-38) years of age and 31 (29-37) years of age in movement group (n=13) and non-movement group (n=58), respectively (P=0.018). Gestational age was 23.6 (21.6-24.0) weeks and 19.9 (18.4-22.6) weeks in non-movement and movement groups, respectively (P=0.004). Estimated fetal body weight in both groups and recipients was larger in non-movement than in movement group (donors: 431 (277-510) vs. 200 (128-349) g, P=0.003 and recipients: 596 (411-649) vs 286 (188-518) g, P<0.001, respectively).

Conclusion: Unsuccessful fetal immobilization was 18% in CSEA with remifentanil infusion during FLP for TTTS. Higher maternal age, higher gestational age, and larger fetal body weight were associated with unsuccessful fetal immobilization.

References:

6381

Heterotopic pregnancy: infrequent case with anesthetic implications

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Background: Heterotopic pregnancy, where 2 embryos implant in different sites, usually due to anovulatory hyperstimulation syndrome, in vitro fertilization or tubarian factor, is rare(1,2). Pregnancy and fetus safety challenges imply adaptations in anesthesia and surgery. In this state, abortion rates in the 1st trimester reach 10%, and laparoscopic salpingectomy is standard. As anesthetics and surgery may affect the fetus, specially during the 1st trimester, risk-benefit must be minded each time(2).

Case Report: Female patient, aged 32, 75kg, 179cm, ASA IIIE, 8 weeks into a monitored heterotopic pregnancy, went in for an emergency 55-minute salpingectomy. General anesthetics used were propofol and fentanyl. Anesthetic maintenance with sevoflurane. Hemodynamic stability was kept, with slight hypotension upon induction, reversed with 5mg ephedrine. As no other anesthetic interferences ensued and considering the physiological parameters of pregnancy, paracetamol 1g and metoclopramide 10mg were administered. Paracetamol was included addition of a uterotonic agent (OR: 1.5332–2.8301, p < 0.0001), higher preanaesthetic haemoglobin SPB (OR: 1.0316, 95% CI: 1.0225–1.0407, p = 0.0001), and higher blood loss amount (OR: 1.0016, 95% CI: 1.0003–1.0030, p = 0.0205).

Discussion: We dispersed that hypotensive episodes before and after delivery may be connected and that these two hypotensive episodes are associated with dissimilar preanaesthetic haemodynamic variables. A higher preanaesthetic heart rate may represent a higher sympathetic activity state, which may be sensitive to spinal anaesthesia–induced haemodynamic deterioration. Furthermore, SBF was related to effective arterial elastance, an index of arterial load. Uterotonic agents are believed to have a vasodilatory effect on small and peripheral arteries, which affect arterial load, and consequently SBF.

Conclusion: Despite the interactions between maternal hypotension before and after delivery, the two hypotensive episodes were related to different preanaesthetic haemodynamic variables. These findings may facilitate the development of future treatment.

4674

Hypotension before and after Caesarean section delivery: risk factor analysis

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Background and Goal of Study: Maternal hypotension is prevalent and multifactorial during Caesarean section. For example, hypotension before delivery may result from sympathetic blockade of the lower trunk and extremities caused by spinal anaesthesia, whereas hypotension after delivery may result from uterotonics-induced arterial vasodilation. However, it remains unclear whether the risk factors for hypotension differ before and after delivery.

Materials and Methods: Parturients undergoing Caesarean section between 2016 and 2017 were consecutively included. The study collected data on demographic characteristics, intraoperative variables, and types of uterotonic agents used. Hypotension was defined as systolic blood pressure (SBP) < 100 mmHg or a >20% decrease compared with the baseline.

Results and Discussion: A total of 871 parturients were included and analysed. Regression analysis revealed that a higher body mass index (OR: 1.0401, 95% CI: 1.0082–1.0730, p = 0.0134) and higher preanaesthetic heart rate (OR: 1.0123, 95% CI: 1.0032–1.0215, p = 0.0070) were risk factors of hypotension before delivery, whereas general anaesthesia was a protective factor (OR: 0.0179, 95% CI: 0.0024–0.1323, p = 0.0001). Risk factors of hypotension after delivery included addition of a uterotonic agent (OR: 1.5375, 95% CI: 1.1301–2.0917, p = 0.0062), hypotension before delivery (OR: 2.0831, 95% CI: 1.5332–2.8301, p < 0.0001), higher preanaesthetic SBF (OR: 1.5332–2.8301, p < 0.0001), and higher blood loss amount (OR: 1.0016, 95% CI: 1.0003–1.0030, p = 0.0205).

Discussion: We dispersed that hypotensive episodes before and after delivery may be connected and that these two hypotensive episodes are associated with dissimilar preanaesthetic haemodynamic variables. A higher preanaesthetic heart rate may represent a higher sympathetic activity state, which may be sensitive to spinal anaesthesia–induced haemodynamic deterioration. Furthermore, SBF was related to effective arterial elastance, an index of arterial load. Uterotonic agents are believed to have a vasodilatory effect on small and peripheral arteries, which affect arterial load, and consequently SBF.

Conclusion: Despite the interactions between maternal hypotension before and after delivery, the two hypotensive episodes were related to different preanaesthetic haemodynamic variables. These findings may facilitate the development of future treatment.

4678

Implication of continuous noninvasive finger cuff arterial pressure devices during caesarean delivery for goal-directed fluid therapy and postspinal hypotension detection: a randomised controlled trial

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Background and Goal of Study: Postspinal hypotension, defined as 20% reduction in baseline oscillometric systolic blood pressure, is associated with maternal adverse effects during caesarean delivery. Application of continuous noninvasive finger cuff arterial pressure (CNP, ClearSight™ system) may be beneficial because it accommodates goal-directed fluid therapy (GDFT) and may facilitate hypotension detection, but these benefits require verification.

Materials and Methods: After obtaining institutional ethics board approval and informed consent, 66 consecutive parturients undergoing elective caesarean delivery were randomly divided into a preload group (N=32) and GDFT group (N=34). Before spinal anaesthesia, preload group parturients received a fixed 1000-mL volume of crystalloid within 15 minutes, and GDFT group parturients received repeated challenges (3 ml/kg) with crystalloid to maximise the stroke volume. Postspinal hypotension was defined using the oscillometric method and treated using intravenous norepinephrine administration. Maternal adverse effects (nausea, bradycardia, dizziness, and shivering) were recorded, and neonatal outcomes (Apgar score and umbilical blood analysis) were assessed.

Results and Discussion: Postspinal hypotension incidence was 49%. Parturients

Learning points: Surgical procedures pose risks for all patients but research is scarce on obstetric subjects. Emergency cases can lead to more invasive measures, minding the risk-benefit and using consensually safe techniques and drugs.
in the GDFT group received more fluid than did those in the preload group (1126 ± 106 vs. 1245 ± 200 mL; p=0.001), but the incidence of postspinal hypotension (78.1% vs. 70.6% in the preload group and GDFT group respectively; p=0.578) and dose of norepinephrine (12.0 ± 10.4 vs. 14.1 ± 12.7 mg) in the preload and GDFT groups, respectively; p=0.269) were comparable between the two groups. Neonatal umbilical blood pH and pO2 were lower in the GDFT group, but these values were within the normal range. The incidence of maternal adverse effects was comparable between the two groups, although fewer parturients in the GDFT group experienced nausea (35.3% vs. 59.4%; p=0.0834). CNAP and oscillometric systolic pressure were poorly concordant with each other (54.6%), and the CNAP detected two more hypotensive parturients. No CNAP normotensive parturient experienced maternal adverse effects, but two oscillometric normotensive parturients experienced nausea.

Conclusion: GDFT with a CNAP device did not ameliorate postspinal hypotension but may be beneficial for nausea. In addition, CNAP-defined normotension is useful in absence of maternal adverse effects.

5067

Predictability of preoperative carotid artery corrected flow time for hypotension after spinal anesthesia in patients undergoing cesarean section

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Background and Goal of Study: Spinal anesthesia induced hypotension is frequently reported in cesarean section. The related mechanisms are reduction of systemic vascular resistance and effective intravascular volume resulted from sympathetic block, which is more aggravated from aortic caval compression. Corrected blood flow time (FTc) is affected by left ventricular preload and is inversely related to systemic vascular resistance. Our hypothesis was that pre anesthetic carotid artery FTc could predict hypotension after induction in patients undergoing cesarean section under spinal anesthesia.

Materials and Methods: This prospective observational study was performed in 47 patients aged 20 to 40 years scheduled for elective cesarean section under spinal anesthesia. Two faculty anesthetists performed two assessment of carotid artery FTc before spinal anesthesia. FTc was calculated by Bazett’s formula and Wodey’s formula and recorded as FTc (B), and FTc (W), respectively. The occurrence of hypotension was recorded from the spinal anesthetic injection until the fetus was delivered. The definition of hypotension is that the systolic blood pressure drops to less than 80 mmHg, or less than 75%. The areas under the receiver operating characteristic curves were calculated to measure predictability of FTc on occurrence of hypotension.

Results and Discussion: 35 patients completed the study. Hypotension occurred in 21 cases (60%). FTc (B) and FTc (W) were significantly higher in non-hypotension group than hypotension group (365.8 ± 18.1 ms vs. 334.7 ± 10.9 ms, P < 0.001; 342.4 ± 15.0 ms vs. 316.0 ± 8.6 ms, P < 0.001, respectively). Receiver operating characteristic curve analysis revealed FTc (B) 346.4 ms and FTc (W) 326.9 ms as the optimal cut-off values for prediction of hypotension with outstanding prediction ability (Table 1).

AUROC, area under the receiver operating characteristic. CI, confidence interval.

Conclusion: In the current study, carotid artery FTc was found to be predictive indicator of hypotension with AUC more than 0.9. Considering the gray zone, FTc (W) is a better indicator than FTc (B).

5287

Different vaspressors for managing maternal hypotension during caesarean section under spinal anaesthesia: A systematic review and network meta-analysis

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Background and Goal of Study: Maternal hypotension during the elective caesarean section is often induced after spinal anaesthesia and vasopressors are the most reliable method for counteracting this hypotension. We conducted a systematic review and network meta-analysis to compare and specifically evaluate the most effective vasopressor for preventing maternal hypotension, and decreasing fetal acidosis in parturients undergoing spinal anaesthesia for caesarean section.

Materials and Methods: We performed systematic and comprehensive search to detect all of the randomized controlled studies on vasopressors for the management of maternal hypotension during caesarean section under spinal anaesthesia, published until June 30, 2019. We conducted a network meta-analysis to combine the direct and indirect comparisons of the vasopressors. The primary outcomes are minimum systolic blood pressure and incidence of hypotension and fetal acidosis. Stata SE 15.0 was used for the meta-analysis.

Results and Discussion: Forty-one studies (n=2,885) with 6 different vasopressors injected as IV bolus were included. According to surface under the meta-analysis ranking curve (SUCRA) value, IV continuous infusion of norepinephrine (SUCRA value 90.2%) was found to be most efficacious vasopressor that had lowest incidence of hypotension, followed by mephentermine (83.8%), and phenylephrine (75.4%). The predictive interval plot showed that IV continuous infusion of all kinds of vasopressors were more effective than control. On the other hand, phenylephrine IV continuous infusion (83.9%) was most efficacious for maintaining relatively higher minimum SBP. In terms of preventing fetal acidosis, only angiotensin II IV continuous infusion (87.9%) was efficacious for resulting closer pH to 7.4. However, there was no statistical significance in 1 min and 5 min Apgar score.

Conclusions: All analyzed vasopressors are more effective only when those were infused continuously comparing with IV bolus injection in managing maternal hypotension. Therefore, clinicians should use any vasopressors continuously in this condition. According to the SUCRA, norepinephrine IV continuous infusion ranked the most efficacious vasopressor that had lowest incidence of maternal hypotension. Therefore, it may be suggested as a potential alternative to phenylephrine. On the other hand, there was no significant difference in umbilical arterial pH except angiotensin II IV continuous infusion.

5773

A randomized controlled trial of prevention of hypotension during elective caesarean section with a fixed-rate noradrenaline infusion versus a fixed-rate phenylephrine infusion

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Background and Goal of Study: Spinal anesthesia for cesarean section can be complicated by hypotension, with untoward effects for both the mother and fetus. Phenylephrine can lead to reflex bradycardia, therefore noradrenaline has emerged as a superior alternative, with better maintenance of cardiac output as compared to the former. The aim of this double-blind randomized study was to compare a fixed-rate prophylactic noradrenaline infusion to a fixed-rate prophylactic phenylephrine infusion during elective caesarean section under combined spinal-epidural anaesthesia.

Materials and Methods: Eighty-two parturients were randomized to Group N (noradrenaline 4 μg/min) or Group P (phenylephrine 50 μg/min) fixed-rate infusions, starting simultaneously with the administration of the subarachnoid solution. Rescue bolus interventions of ephedrine 5 mg for hypotension or atropine 0.6 mg bolus or ephedrine 5 μg/min and phenylephrine 5 μg/min fixed-rate infusion were administered accordingly. The primary end-point of the study was the incidence of maternal bradycardia (HR<55 bpm). Additionally, maternal hemodynamics, the incidence of hypotension (SBP<80% of baseline) or hypertension (SBP>120% of baseline), the requirement for ephedrine or atropine bolus administration as well as the acid-base status and Apgar score of the neonate were recorded.

Results: The incidence of bradycardia as well as the requirement for atropine administration was higher in the phenylephrine group (p<0.001 and 0.002, respectively). Additionally, fetal pH, bicarbonate concentration, base excess and fetal blood glucose concentration were higher in the noradrenaline group (p=0.027, respectively).
0.014, 0.037 and 0.019, respectively), while Apgar scores did not differ. No difference in the occurrence of hypotension, hypertension or in the requirement for bolus vasoconstrictive medication was demonstrated.

Conclusion: A fixed-rate infusion of 4 µg/min of noradrenaline is as effective in the management of hypotension during spinal anaesthesia for caesarean section as a fixed–rate infusion of phenylephrine, with the avoidance of phenylephrine-induced bradycardia and its potential untoward effects on maternal cardiac output. The more favorable neonatal acid-base profile of noradrenaline might be due to better maintenance of placental blood flow in the noradrenaline group due to its beta action, while the higher fetal glucose concentration in the same group might result from a catecholamine-stimulated glucose metabolism increase and a β-receptor mediated insulin decrease.

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4552

Predictive ability of the perfusion index for hypotension after spinal anesthesia in Caesarean section: A systematic review and Bayesian bivariate meta-analysis

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Background and Goal of Study: The perfusion index (PI) is measured by pulse oximetry and reflects the vasomotor tone. Previous studies have indicated that the PI could predict hypotension after spinal anesthesia for caesarean section; however, the predictive ability of the PI is controversial. This study aimed to investigate the predictive ability of the PI for hypotension after spinal anesthesia in caesarean section.

Materials and Methods: This study is a systematic review and meta-analysis. We searched for retrospective and prospective observational studies and trials using five databases and three preregistration sites. After reviewing the title and the abstract list for eligibility, the full texts of the potentially relevant studies were retrieved. Retrieved articles were reviewed by two independent investigators and further investigated qualitatively and quantitatively. The pooled sensitivity, pooled specificity, and area under the summary receiver operating characteristic curve (AUC-sROC) with their 95% credible intervals (CrI) were calculated by Bayesian bivariate meta-analysis using the integrated nested Laplace.

Results and Discussion: We obtained 137 trials from five databases and three trial registration databases. After full-text retrieval and qualitative analysis, four prospective observational studies were subjected to quantitative analysis. Four studies included 276 patients who underwent elective caesarean section and reported the predictive ability of the PI with cut off values between 3.0 and 3.5. The pooled sensitivity and specificity were 0.82 (95% CrI: 0.62–0.94) and 0.52 (95% CrI: 0.21–0.81), respectively. The AUC-sROC was 0.82 (95% CrI: 0.53–0.95).

Conclusion: The predictive ability of the PI for hypotension after spinal anesthesia in a caesarean section may be high (i.e., the AUC-sROC > 0.8). The high pooled sensitivity suggests that it is useful for exclusive prediction. However, we could not reach a firm conclusion because of the wide CrI. We need further observational studies to confirm the predictive ability of the PI.

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Retrospective evaluation of maternal and fetal effects of shock index value in hypertensive diseases due to pregnancy

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Background and Goal of Study: Maternal Early Warning Criteria including; systolic–diastolic blood pressure (SBP - DBP), peripheral oxygen saturation and urine output, is a useful marker for predicting postoperative complications. Shock index (SI) is the ratio of heart rate to systolic blood pressure and was used to determine the need for fluid and transfusion in hypovolemia. The normal range was between 0.5–0.7, and as it is >1, it is correlated with postpartum severe bleeding in patients. The modified shock index (MSI) is a recently developed marker for the same purpose as the ratio of heart rate to mean arterial pressure. The aim of this study is to evaluate the effectiveness of SI and MSI as a parameter of early warning system in predicting maternal and fetal complications and mortality in pregnancy-related hypertensive diseases (GHT).

Materials and Methods: Following the local Ethics Committee approval, between 2012-2017, 192 patients between the ages of 13–47, undergoing cesarean section due to preeclampsia and eclampsia were enrolled in this study. We included 140 patients with preeclampsia, 15 with eclampsia, 24 with chronic hypertension and 13 with GHT. Vital signs, demographics and postoperative complications were recorded. IBM SPSS Statistics 22 was used for the statistical analysis. The results were evaluated at 95% confidence interval and a p-value less than 0.05 was accepted as statistically significant.

Results and Discussion: Maternal age was significantly lower in patients who were internalized due to eclampsia (p <0.01) and SI, MSI were high. Heart rate, SBP-DBP, SI and MSI values at the time of admission were similar after the operation. Postpartum SI was significantly higher in eclampsia and GHT group compared to other groups (p <0.05). SI and MSI values of the patients at admission and delivery were significantly higher in all groups. The number of epileptic seizures and length of stay in the Intensive Care Unit, intubation rate of fetus were higher in the eclampsia group (p <0.05). There was a positive correlation between admission SI values and embolism and arrhythmia at admission MSI and between MSI at birth and IURG.

Conclusion: We concluded that MSI and SI values may be an important predictor of predicting complications in mother and fetus as well as evaluating SBP-DBP measurements as risk markers, especially in pregnancies with eclampsia.

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Evaluation of the sympathetic blockade intensity after spinal anesthesia for cesarean section: interest of the ankle-brachial index

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Background and Goal of Study: The ankle-brachial index (ABI) is the ratio of the blood pressure at the ankle to the blood pressure in the upper arm (brachium). ABI is an essential diagnostic tool for peripheral artery disease and other vascular injuries of the lower limbs. This tool is not commonly used in the operating room, apart from in vascular surgery. Our study aimed to investigate the ABI following the onset of spinal anesthesia for cesarean section regarding changes in macrocirculation and its implications for the redistribution of blood flow following this induction.

Materials and Methods: A monocentric observational prospective study was carried out. We included patients according to the principle of voluntarism, who were undergoing cesarean section by spinal anesthesia and providing informed consent for the measurement of the ankle-brachial index on both sides before and during the procedure.

Results and Discussion: We included 103 patients. The ABI showed a significant drop after spinal anesthesia reaching values between 0.4 and 0.6 after 10 minutes of sympathetic block installation and returned to normal values 30 to 60 minutes after the start of the procedure. Patients with preeclampsia (n = 38) had higher initial values, more abrupt decline after spinal anesthesia. Patients whose newborns were admitted to the intensive care unit (n = 25, 11 of whom required mechanical ventilation) had a greater fall in the ABI between 5 minutes and 20 minutes (p = 0.002).

Conclusion: The conventional monitoring means may be insufficient and may underestimate the harmful effects of anesthesia on the maternal-fetal circulation. ABI is a non-invasive monitoring that can be easily deployed in the operating-theater.
Anesthesia for pregnant pacient porter of myasthenia gravis and scleroderma: case report

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Background: Myasthenia gravis is an autoimmune chronic disease that prevalence of 1 in 7.500. Scleroderma affects mostly young women, in which pregnancy increases the disease in 50% of the patients.

Case Report: Patient, 20 years old, PS3E, gestational age 33 weeks and 4 days, diagnosed with myasthenia gravis and limited cutaneous scleroderma was hospitalized for severe pre-eclampsia. Previous cesarian-section since 11 months with fetal death of 27 weeks due to eclampsia. Came to obstetric emergency with blood pressure of 170 x 100mmHg and strong headache. Cesarian-section was indicated. At the pre-anesthesia evaluation was observed predictors of difficult airways: mouth opening 2cm, Mallampati 4 and thyromental distance 6cm. Optated for spinal anesthesia and the presence of 2 anesthesiologists at the operation room. The general surgery team was present if was necessary emergency surgical approach of airways. Monitoring: oximeter, non-invasive pressure, cardioscopy with 5 derivations. Spinal anesthesia was performed with Quincke 26G needle, a median puncture after second attempt at L3-L4 vertebral interspace. Hyperbaric bupivacaine 13mg and morphine 100mcg were injected at subdural space. The level of sensory block reached T4. Intravenous drugs as cefazoline 2g, dexamethasone 10mg, ocitoxytocin 9 UI and ondansentron 8mg were made. After the procedure, the patient was directed to the recovery room in spontaneous ventilation, staying under observation for 24 hours. The patient evolved without complications, being directed to the infirmary.

Discussion: Patients with myasthenia gravis usually need ventilatory support after the surgery. The muscular strength seems adequate during the immediate postoperative, but it can deteriorate some few hours later. The anesthetic evaluation of the patients with scleroderma must show attention to the narrowing of the oral opening due to the cutaneous stiffness and the laryngoscopy by optical fiber might be necessary.

References:

Learning points: Coexisting diseases can severely increase the anesthesiat risk in pregnant patients.

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Conclusion: Breakthrough pain during a CS is extremely uncomfortable for the mother. A pro-active policy is required in order to prevent breakthrough pain or discomfort during CS. Early identification of problematic epidural catheters for labor analgesia is essential in the prevention. Strategies to reduce the incidence may include a reduction in duration of surgery and administration of a prophylactic epidural top-up if duration of surgery is prolonged.
80% of large hospitals have a detailed epidural augmentation protocol (p=0.034). More than 80% use Lidocain. 74.7% supplement with bicarbonate. 24.2% add adrenaline, mostly in large hospitals (p<0.001). The most commonly used drug combination is lidocaine+fentanyl+bicarbonate, with no adrenaline (41%). In large hospitals, 96% initiate drug bolus before entering operating room (p=0.001). We found that hospitals that require official training in obstetric anesthesia have lower failed conversion rates (p=0.036). We found that successful conversion is weakly correlated with bicarbonate supplementation (p=0.056).

Conclusions: We report variations in common practices, depending on hospital size. However, these have little effect on success rate. Proper training to anesthesiologists who work regularly in delivery rooms, and bicarbonate supplementation can improve epidural conversion for c-sections.

Acknowledgements: Dr. Amir Giladi, Tali Bdotlah-Abrah.

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Re-audit of postoperative monitoring of women undergoing caesarean section (CS) under neuraxial block with diamorphine: A monitoring tool of improved perioperative care and measure of practicality of guidance

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Background and Goal of Study: Poor postoperative care was found to be a contributing factor for three maternal deaths on CEMID triennium report. NICE has suggested an hourly 12-hour monitoring at the ward level for women who received intrathecal diamorphine on its 2004 guidance to avoid delayed respiratory suppression (1). Materials and Methods: We conducted a prospective audit to check whether post-operative CS patients with opioids were monitored for all 3 parameters i.e. pain score, sedation score (AVPU), respiratory rate for up to 12 hours in the recovery and ward as per the NICE guideline, and also see whether any improvement from previous audit has been done. Fifty women who had CS in theatres were followed up the next day and their notes were reviewed to see how many observations of pain score, sedation score and respiratory rate were actually done in the recovery and the ward.

Results and Discussion: Our previous audit showed compliance rate of 42% in terms of observations numbers. Following the implementation of recommendations our compliance rate has improved to 49.4%. We aimed for a target compliance of 80% to NICE guidance (2). Staff shortage, work load on the ward, simultaneous presence of other scoring systems (e.g. MEWS, MODS) and local training availability are all contributing to not achieving 100% compliance. Our correspondence with NICE on the points of reality and level of evidence was taken up for consideration to review the current guidance by the NICE developers.

Conclusions: Although rare, delayed respiratory depression following intrathecal opioid administration can be fatal in post-partum women. More studies are needed to determine who are likely to be at risk. Meanwhile, monitoring is essential. Clinical audit is known as an effective tool to measure compliance level with guidance. Our study has proven to be a realistic tool to measure the practicality of an idealistic guidance in our practice.

Learning point: Clinical audit not only improves the clinical practice and patient safety, but is also a realistic tool to measure the practicality of an idealistic guidance.

References:

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Spinal Anesthesia for Cesarean Delivery in a Parturient with Klippel-Feil Syndrome

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Background: There are no specific recommendations for type of anaesthesia in patients with Klippel-Feil Syndrome (KFS). We report successful anesthetic management in parturient undergoing C-Section (CS) under spinal anesthesia (SA).

Case Report: A 30 year old primipara 151 cm in height, 48 kg weigh, with low hairline and short neck with restricted neck movements and severe thoracic kyphoscoliosis was scheduled for CS. Preoperatively laryngoscopy was performed by otorhinolaryngologist and have presented features of difficult airway (Mallampatti 3). Her vital capacity was 24% of predicted with an FEV1/FVC ratio of 0.85. We use SA with 8 mg 0.5% isobaric bupivacaine, 20 mcg fentanyl and 100 mcg morphine (total volume 2.2 ml). This provided anesthesia up to T4 sensory level, without significant effects on cardiovascular or respiratory function. No side effects occurred and the parturient was discharged after 7 days.

Discussion: The clinical findings of short neck, limited neck movement, low posterior hair line and thoraco-lumbar kyphoscoliosis led to diagnosis of KFS although various other congenital anomalies can be associated (1). The major anaesthetic considerations while managing a patient with KFS are spinal deformities, which can lead to anticipated difficult airway due to fused cervical vertebrae. Epidural anesthesia can be a technique of choice for the majority of CS but there is concern regarding to identification of the epidural space and unpredictable spread of

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Fast-track in caesarean section: a multidisciplinary challenge

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Background and Goal of Study: The publication of the Enhanced Recovery After Surgery in caesarean delivery guidelines has created a pathway for postoperative care. Recommendations include nausea and vomiting prevention, postoperative analgesia, early mobilization and urinary drainage. It is a multidisciplinary challenge that involves obstetricians, anaesthesiologists and midwives. The aim of our study is to assess whether the non-insertion or early removal of urinary catheter (UC) after caesarean section (CS) affects the time of first micturition and the time to mobilization, as well as how these times are affected by morphine on neuraxial anaesthesia.

Materials and Methods: An observational study is being conducted in our centre. According to obstetric criteria, the non-placement of UC or its early removal (<6h) are conducted when possible in CS. Demographic and obstetric data, type of CS, time of UC removal, type of anaesthesia and opioid used, complications, time of first micturition and time to mobilization were collected. Data were analysed using Stata vs15.

Results and Discussion: 37 women, mean age 34.1 years (SD 5.3) are currently included in the study. 24 underwent elective CS, 9 had CS in labour and 4 had urgent CS. UC was placed in 27 patients, early removed in 21 and not placed in 10. Epidural anaesthesia was used in 9 patients and spinal anaesthesia in 28. Neuraxial morphine was used in 18 patients. Comparing patients who received morphine to those who did not, no differences were found in the time of first micturition and the time to mobilization (p>0.05), nor in postoperative complications. A difference of 6.9 hours (IC95% 1-12.8h, p=0.02) was found between the time of mobilization in patients in which UC was not placed or early removed compared to those with late removal (>6h), with no differences in the time of first micturition after UC removal. Conclusions: The non-placement of UC or its early removal (>6h), with no differences in the time of first micturition after UC removal.

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anesthetic within the modified epidural space in KFS (2). Low dose SA minimize this inadequacy, providing a more reliable sensory block, but care is given to choose the right spinal dose. It is our experience to limit the dose of isobaric bupivacaine up to 10 mg which in many cases proved to be correct.

References:

Learning points: Spinal low-dose anesthesia in some situations might also be successful alternative technique for CS in patients with KFS.

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Cauda equina syndrome following combined spinal-epidural anesthesia with levobupivacaine and sufentanil for elective cesarean section

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Background: Cauda equina syndrome (CES) is a rare complication of spinal and epidural anesthesia, more frequently reported with lidocaine. We describe a case of CES following spinal administration of levobupivacaine.

Case Report: A 33-year-old female (72 kg, 160 cm), ASA II, with no relevant background or known allergies, underwent elective cesarean section under locoregional anesthesia. The combined technique was performed in the sitting position, first attempt, with 18G Tuohy epidural and 27G lancet spinal needles at L3-L4 interspace. Levobupivacaine 0.5% (8mg) and sufentanil (1.5 mcg) were injected intrathecally. No adverse events, pain or paresthesia were reported during the procedure. After the uneventful cesarean and upon recovery from motor block, she was discharged to the obstetrics ward. Postoperative analgesia with levobupivacaine 0.25% (15 mg), via epidural bolus, 4/4h was initiated. Within 34 hours, patient referred neurological symptoms: diminished strength and abolished osteotendinous reflexes (OTR) in the left lower limb (LLL), bilateral L4-L5 and sacral dermatomes hypoesthesia, sphincter dysfunction and saddle anesthesia. Lumbosacral CT scan and MRI revealed no hematoma or compression of the cauda equina nerve roots or spinal medulla. Patient began a 7-day course of IV methylprednisolone (1g q.d.). At hospital discharge, she could walk short distances, had improved strength, diminished OTR and less hypoesthesia in the LLL but kept sphincter dysfunction and saddle anesthesia. Nine-month follow up revealed no sphincter dysfunction and improved strength with autonomous walking but maintenance of diminished OTR on the LLL and saddle anesthesia.

Discussion: Saddle anesthesia, sphincter dysfunction and paraplegia are consistent with CES. Damage to the nerve roots may be due to compression, inflammation, direct trauma, ischemia or neurotoxicity, being the latter the most likely cause in this case. The role of epidural analgesia bolo cannot be neglected, since transmeningeal transfer or catheter migration with subsequent neurotoxic spinal concentration of levobupivacaine may have occurred.

References:

Learning points: Prompt suspicion of neuroaxial complications, early detection and treatment are vital to minimize the risk of permanent damage.

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Perioperative management for elective cesarean section in a woman with superior vena cava syndrome

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Background: Patients with superior vena cava syndrome (SCVS) bring out two main problems for anesthesiologists: hemodynamic and respiratory compromise (1). Pregnancy per se is already associated with increased hemodynamic and respiratory risk, which hinders SCVS diagnosis. SCVS in a pregnant woman generate a particularly high perioperative risk scenario (2).

Case report: Pregnant woman with SCVS due to a diffuse B-cell non-Hodgkin lymphoma of the primary mediastinal type who underwent elective cesarean section at 32 week gestation time. A titrated epidural was performed successfully hemodynamic stability during surgery. In case of failed epidural we pre-planned a general anesthesia with fiberoptic guided intubation if hemodynamic stability and fetal wellbeing was preserved or a general anesthesia with rapid sequence induction otherwise. The cardiac surgery team was physically present on the surgical block and cardiopulmonary bypass (CBP) and/or extracorporeal membrane oxygenation (ECMO) was readily available.

Discussion: SVCS in pregnant management is scantily reported in anesthetic literature (3). We believe that there is no ideal anesthetic plan for this clinical scenario. Yet neuroaxial techniques are a sound first option management. Other anesthetic procedures can be nevertheless be considered in each individual case. Having a detailed plan of action is crucial regardless on the anesthetic technique of choice.

References:

Learning points: In pregnant women with SVCS with compression symptoms avoid AG whenever possible, and avoid sudden sympathetic block. Provide an airway management plan. Provide a contingency plan for potential failure (CEC, ECMO etc.).
Cesarean section in a patient with Severe Aortic Stenosis: an anesthetic approach

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Background: Aortic stenosis (AS) may present for the first time during pregnancy, and severe form poses a high risk with heart failure occurring in 10% and arrhythmia in 3-25%. We present a case of severe AS submitted to caesarean section under general anaesthesia.

Case Report: A 42-years-old primigravida, 36 weeks gestation, was submitted to caesarean section due to severe AS. The diagnoses of congenital bicuspid aortic valve occurred early in the pregnancy, after episodes of palpitations, without other symptoms. Cardiac surgery was delayed due to mother’s cardiac stability. A multidisciplinary approach was involved in the preoperative assessment. On the day of the procedure, a cardiothoracic intensive care unit without complications, with hospital discharge 4 days later.

Discussion: As severe AS poses an increased risk of morbidity and mortality, this case highlights that with multidisciplinary approach and an exhaustive preparation this patients can be managed uneventfully.

Learning points:
- Multidisciplinary approach and timing for cesarean decision are vital for uncomplicated discharge of both mother and baby.

Systematic review and meta-analysis of the association between labour neuraxial analgesia and breastfeeding

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Background and Goal of Study: Breastfeeding is recommended by the World Health Organization as it confers health benefits to both, mother and child (1). Some studies have shown that neuraxial anesthesia, the gold standard for labor analgesia, has a negative effect on breastfeeding (2), a finding not corroborated by others (3).

Materials and Methods: For this meta analysis we included studies that compared neuraxial analgesia to alternate analgesia (intravenous opioids or N2O) or no analgesia and assessed the success of breastfeeding after two to twelve weeks. A systematic literature research was performed across various databases to identify retrospective or prospective studies. We aggregated the retrieved data in a conventional meta analysis, using the random effects model.

Results and Discussion: We included six studies and 2314 participants. Women with neuraxial analgesia were less likely to breastfeed, odds ratio and 95% confidence interval, (95%CI) being 0.67 (0.53 to 0.85). Heterogeneity was not elevated with I2=0%. One study had a high weight and omitting these data from analysis (leave-one-out meta-analysis) then yielded no significant difference between the neuraxial and the alternate or no analgesia group: OR 0.83, 95%CI 0.58, 1.19 (Figure 1).

Conclusion: Our data suggests that neuraxial analgesia does not reduce the likelihood of breastfeeding after two to twelve weeks. Women who have chosen to deliver without neuraxial analgesia may be more inclined and motivated to breastfeed, may have had shorter and easier labors, and may be less sensitive to pain. All these factors rather than the neuraxial analgesia may influence breastfeeding maintenance.

Anaesthetic management in a pregnant woman with right atrial thrombus: Case report

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Background: Cardiac masses include primary or metastatic tumors of the heart, thrombus, vegetation, calcification of valve or annulus. These masses mostly originate from the left atrium and ventricle, rarely seen on the right side of the heart. Cardiac mass during pregnancy is a rare condition. We aimed to present anesthetic management of a pregnant patient with right atrial thrombus in the third trimester of pregnancy.

Case report: A 35-year-old, 30-weeks gestational pregnant patient had a history of right mastectomy, radiotherapy and chemotherapy in 2014 due to breast cancer. Her symptoms were dyspnoea and tachycardia. Echocardiography and cardiac MR imaging revealed a 3.5x4.5 cm thrombus that filled most of the right atrium, extending into the right jugular vein and vena cava superior, which did not expose the lumen and allow flow. There were no thrombus in the inferior vena cava, lower and upper extremity veins. After follow up 8 days in the coronary intensive care unit, the cesarean section was decided. During the obstetric follow up, it was from anesthesia occurred without complications. Full resuscitation equipment and a cardiac surgical team was always available. The postoperative period occurred in a cardiothoracic intensive care unit without complications, with hospital discharge after 4 days.

Discussion: The prevalence of primary tumors of the heart is around 0.001-0.3%, of which 75% are benign (myxoma). Secondary tumors are 15-20 times more common than primary tumors and cardiac metastasis occurs in 15% of patients with any cancer. Lung and breast cancers, melanoma and lymphomas are the most common metastases to the heart. Our patient had a history of breast cancer and showed symptoms in the last trimester of pregnancy. Preoperative careful preparation, intraoperative dose and advanced hemodynamic monitoring and postoperative careful follow-up are required in these patients.

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Is the size of the dural puncture a risk factor to develop a post-dural-puncture headache?

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Background and Goal of Study: Accidental dural puncture (ADP) is the most common complication related to anesthesia in the obstetric patient. An ADP causes a temporary leak of cerebrospinal fluid and may produce a typical headache pattern. Therefore, the risk to develop a PDPH following an ADP should depend on the needle size. The goal of this study is to establish the differences between ADP secondary to a Touhy needle and an epidural catheter.

Materials and Methods: We retrospectively reviewed 61 pregnant patients who underwent cesarean section patients were recorded at 15 and 30 minutes, and 1, 2, 6, 12, 18 and 24h after surgery. The analgesic satisfaction degree was evaluated on the day after surgery, and was divided into 4 grades (1: very satisfied, 2: satisfied, 3: not very satisfied, and 4: not satisfied). We examined associations between clinical factors and pain scores by using a multivariate regression model. Correlation between pain scores and analgesic satisfaction degree was also examined.

Results and Discussion: Fifty-six patients were included for analysis. The average of pain scores between 2 and 24h after surgery was significantly associated with past C/S and no scheduled acetaminophen (p<0.05). The analgesic satisfaction degree during first 24 h was evaluated on the day after surgery was significantly associated with past C/S and no scheduled acetaminophen and young age (p=0.05). No significant correlation between pain scores and analgesic satisfaction degree was observed (p=0.75).

Conclusion: This study revealed that past C/S, no scheduled acetaminophen and young age were risk factors of postoperative pain after C/S under CSEA. Analgesic satisfaction degree could not be explained only by pain scores.
References:

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Chronic pain following caesarean section: a prospective observational study of prevalence and risk factors

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Introduction: Caesarean section (CS) has been linked to chronic postsurgical pain (CPSP). The reported incidence of CPSP after CS ranges from 0 to 56%. The aim of this study was to detect the occurrence of CPSP after CS at a Spanish tertiary referral Hospital and to describe its characteristics.

Materials and methods: A prospective observational descriptive monocentric study was conducted (September 2017 –December 2018) at La Paz University Hospital –Madrid (Spain). Consenting consecutive parturients were included after urgent or scheduled CS. We recorded age, obstetric history, medical and surgical history and current medication. Surgical and anaesthetic management in the operation room were assessed. Analgesia requirements and pain (using a Visual Analogue Scale (VAS) and DN22 questionnaire) were evaluated in the postoperative period and 3 months after surgery. Results were analysed with parametric tests for quantitative variables, while Fisher’s test or Chi-square test were used for Qualitative variables.

P<0.05 was considered statistically significant.

Results and discussion: 597 consecutive patients were included, with an incidence of Chronic post-surgical pain (CPSP) at 3 and 12 months was 6.2% and 1% respectively. Most of the women with CPSP experimented mild pain at rest and mild/moderate pain at movement. Risk factors for CPSP were: a Numerical Rating Scale (NRS) for pain >5/10 at movement one week after caesarean section (OR: 2.5 (95% CI: 1.26-4.91) p<0.009); a uterine exteriorization (OR: 2.97 (95% CI:1.075-8.202) P=0.046); a neurophatic pain questionnaire of 2 questions (DN2) score >3 one week after caesarean section (OR: 3.686 (95% CI: 1.577-8.615); Gestation week, at a lower gestation week more pain (p=0.008). The use of ondansetron seemed to have a protective factor (OR: 0.16 (95% CI: 0.152 - 0.997) p=0.047). Compared with other studies and meta-analysis, the incidence of CPSP after CS at our hospital was found to be lower (6%) than in other centres.

Conclusions: PSCP after CS affected 6% of patients in our cohort. Predictors for CPSP included higher average intensity score of one-week postoperative pain on movement, uterine exteriorization, less gestation week, closure of the peritoneum and higher height. Use of intravenous ondansetron is a protective factor. Preventive strategies should target these risk factors to improve recovery in parturient.

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Can we treat persistent postoperative nausea and vomiting after spinal anaesthesia on a C-section? a successful treatment in a two-case report

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Background: Postoperative nausea and vomiting (PONV) is a problem in any anaesthetic procedure. Although specially related to general anaesthesia, PONV for elective caesarean delivery can occur in up to 66% of pregnant women. Appfel score tries to predict its occurrence and relation of antiemetic need, however pregnant women are a risk group, not only because they match 2 factors (women and non-smokers status) but also by the reduced tone of the esophagogastric junction and an increased intraabdominal pressure. It is important to balance the three antiemetics used in prophylaxis (dexamethasone, droperidol and ondansetron) together with their side effects but also to have knowledge of options for treatment when triple prophylaxis fails.

Case Report: Two pregnant women in the age of 30 years old, ASA II, proposed to elective caesarean. Both had no previous pathological medical history however both declared motion sickness. They both received sequential anaesthesia with 8 mg bupivacaine plus 0,002mg sufentanil and 150ug morphine, after duple PONV prophylaxis with dexamethasone 4mg and ondansetron 4mg. On the recovery room, parturients had complains of serial vomiting episodes with no improvement after rescue anti-emetics. As a final attempt to provide comfort, a low dosage naloxone infusion 0,25mg/h was started, considering intrathecal opioid the origin of the persistent symptoms. After 2h parturients referred improvement of the symptoms and in 3h of perfusion tolerated food ingestion. There was no register of pain aggravation.

Discussion: Persistent postoperative nausea and vomiting is common among parturients as a physiologic response of pregnancy status. It is the anaesthesiologist function to provide comfort to the parturients and find new options of treatment. When all rescue antiemetic solution isn’t effective, low dosage naloxone infusion is a successful treatment with intrathecal opioids are used for analgesia, with no prejudice on the analgesic effect.

References:

Learning points: Low dosage infusion is an effective treatment for persistent PNVO in case of failure of rescue antiemetics.

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Incidece and outcome of conservative vs interventional (ebp) management of pdpd

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Background and Goal of Study: Epidural analgesia is sited in around 30% of labouring women in Lourdes hospital, a regional hospital in Drogheda,Ireland. We compared the incidence of conservative VS epidural blood patch (EBP) and their outcome for managing post-dural puncture headache.

Materials and Methods: Data was reviewed retrospectively over a period of ONE year (1 October 2018 to 31 September 2019), and included all patients diagnosed with PDPH.

Results and Discussion: 890/2976 patients received labour epidural/spinal anaesthesia respectively during this period. Diagnosis of PDPH was established in 13 patients following accidental dural puncture and 04 patients after spinal anaesthesia. Epidural/Spinal were performed by anaesthesiologists with various degree of experience in years. There was higher incidence of accidental dural puncture at out of office hours. 53% (9/17) got conservative management with fluids, caffeine, codeine, paracetamol and non-steroidal anti-inflammatory drugs. 35.29% (6/17) patients received an epidural blood patch following no relief after conservative management for 48 hours. None of the patient required second EBP. 11.76% (2/17) patients requested EBP despite of mild symptoms of PDPH due to fear of severe headache should conservative management fail.

Conclusion: The incidence of conservative and EBP is comparable.

References:
Prevention of postdural puncture headache: retrospective analysis of 12 years experience in a tertiary obstetric referral centre

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Background and Goal of Study: Post dural puncture headache (PDPH) following accidental dural puncture is a common complication of neuraxial anaesthesia and represents a relevant cause of short term morbidity in parturients. The aim of our study was to evaluate factors influencing headache incidence, duration and intensity following accidental dural puncture in obstetric patients.

Materials and Methods: We conducted a retrospective study in a tertiary referral center between January 2007 and December 2018. During this period, 26711 neuraxial blocks were performed: 4321 combined spinal-epidural. Record sheets of all patients who experienced either ADP or PDPH were reviewed. Headache intensity was stratified as absent, mild, moderate or severe and duration classified in four groups (<24h, 24-48h, 48-72h, >72h).

Description: Of 26711 obstetric neuraxial blocks performed, 4321 combined spinal-epidural. Record sheets of all patients who experienced either ADP or PDPH were reviewed. Headache intensity was stratified as absent, mild, moderate or severe and duration classified in four groups (<24h, 24-48h, 48-72h, >72h).

Results and Discussion: There were 87 ADPs (0.3%), 63 (7.2%) observed and the remaining cases being PDPH following suspected/unrecognized ADP. Conservative prophylactic measures (bed rest, adequate hydration, caffeine, oral analgesics) were immediately initiated in 44 (50.6%) ADPs. Seventy (80.5%) women developed PDPH. Prophylactic measures significantly reduced PDPH incidence (88% vs 93%, p=0.003) and intensity (p<0.001), but increased duration (p=0.03). After detected ADP, re-siting epidural catheter at a different lumbar interspace was associated with decreased incidence (68.6% vs 100%, p=0.03) and intensity (p=0.02), but did not influence the duration (p=0.58) of PDPH when compared with catheter insertion in the same space. PDPH incidence and character was not significantly influenced neither by maternal age, body mass index and parity, gestational age, nor neuraxial technique type, performance in sitting vs lateral decubitus position, interspace level by maternal age, body mass index and parity, gestational age, neither by neuraxial technique type, performance in sitting vs lateral decubitus position, interspace level by maternal age, body mass index and parity, gestational age, neither by neuraxial technique type, performance in sitting vs lateral decubitus position, interspace level by neuraxial technique type, performance in sitting vs lateral decubitus position, interspace level.

Conclusion: Incidence of PDPH was similar to previously published reports. After suspected or witnessed ADP, immediately prophylactic measures and epidural catheter re-siting at different lumbar interspace may help to prevent or alleviate PDPH symptoms.

6334

Treatment of post dural puncture headache: review of 26,711 obstetric cases at a single centre

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Background and Goal of Study: Accidental dural puncture (ADP) and post-dural puncture headache (PDPH) remains a disabling outcome in the obstetric population. We aimed to evaluate its management among obstetric anaesthesiologists.

Materials and Methods: We conducted a retrospective review of all ADP cases at a tertiary obstetric referral center. Between January 2007 and December 2018, 26,711 neuraxial blocks were performed: 21,953 epidural, 437 spinal and 4,321 combined spinal-epidural. Descriptive analyses of variables were used to summarize data.

Results and Discussion: There were 87 ADPs (0.3%), 42 (72.4%) observed and 16 (27.6%) in which ADP was not witnessed and represents a relevant cause of short term morbidity in parturients. The aim of our study was to evaluate factors influencing headache incidence, duration and intensity following accidental dural puncture in obstetric patients.

Conclusion: Incidence of ADP, PDPH and EBP was similar to the literature. In the case of a DVT in a term pregnancy patient we must not only prevent TP, but also possible bleeding associated with delivery. In these extreme situations a temporary IVC filter should be considered as a possible safety solution.

6019

The hidden enemy strikes in the obstetric emergency: spontaneous subcapsular hepatic hematoma in a pregnant patient

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Background: Spontaneous subcapsular hepatic hematoma (SSHH) with or without previous disease is a very rare condition in pregnancy and postpartum with high mortality for the mother (39%) and newborn (42%) [1]. In this report we present a case of SSHH conservatively managed with vital support, fetal extraction by caesarian section and hepatic packing through median laparotomy.

Case Report: Pregnant patient of 42 + 1 weeks and 33 years old without any previous disease was admitted to the ED due to abdominal pain of several hours. Cardiotoxicographic record and abdominal ultrasound evidenced poor variability and intra-abdominal free fluid. An emergent c-section under general anesthesia was practiced followed by fetal extraction. After delivery, in the presence of hemoperitoneum with an unbroken uterus, a large abdominal pack was performed showing a left SSHH without active bleeding. Therefore, a hepatic packing was placed. Twelve hours after admission in the ICU, the abdominal cavity was examined and closed. In the following days, she was diagnosed of HELLP syndrome. After 6 days in the ICU, she presented a left lobar pulmonary thromboembolism, hence an inferior vena cava filter was placed.

Discussion: In the last decade, HSH is observed as a complication of preeclampsia which cannot be present at the moment of the diagnosis. The most frequent symptom is persistent abdominal pain, but it also can debut as hemorrhagic shock [1]. The management of HSH remains discussed. After emergent c-section, the therapeutic attitude on

5206

Inferior cava venous filter as a solution to an unexpected and severe complication in a term pregnancy

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Background: The thromboembolic event incidences are increased during pregnancy due to anatomical and physiological changes. Consequently, the risk of deep vein (DVT) and pulmonary thrombosis (PT) are higher and there are associated with elevated maternal mortality1.

Case Report: A 40-week pregnant woman sought medical consultation for pain and increase of temperature in lower extremities without other symptoms. The eco-Doppler study showed a femoral and popliteal bilateral thrombosis with thrombophlebitis of the right internal saphenous vein. Due to the risk of PT and also the risk of bleeding with anticoagulation during the delivery, an inferior vena cava (IVC) filter was placed and a continuous perfusion of unfractionated heparin at 900 Uih was initiated. We worked on a plan in case of an emergency involving anticoagulant reverser, laboratory testing and an anaesthetic strategy. After 12 hours the patient’s labor started, we were able to stop the heparin perfusion 4 hours before caesarean section that was performed under general anaesthesia without significant blood loss. In the postoperative period she had a surgical hematoma and after its resolution the removal of the IVC filter was done with extreme difficulty but without incident.

Discussion: The standard treatment for DVT is anticoagulation but during pregnancy, especially in term gestations, it is associated with an unacceptable risk of bleeding. Taking into account this fact and comparing with other possible treatments, we decided to use an IVC filter. Studies have reported that the complication rates among pregnant patients with an IVC filter are comparable to those in non-pregnant population although an increased risk of filter migration has been found2. An elective caesarian section is recommended to avoid contractions and reduce the possible IVC filter migration. The management of DVT in a term pregnancy patient is complex and an algorithm could help us act more effectively.

References:

Learning points: In the case of a DVT in a term pregnancy patient we must not only prevent TP, but also possible bleeding associated with delivery. In these extreme situations a temporary IVC filter should be considered as a possible safety solution.
Acute standford type B aortic dissection in a puerperal patient with borderline marfan syndrome (MS)

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Background: Cardiovascular morbidity is the main cause of maternal complications during pregnancy. Aortic disease is its main contributor, although connective tissue disorders are becoming an increasing etiology. We report the case of a patient with borderline MS criteria that developed an acute type B aortic dissection (AAD) in the postpartum period.

Case Report: A 43-year-old pregnant patient, with a medical history of recurrent miscarriages and borderline criteria for MS, was admitted for labor in 38 weeks. She had been followed up by the high-risk obstetric and cardiology unit. There were no relevant echocardiographic findings except for a minimal aortic root dilation-37mm-that did not contraindicate vaginal delivery, which went uneventful. Eight hours later the patient developed progressive chest and back pain as well as dyspnea. Antihypertensive treatment was established and CT scan revealed a type B AAD, distal to the left subclavian artery reaching the iliac artery bifurcation. Conservative treatment and delayed surgery were considered the optimal therapeutic approach. The patient was safely discharged and uneventful surgery was performed two months later.

Discussion: MS is the most frequent cause of aortic dissection during pregnancy. It is caused by a mutation in the fibrillin gene and has got a high variability in its phenotypic expression. Common features include a proximal aortic dilation, the most important risk factor for dissection. Absence of dilation does not exclude this complication, which tends to take place in third trimester and postpartum period due to the elevated cardiovascular demand. It is essential to perform an individual risk assessment which includes prepregnancy complete aortic imaging. Pregnancy is discouraged and aortic replacement advised if aortic diameters exceed 40-45mm. Follow-up includes periodic echocardiography and betablockers to delay aortic diameters increases.

Learning points: SSIIH is a very rare complication of preeclampsia that should be managed depending on hemodynamic stability and hematoma integrity. Special attention should be paid to the presence of thromboembolic events.

References:
treatment and the choice to use or not the prophylaxis is at the discretion of the caregivers, considering IVF level and bleeding tendency. Pregnancy doesn’t require any specific considerations.

References:

Learning points: The prophylaxis with NOVOSEVEN is effective and safe and should be always included in an obstetric protocol. It would be ideal to monitor coagulation with rotational thromboelastometry.

4486
Sometimes HELLP is not just a HELLP. A case report
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Background: HELLP syndrome is a multisystem disorder related with preeclampsia which remains an important cause of maternal and perinatal mortality and morbidity1. We present the management of a patient with HELLP syndrome admitted at our tertiary hospital for the delivery of a twin gestation.

Case Report: This 21-year-old primiparous patient was admitted to the hospital for preeclampsia at 36+4 week of gestation, with high blood pressure associated with epigastralgia, photosis and edema. Induction of labour was indicated and an epidural catheter was inserted for labour analgesia. Magnesium sulfate perfusion was initiated. The persistence of abdominal pain permitted to diagnose a placental abruption, and a category 1 caesarean section was performed: the foetus was delivered with good vitality signs. The patient presented uterine atony and required the intravenous administration of 10 IU oxytocin, 0.2 mg methylergonovine and 1 mg of intrarectal misoprostol. She needed a transfusion of 2 units of RBC, 1 gr fibrinogen and 1 gr tranexamic acid. She was transferred to the ICU. In the ICU, she developed a multorgan failure associated with acute oliguric renal failure which required renal replacement therapy for 10 days. Slight ventricular dysfunction was diagnosed and hemodynamic lability required a 24 hours infusion of Noradrenaline 0.05-0.1 mcg / kg / min. After haemodynamic stabilization, she developed a refractory hypotension to intravenous labelol and required the adjunction of intravenous Clevidipine that finally allowed therapeutic progression to oral route. A progressive anemia, associated with a decreased platelets count and prolonged renal failure made us suspect an atypical uremic hemolytic syndrome, which was confirmed by a decrease in C3. A total of 6 plasmapheresis sessions were performed with good response. Finally the patient was discharged 16 days after admission with recovery of renal and ventricular functions and was only treated with Enalapril 10 mg / 12 hours.

Discussion: HELLP syndrome can be confounded with other microangiopathic syndromes, and a careful differential diagnostic evaluation is required, especially when the disease has an unusual course2.

References:
2.Therapeutic Apheresis and Dialysis. 2019; 23(1).

Learning points: Preeclampsia is an obstetric disease that requires early treatment, especially when serious symptoms appear. Teamwork is essential to an optimal management.

4815
Eisenmenger’s syndrome with congenital heart defect in pregnancy
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Background: Pulmonary hypertension is a devastating and refractory disease. It is rarely reported in pregnant women, but it is associated with significant morbidity and mortality of both mother and baby. The maternal mortality rate during pregnancy or puerperium is 30-70%.[1]

Case Report: A 24-year-old pregnant woman, she is a known case of Eisenmenger’s complex at 36 weeks of gestation she presented to the emergency room with cyanosis, dypsnea,Spo2-75%on room air, BP=130/90mmHg & HR=90bpm. Her Echo showed a large VSD with right to left shunt, pulmonary hypertension, mild MR, moderate pericardial effusion and EF-54%. Hb-12.2g,PCV-40%. ABG on room air was pH=7.31, PaCO2=54mmHg, PaO2=60mmHg, and SaO2-76%. In the operation theatre, standard monitors, an arterial line and a central venous catheter were placed. Milrinone and phenylephrine were considered to avoid elevations in PVR and maintain SVR. After pre-oxygenation, SpO2 increased up to 90%. The pre-induction CVP was 11mmHg. Anaesthesia induced by slow injection of ketamine and Etomidate to limit hemodynamic changes, Lidocaine was considered with rapid sequence induction and cricoid pressure. Maintenance of anaesthesia with 0.5% sevoflurane and neuromuscular blockade was achieved with vecuronium. Post-operative patient was admitted to ICU for recovery and monitoring as there is high risk for sudden death. Epidural anaesthesia used for post-operative analgesia.

Discussion: The main anesthetic goals are to avoid a fall in the arterial blood pressure by maintaining both cardiac output and SVR, and to prevent elevations in PVR.2) Epidural anaesthesia must be used cautiously as it causes sympathetic blockage and reduce SVR without a concomitant decrease in PVR as the amount of right-to-left shunt depends in part on the PVR:SVR ratio.

References:

Learning points: Pregnancy must be discouraged in women with Eisenmenger’s syndrome, it could be successful. Safe anaesthetic management of these patients requires meticulous preparation. General anaesthetic can be used with maintenance of haemodynamic stability, low VT with low PEEP could be helpful, with adequate pain control and early initiation of thromboprophylaxis for successful management.

4831
Caesarean section in a parturient with concomitant V-Leiden thrombophilia and HELLP syndrome
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Background: V-Leiden thrombophilia, a common thrombotic disorder, characterized by poor antiocoagulant response to activated protein C, may lead to deep venous thrombosis or pregnancy loss. The preferred treatment during pregnancy is LMWH. On the contrary, HELLP syndrome is a pregnancy complication characterized by elevated liver function tests, haemolysis and thrombopenia. HELLP carries a high mortality rate, both for the parturient and the neonate.

Case Report: A 37 y G3P1 woman, at the 32nd w of gestation, was admitted for a category 3 caesarean section (CS) due to intraterine growth restriction. With 2 previous CSs, gestational diabetes and inherited V-Leiden thrombophilia, she was under LMWH & aspirin. HELLP was diagnosed by the end of pregnancy with a decreasing trend in platelet count (185-109 down to 77 106/L) and plasma fibrinogen below 2g L-1. Preoperative VHA with ROTEM® showed poor fibrinogen low clot firmness: A5FIBTEM=10mm, A5EXTEM=28mm, CTIFIBTEM=67sec, CTEXTEM=81sec, MCFIBTEM=12mm, MCFEXTEM=54mm. Fibrinogen concentrate, 3g, was given, resulting in relative better firmness, i.e.: A5FIBTEM=14mm, A5EXTEM=30mm, CTIFIBTEM=51sec, CTEXTEM=68sec, MCFIBTEM=17mm, MCFEXTEM=55mm. Just before surgical cut, 1 g fibrinogen concentrate was given resulting in: A5FIBTEM=13mm, A5EXTEM=36mm, CTIFIBTEM=51sec, CTEXTEM=30sec, MCFIBTEM=17mm, MCFEXTEM=62mm. Worsening thrombopenia excluded regional anaesthesia; general anaesthesia with invasive BP monitoring was performed with remifentanil at induction, labetalol and restricted fluids. The neonate’s Aggar scores was 7 and 7 and no acidosis in cord ABGx. The caesarean was completed with no blood or platelet transfusion. In the following days progressive amelioration of liver tests and platelet count was noted. Discussion: VHA individualized haemostatic approach contributed to safe coagulation disorder management of this case, keeping a delicate balance between thrombophilia and thrombopenia and avoiding unnecessary platelet transfusion and its relative dangers.

References:

Learning points: Apart from PPH, conflicting coagulation disorders may be well managed by VHA with ROTEM.
Anaesthetic management of a parturient with Hereditary Hemorrhagic Telangiectasia

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Background: Hereditary Hemorrhagic Telangiectasia (HHT), also known as Osler-Weber-Rendu Syndrome, is an autosomal dominant disorder with variable penetrance which is characterized by multiple arteriovenous malformations (AVMs) in skin, mucosal surfaces and internal organs. Pulmonary AVMs seem to increase during pregnancy, mostly during the 2nd and 3rd trimester. Pregnancy in patients with HHT is considered high risk since physiologic changes of gestation may cause significant disease progression and life-threatening complications.

Case Report: A 27-year-old pregnant woman with diagnosis of HHT presented for an anaesthetic consultation prior to delivery. She had positive family history for HHT, diagnosis confirmed by genetic screening and also evidence of pulmonary AVMs on previous computed tomography (CT) chest. A magnetic resonance imaging (MRI) of the brain and spine ruled out any possible cerebral AVMs. During pregnancy she presented with daily abundant epistaxis with haemoglobin dropping and iron infusions were required. After extensive multidisciplinary team discussion, it was decided that vaginal birth would be the most appropriate form of delivery. The parturient was offered an induction of labour and an epidural catheter was used for analgesia. Her delivery was unremarkable and forceps were used to avoid prolonged expulsive efforts. The epidural catheter was removed after delivery. Her post-partum period was uneventful.

Discussion: Pregnant woman with HHT should be appropriately counselled and a multidisciplinary approach is crucial. Morbidity and mortality are increased due to potential pulmonary AVM haemorrhage and strokes. Recommendations include prenatal screening of pulmonary and brain AVMs. Exclusion of spinal AVMs by MRI during pregnancy should be done to allow regional anaesthesia.


Learning points: Although there are few cases described in literature, prognosis is usually good. However, it is important keep in mind that severe complications such as haemorrhage and emboli, are possibilities. A multidisciplinary approach and anaesthetic consultation prior to delivery are essential to improve outcome. Both regional and general anaesthesia have significant risks associated and the decision to proceed with one or the other will depend on the patient's clinical status.

Subcapsular hepatic haematoma: The (not so) usual suspect

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Background: This subcapsular liver haematoma case report describes a complication of preeclampsia, an emergent obstetrical problem, associated with severe morbidity and mortality.

Case Report: A 41-year-old pregnant woman with a gestational age of 26 weeks and 6 days and history of hepatic haemangioma was admitted to study an intrauterine growth restriction. During hospitalization, due to the onset of hypertension and proteinuria, she was diagnosed with preeclampsia. On the 10th day of hospitalization, she reported severe epigastric and right shoulder pain, associated with nausea and vomiting. Heart rate was 120 bpm and blood pressure 156/89 mmHg. Laboratory results were normal, including platelet count and liver enzymes. Due to the development of severe preeclampsia, an emergent caesarean section was performed under general anaesthesia. After uterine closure, a hemoperitoneum was observed but the bleeding source was not identified. General Surgery team collaboration was requested and an extensive subcapsular hepatic haematoma was identified as the bleeding cause. Perihepatic packing was performed. During surgery, massive haemorrhage protocol was activated. Although the sustained haemodynamic stability, a blood loss of 2.5 litres was estimated. The patient was transferred to the Intensive Care Unit in the postoperative period. The premature newborn weighted 650 grams and had an APGAR score of 7, 9, 9 at the first, fifth and tenth minute. 24 hours after the procedure, a rise in liver enzymes AST 657 IUL, ALT 763 IUL, associated with a platelet count of 9400/mm3 and an elevated level of LDH (505 IUL) was documented. Two surgical interventions were performed for packing revision. The patient was discharged on the 36th day after caesarean section.

Discussion: Subcapsular liver haematoma is a rare complication of severe preeclampsia. The clinical symptoms and signs are nonspecific and may vary from epigastric, right upper quadrant abdominal or shoulder pain, to nausea, vomiting and abdominal distension. (1) It represents a life-threatening complication because it may result in hepatic rupture, as shown in this case.


Learning points: Physicians should be aware since a high level of suspicion and vigilance is key. Early diagnosis could decrease morbidity and mortality for both the mother and child.

Subcapsular hepatic haematoma: The (not so) usual suspect

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Subcapsular hepatic haematoma: The (not so) usual suspect

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Learning points: Physicians should be aware since a high level of suspicion and vigilance is key. Early diagnosis could decrease morbidity and mortality for both the mother and child.

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Eclampsia as the cause for post-operative agitation – an uncommon diagnosis

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Background: Eclampsia, a rare hypertensive disorder of pregnancy, is a medical emergency characterized by seizures in association with pre-eclampsia. A caesarean section under general anaesthesia (GA) must be performed to prevent maternal and fetal moribundity. We describe a case of an emergent caesarean section for eclampsia accompanied by post-operative alteration in mental status.

Case Report: 18 year-old, pregnant woman, G1P0, had her pregnancy monitored in a primary care unit with no reported pregnancy-related complications. At 38 weeks and 5 days of pregnancy she developed tonic-clonic generalized seizures. A new-onset grade 2 hypertension was noted and the diagnosis of eclampsia assumed and managed accordingly by the emergency team and the patient transported to our central hospital. An emergent caesarean section under GA was performed, with no complications. After extubation and emergence, the patient revealed severe psychomotor agitation. The more frequent diagnosis was excluded and given the sustained agitation, a cerebral computer tomography was performed revealing
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focal, hypodense, cortical-subcortical areas in the bilateral parietal and occipital cerebral areas. Based on the aforementioned clinical features and neuroradiological findings, the most probable cause for the change in mental status was posterior reversible encephalopathy syndrome (PRES). The woman was admitted in the intensive care unit for vigilance and discharged to the ward 2 days after.

Discussion: PRES is characterized by acute neurological symptoms accompanied by brain imaging features related to vasogenic cerebral oedema.1 The condition is usually reversible with a favourable prognosis.1 We describe a woman with sudden onset of seizures and hypertension. After caesarean section, the psychomotor agitation made the anaesthesiologist suspect of something else. A brain imaging exam was ordered, proving the final diagnosis of PRES in association with eclampsia, an association that may often be overlooked in our clinical practice.

References:

4330

Icterus in peripartum

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Background and Goal of Study: In peripartum, jaundice is a symptom rarely encountered, it can be dependent on several etiologies of different gravity. The rarity of this condition should not ignore the etiological diagnosis that remains essential and conditional to the quality of care and maternal and fetal prognosis.

Materials and Methods: Retrospective and descriptive work spread over a 3-year period from January 2016 to December 2018, including all patients admitted to the obstetric resuscitation unit who presented mucusal and intemature jaundice with hyper-bilirubinemia> 15 mg / l, hepatocellular insufficiency, a cytolysis syndrome at admission or after hospitalization* For all these patients, characteristics of pregnancy, medical and obstetric ATCDs, clinical signs of pre-icteric and icteric phases, clinical and biological course, termination of pregnancy, complications and treatment were noted. Established.

Results and Discussion: We collected during these three years 24 cases of severe jaundice occurred in peripartum, the mean age is 33 years (with extremes of 24 - 41 years), no patient had medical background of known liver diseases or taking hepatotoxic drug, the cause of jaundice in 4 patients was PE, help syndrome in 3 patients, viral hepatitis in 2 patients, cholestasis in 4 patients and SHAG in 11 patients.* 8 cases of in utero deaths are recorded in this series of which 5 during the delivery and 3 others during PE. * The complications were multiple represented by the haemorrhage of the delivery (18 cases), the digestive haemorrhage (10 cases) the visceral failures: IRA (22cas), hepatic encephalopathies (4cas), CIVD (11cas).

In this series, there are 5 maternal deaths (4 SHAG and 1 PE).Jaundice occurring in the third trimester may be related to accidental discovery of liver disease, chronic liver disease known before pregnancy, or pregnancy-specific liver disease. SHAG remains the only gravidic pathology responsible for hepatocellular insufficiency, its prognosis is dark especially if diagnosis and management are late.

Conclusion: In our series, 80% of deaths are due to SHAG. Before the 1980s, maternal mortality due to SHAG exceeded 80%; these figures are currently significantly improved by early diagnosis and resuscitation associated with early and adapted obstetric management.

4432

Peripartum anesthetic management in women with inflammatory bowel disease, a retrospective study

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Background and Goal of Study: Inflammatory bowel diseases (IBD) are a group of pathologies associated with an increased rate of cesarean sections and morbidity during the peripartum period. The objective of this retrospective study was to investigate the anesthetic management of the delivery of women with IBD.

Methods: The records of 107 patients with IBD, who delivered at our Center, were obtained for data which included anesthetic and obstetric management as well as neonatal outcome. Five subgroups were defined based on mode of delivery, presence or absence of epidural in normal vaginal delivery (NVD) and urgency of cesarean section, each of which was compared with control groups of healthy patients in the same period. Additionally, the rate of cesarean sections and the use of epidural analgesia for NVD were compared with the general obstetric population of our center in the same period.

Results and Discussion: The rates of cesarean sections and emergency cesarean sections were significantly higher than in the general population. However, the rate of instrumental delivery and the use of epidural analgesia for NVD were similar. Among those who underwent cesarean sections, no significant differences were found in the type of anesthesia, the duration of surgery, the number of complications, the type of monitoring or postoperative management with respect to the control group.

Conclusion: The peripartum anesthetic management of patients with IBD does not differ greatly from that of patients without this pathology. Anesthesiists can plan their anesthesia in a similar way as they do in healthy obstetric patients.

4577

Cardiorespiratory arrest in pregnant women: a case report

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Background: Cardiopulmonary arrest (CPA) in pregnant women is a rare and challenging event that requires a complex and multidisciplinary approach to both the pregnant and the fetus. The causes are numerous: anesthetic, hemorrhagic, respiratory, cardiovascular, embolic, infectious or hypertensive. Early recognition and intervention with resuscitation maneuvers is imperative. Although the advanced life support (ALS) algorithm of the pregnant woman is similar to that of the adult, there are specific characteristics associated with pregnancy’s physiological changes. If performed in time, emergent cesarean in the context of maternal CPA is the main intervention to increase maternal and fetal survival.

Case report: 28-year-old pregnant woman, 40-weeks primiparous, smoker, with no previous history and no usual medication, except for pre-pregnancy oral contraceptive. The labour was pharmacologic induced. During induction she experienced general malaise, nausea and abdominal discomfort and posterior evolution to CPA. ALS was promptly started and an emergent cesarean was performed. Spontaneous circulatory return was achieved after 3 cycles. The newborn had an aggar score of 2 but recovered quickly. The case was complicated with uterine atony, hemorrhagic shock and consumptive coagulopathy, and an emerging hysterecctomy was required. In the postoperative period she was admitted to the Intensive Care Unit (ICU), and several exams were performed. Transthoracic echocardiography revealed a right intra-atrial thrombus with extension to inferior vena cava and in the angio-TC scan, an extensive venous thromboembolism was found. During the follow-up, the CT brain scan and MRI showed signs of cerebral edema and anoxic encephalopathy. During 42 days in ICU, GCS improved from 3 to a maximum of 10. After 93 days she was discharged to a Continuing Care Unit, maintaining the neurological status. The newborn was discharged, healthy.

Discussion: Despite being a rare situation, all the participants in the obstetric approach should be prepared to act on CPA, especially given the actual increase in number of risk pregnancies. The need for early detection and timely establishment of ALS maneuvers in pregnant women are vital to improve morbidity and mortality.

References:

Learning points: Vigilance of high-risk pregnancies, early detection and timely establishment of ALS maneuvers are the main factors for the success of these cases.
Learning points: Despite being a rare disease, PPCM must be suspected during pregnancy or postpartum in patients with risk factors presenting with haemodynamic instability or heart failure symptoms. Ultrasound, a non-invasive and accessible tool, has become extremely valuable in critical settings.

4655

General anesthesia for elective cesarean section in a woman with type IV Ehlers-Danlos syndrome - case report

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Introduction: Vascular Ehlers-Danlos syndrome (EDS), type IV (5-10%) of EDS) distinguishes because of its risk of medium/large caliber arterial rupture, pregnancy exacerbation risks and makes SED IV a contraindication to pregnancy. Regarding anesthesia, airway hemorrhage, pneumothorax, and epidual hematoma are among complications. Despite the complexity, the scarcity of case reports in obstetrics translates into the absence of standard anesthetic practices in SED IV.

Case report: 22 years primigravida, with previous diagnosis of Vascular SED, proposed for elective caesarean section at 35 weeks. No other relevant pathology. Asymptomatic, under bisoprolol, echocardiography without changes. Family history of sudden death from aortic rupture. After discussion with the surgical team and the patient, general anesthesia was performed: Lidocaine 1.5mg/kg; Propofol 2mg/kg; Succinylcholine 1.5mg/kg. Monitoring; standard and anesthetic depth (BIS). Deciding not to immediately insert arterial and central venous catheter, being the equipment for its placement properly prepared. Maintenance: propofol; after fetus extraction: sevoflurane, rocuronium and fentanyl. Reversal of neuromuscular block: Succinylcholine 2mg/kg. Postoperative anagelasia: Paracetamol 1g, Tramadol 100mg and Morphine 6mg; antiepileptic prophylaxis: 4mg dexamethasone and Ondasetron. Duration of the procedure: 40 minutes no complications reported. At the end, the patient was transferred to the intermediate care unit where she remained 24h. The mother and newborn were discharged from the Obstetrics ward on the 4th day.

Discussion: In SED IV, standard obstetric neuroaxis anesthesia carries a significant risk of epidural hematoma and hemodynamic instability in case of hemorrhage, making the choice of anesthetic technique complex. Vascular fragility limits the degree of monitoring invasiveness and requires a careful airway management plan.


Learning points: The decision between regional and general anesthesia must be weighted on an individual basis.

5015

Systemic lupus erythematosus, kidney transplant rejection with end stage renal failure, intensive dialysis and c-section. Case Report and Anesthetic considerations

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Background: Successful pregnancy in a patient with lupus nephritis (LN) and on dialysis is an uncommon event. Renal transplant in patients with systemic lupus erythematosus (SLE) do not fare as well as patients with other causes of end-stage renal disease. Intensified hemodialysis (HD) offers improved maternal and neonatal outcomes. Pregnancy should be carefully planned in renal transplant recipients to reduce risk for graft loss, optimize pregnancy outcomes, and ensure immunosuppression regimes are nonteratogenic. SLE flare during pregnancy predicts adverse fetal outcomes. Pregnancy should be delayed until the disease has been in remission for 6 months.

Case Report: We present a case of a 32 years old woman at 36+1 weeks gestation, primigráve, ASA IV, scheduled for a c-section. She had a renal transplant in 2011 due to end stage lupus nephritis and she was on intensive dialysis (6 times per week, 4
hours sessions) because of transplant rejection with acute and chronic renal failure. She was receiving prednisone, hydroxychloroquine, labetalol, acetylsalicylic acid (suspended before surgery). She had a dialysis session without heparinization the day before surgery. Spinal anesthesia with 26 g pencil point needle was performed at L3-L4 with hyperbaric bupivacaine (10 mg) and fentanyl (20 mcg). Thereafter, if target controlled infusion was used to prevent hypotension. A healthy baby was born, Apgar 8/9. Dialysis sessions were resumed on first day postoperatively, along with hydrocortisone stress dosis (50 mg).

Discussion: Regional anesthesia may be preferred in the first place for pregnant women with renal transplantation, unless there is any contraindication. SLE pregnant patients are considered to be high risk and coordinated care with effective communication between anaesthesiologist, nephrologists, obstetricians, haematologists, rheumatologists and clinicians is mandatory.

References:

Learning points: Better outcomes are expected if pregnancy is delayed until a 6 month remission period. Intensified hemodialysis offers improved maternal and neonatal outcomes. Regional anesthesia may be preferred in the first place for pregnant women with renal transplantation.

6006

Rare case of supraventricular tachycardia post administration of sublingual misoprostol in the management of postpartum haemorrhage

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Background: Postpartum haemorrhage is the leading cause of mortality in childbirth (1). Misoprostol can be used in its treatment (1). Misoprostol has adverse effects, which are dose dependent (1). Very little is known about the relation between supraventricular tachycardia (SVT) and misoprostol, with little effect (170bpm). The heart rate was controlled (100bpm) with labetalol (50 mg). The patient was transferred to a level II unit for a day. She was discharged 3 days after delivery.

Discussion: Misoprostol is an alternative for managing postpartum haemorrhage, despite concerns about its side effects profile (1). The most common are shivering and fever, which increase following sublingual administration (1). In this case, we increased the dose of misoprostol to assess its safety. We hypothesise that the SVT may also be a side effect. SVT is one of the commonest causes of hypotension (75/50mmHg). She was treated with oxytocin infusion, bolus of crystalloids and ephedrine and sublingual misoprostol (800mg), with blood loss and hemodynamic control. A few minutes later, the patient was pyretic (40ºC) and tachycardic (HR 200 bpm). 1gr paracetamol was administered with no response. The temperature dropped by 2ºC after 2 gr metamizole. A 12 lead ECG revealed a ventricular tachycardia (HR 200 bpm). The patient was anticoagulated with unfractioned heparin and transferred to the ICU. In the following days she progressively recovered her pulmonary and ventricular function, with normalization of biomarkers (cardiac troponin, NT-ProBNP). A caesarean section (CS) was scheduled for the 36 gestational week.

Learning points: Dyspnea may mask severe cardiac and pulmonary diseases; hence, accurate differential diagnosis is mandatory. PE in pregnancy is a life-threatening condition. As long as the patient is hemodynamically stable, anticoagulation is the therapeutic milestone. A multidisciplinary birth plan should be discussed, according to the mother’s and fetus’ clinical condition.

References:

5979

Factor V deficiency and pregnancy

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Background: Factor V (FV) is a rare but challenging bleeding disorder. We report a multidisciplinary management of delivery of a parturient presenting a FV deficiency. Case Report: A 26-year-old woman was diagnosed with constitutional FV deficiency during pregnancy and being able to establish a correct diagnosis is crucial for an adequate treatment and therefore to avoid maternal and fetal morbidity.

Learning points: With this clinical case we intend to warn anaesthesiologists on the risk of SVT’s with the use of misoprostol and advise on the measures to take in such occurrences, for, if untreated or poorly so, they are life-threatening.
Audit of Remifentanil Patient Controlled Analgesia (PCA) for Labour analgesia

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Background and Goal of Study: Remifentanil is an ultra-short acting opioid. The role of remifentanil in labour analgesia as an alternative, but not equivalent, to epidural analgesia is well documented albeit controversial. The main concern with remifentanil use is risk of apnoea, and significant adverse maternal outcomes reported in the literature pertains to unsupervised or inappropriate use. This audit is to compare how the electronic system (MN-CMS) improved remifentanil documentation for the Anaesthesiologist which includes the indication. The results of this analysis serve to further improve the quality of epidural anaesthesia in our hospital, with particular reference to maternal satisfaction. The level of overall satisfaction of our patients with the EA and CSE process was very high.

References:

Learning points: Women with FV deficiency are at increased risk of post partum hemorrhage. Prophylactic FFP should be administered prior and post delivery to ensure adequate hemostasis. Thromboelastometry can improve management of this condition.

Audit of Remifentanil Patient Controlled Analgesia (PCA) for Labour analgesia

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Background and Goal of Study: The combined spinal-epidural (CSE) technique is an established method for providing labour analgesia with advantages over standard epidural analgesia (EA) such as speed of onset and better sacral analgesia. Goal of study is comparation of maternal satisfaction and complication between CSE and EA.

Materials and Methods: We conducted retrospective survey on parturients at or beyond 35 weeks gestation, who received EA (between May and November 2018) or CSE (between May and November 2019) during labor at Clinic for Gynecology and Obstetrics UCC of the Republic of Srpska.

Results and Discussion: The EA group included 100 parturients and CSE included 92 patients. 57% were nulliparous in EA group and 60% in CSE group. Fear of epidural analgesia before procedure had 24% in EA and 25.6% in CSE group, pronounced motor block had 2% in EA and 2% in CSE, unilateral block or CSE (between May and November 2019) during labor at Clinic for Gynecology and Obstetrics UCC of the Republic of Srpska.

Results and Discussion: Between the beginning of January and the end of December 2018, 32 patients availed of this service, compared to 26 patients in 2016. Adverse outcomes/side effects: Maternal: Five (15.6 %) patients experienced nausea and vomiting during remifentanil PCA use and received anti-emetics, in comparison with only (12.5%) in 2016. No patient had a respiratory rate less than 10 / min. No patients had oxygen saturation recorded ≤ 93% or received naloxone.

Conclusions: Further education on prescribing practice and documentation by Anaesthesiologist and Midwifery staff is required. Initiate a care plan on MN-CMS for remifentanil documentation for the Anaesthesiologist which includes the indication. Entonox and Oxygen should be prescribed as any other drug given to the patient. A coloured illuminated card attached to all remifentanil PCA pumps with all safety measures to be followed by Midwifery staff. Upgrade Spo2 monitors in the labour ward and to be integrated into the electronic system.

Epidural analgesia versus combined spinal-epidural analgesia in labor - maternal satisfaction and complications - retrospective analysis

6157

Patient controlled analgesia in labour using remifentanil in trombocytopenic pregnant

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Background: The prevalence of thrombocytopenia during pregnancy is around 10%, in which less than 1% has a platelet count below 100000 μL−1. Immune thrombocytopenia (ITP) represents the most common cause of thrombocytopenia during the first trimester of pregnancy. Although ITP does not affect fetal growth, it must be taken into account for the potential risk of thrombocytopenia (<50000 μL−1) that affects 15 % of the cases.

Case report: A 34-year-old woman, at 36 weeks of gestation, affected by ITP was admitted for labour induction. She had a personal history of Systemic Lupus Erythematosus and corticosteroid-resistant ITP. Her platelet count was monitored during her pregnancy. The day expected to give birth platelet count had increased from 25000 to 50000 μL−1 after being treated with IV globulin (1g/ kg), for two days. We considered epidural analgesia unsafe in this particular case, and after considering its benefits and risks, we offered her remifentanil IV using a Patient Controlled Analgesia device. We programmed the pump, following our protocol, to deliver a bolus dose of 0.2 mcg/kg with a lockout time of 2 min. Blood pressure, pulsioxymeter and capnography were monitored. Patient expressed optimal analgesia without negative side effects. Apgar score was 10.

Discussion: Epidural analgesia is a safe and effective technique for labour but there are risks that need to be managed. Remifentanil is a short-acting opioid with appropriate properties: to be metabolized by non-specific esterases to an inactive form and to be quickly eliminated from the blood plasma in such a way that accumulation does not occur. It should be noted that remifentanil is a plausible alternative for labour analgesia in patients with thrombocytopenia, in whom neuroaxial analgesia might be inappropriate.


Learning points: Trombocytopenia is considered a relative contraindication to neuraxial anaesthesia, being still under debate the optimum platelet count at which it can be practiced in a safe way. Remifentanil supposes an adequate and safe analgesic technique when neuraxial anaesthesia is contraindicated. More studies in pregnant women with thrombocytopenia are needed.

observations by midwifery staff during remifentanil PCA use in labour. 3) Review anaesthesia prescribing practice. Data regarding compliance with practice and recording of maternal/fetal outcomes was sourced from MN-CMS. Example of indications for remifentanil PCA in this period : Failed epidural, thrombocytopenia, bleeding disorders, clotting factors deficiency, sepsis and brain tumour.


Epidural analgesia versus combined spinal-epidural analgesia in labor - maternal satisfaction and complications - retrospective analysis

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Epidural analgesia versus combined spinal-epidural analgesia in labor - maternal satisfaction and complications - retrospective analysis

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Background and Goal of Study: The combined spinal-epidural (CSE) technique is an established method for providing labour analgesia with advantages over standard epidural analgesia (EA) such as speed of onset and better sacral analgesia. Goal of study is comparation of maternal satisfaction and complication between CSE and EA.

Materials and Methods: We conducted retrospective survey on parturients at or beyond 35 weeks gestation, who received EA (between May and November 2018) or CSE (between May and November 2019) during labor at Clinic for Gynecology and Obstetrics UCC of the Republic of Srpska.

Results and Discussion: The EA group included 100 parturients and CSE included 92 patients. 57% were nulliparous in EA group and 60% in CSE group. Fear of epidural analgesia before procedure had 24% in EA and 25.6% in CSE group. Frequency of itching during and after delivery were 11% in EA and 28.42% in CSE group. Nausea and vomiting were 4% in EA and 10% in CSE group. 2% in EA group parturients experienced breakthrough pain the duration of labor and 1% in CSE group, pronounced motor block had 2% in EA and 2% in CSE, unilateral block 4% in EA and 1% in CSE group. 4% had urinary retention requiring catheterization of the bladder in both groups. 5% experienced a headache in both groups. 83% in EA group and 93,5% in CSE group of mothers did not feel any symptoms after delivery. Total satisfaction with EA was in 97% of patients in EA group and in 98,92% in CSE group.

Conclusion: The results of this analysis serve to further improve the quality of epidural anaesthesia in our hospital, with particular reference to maternal satisfaction. The level of overall satisfaction of our patients with the EA and CSE process was very high.

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Audit of Remifentanil Patient Controlled Analgesia (PCA) for Labour analgesia
Finding the middle ground: Food in labor practices & perceptions in the labor & delivery unit of Tel-Aviv Medical Center

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Background and Goal of Study: Improvements in labor analgesia and airway management have created conflict regarding restrictive fasting policies during labor. The ACOG/ASA/ISA discourage oral intake, however the WHO recommends “non-interference". As a result, liberal food policies have become widespread. Our goal was to assess practices and opinions in our labor and delivery unit (L&D) regarding oral intake during labor.

Materials and Methods: Following IRB approval in our 13,000 annual delivery L&D, an anonymous survey on practices and opinions regarding oral intake during labor was sent to anesthesiologists, midwives and gynecologists at our tertiary medical institution.

Results and Discussion: 77 respondents - 34 anesthesiologists, 32 midwives, 11 gynecologists. 68% correctly stated there are no institutional guidelines for oral intake. 99% and 95% respectively, reported that women at low risk for cesarean delivery (CD) may eat before and after epidural analgesia, and 62% and 65% respectively agreed with this practice. 50% stated that women at high risk for CD are allowed food, 10% and 15% (all midwives) agreed with this practice, before and after epidural analgesia, respectively. 66% allow light food, 12% impose no restrictions, 13% water only. Reasons to discourage eating include bleeding (65%), complicated obstetric history (61%), pre-eclampsia (57%), dystocia (49%), twins (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% of midwives named aspiration as the primary risk associated with oral intake; 9% believed there were no such risks.

Conclusion: Use of epidural analgesia did not significantly change staff opinions on food in labor. Despite restrictive Israeli national guidelines, women at high risk for CD or aspiration are not uniformly advised to avoid food. Guidelines regarding oral intake for low and high risk laboring women are required. Permissive eating practices identified in our survey should be addressed in order to find the middle ground between restrictive and permissive policies, and minimize aspiration risk for high risk women.
Local anesthetic systemic toxicity in a pregnant woman: case report

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Background: Pregnancy is a clinical setting in which local anesthetic systemic toxicity (LAST) is inclined to occur. It can be reversed by using 20% intravenous lipid emulsion (ILE) therapy. Limited case reports have been published on the treatment of LAST during pregnancy using ILE 1; safety in this setting is still questioned.

Case Report: A 26-weeks pregnant woman presented for fetal thoracentesis under infiltration anesthesia. Anesthetic team was called for help after the patient developed shortness of breath and dizziness. She presented slurred speech, which evolved into loss of consciousness. Respiratory arrest followed. Considering the total dose of lidocaine administered (lidocaine 2% without epinephrine, 40ml, 800mg), a diagnosis of LAST was suspected. 100 ml of ILE were administered. While preparing for orotracheal intubation the patient developed a tonic-clonic seizure which stopped administering propofol and midazolam. An infusion of ILE was continued in the ICU. After the toxicity event, uterine contractions saturated and a cesarean delivery was decided. After that, the patient was woken up with ade integrum sensorium restitution.

Discussion: As safety of ILE therapy in pregnancy is still questioned and randomised controlled trials are not feasible, we consider that it is important to report all cases in which ILE therapy is used in gravid women. Although performing a fetoscopy increases the risk of preterm delivery 2, it cannot be ruled out that ILE therapy contributes to appearance of uterine dynamics. It may also be of interest to investigate if ILE therapy dosing should be the same during pregnancy than other LAST settings.

References:

Learning points: We highlight early detection and treatment of LAST with ILE therapy. Neurological signs and symptoms have to be assumed as prodromal and cardiovascular collapse should be expected and avoided. We also highlight the decision for advanced airway management in an early stage, since respiratory acidosis favors the development of cerebral edema and maintains ionized form of local anesthetics in the bloodstream, perpetuating neurological disorders.

5855

PCA remifentanil – alternative and effective option for labour analgesia

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Background and Goal of Study: The neuraxial techniques currently represent the most effective methods for pain control during labour and epidural analgesia is considered the gold standard during delivery with minimal side effects for mother and neonate. PCA (patient-controlled analgesia) remifentanil represent a good and effective alternative to pethidine or morphine for women who cannot receive or refuse epidural. The protocol used in our hospital for PCA Remifentanil is: dedicated intravenous line /giving set/pump, concentration of Remifentanil 32 mcg/ml (parturient weight < 60 kg) 40 mcg/ml (parturient weight > 60 kg), 3 minutes lockout period, continuous monitor vitals. Our aim was to find if PCA remifentanil is a safe and effective option for pain relief during labour.

Materials and Methods: A local retrospective study. We used data from patients who used PCA Remifentanil for labour pain on a proforma sheet from January 2016 to January 2020, after approval from the local committee.

Results and Discussion: A total of twenty-two parturients, who received PCA Remifentanil for labour analgesia during one year. The most common causes were infectious (41%), neurologic causes [disc damage, spina bifida occulta, maternal multiple sclerosis, intracranial HTN] followed by failed epidural and contraindication for epidural or patient refusal . There was no cardiovascular instability or respiratory depression noted during the use of PCA Remifentanil.The average maternal sedation and pain score was 1.27/5 and 1.54/5, respectively. Neonatal Apgar scores were recorded at 1 and 5 minutes, and the Apgar score was 9 at 1 minute and 9.95 at 5 minutes.

Conclusion: PCA Remifentanil represent a safe and effective alternative for labour analgesia with minimal maternal and neonatal side effects.

References:
**Case Report: Battery swallowed induced tracheoesophageal fistula in a pediatric patient**

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**Abstract:** Tracheoesophageal fistula (TEF) is an abnormal connection that presents as congenital or acquired. We discuss the diagnosis and management of a button-battery induced TEF in a pediatric patient.

**Introduction:** Button-battery ingestion forms an electrical circuit that eventually perforates the esophagus forming a TEF. Gas/reflux via the respiratory and GI tracts via the TEF require emergent surgical repair.

**Case Report:** A 13-month-old patient (8.5 kg) post-placement of a button-battery presented for surgical repair of a TEF (50% C6-T1 erosion) (Figure). NPO, IV antibiotics, CXR, CT angiography and chest MRI were ordered. The patient was intubated upon arrival to the OR. TIVA included propofol, remifentanil, and rocuronium. The neck was exposed surgically and a tracheostomy was performed. Local tissue flaps were used to close the tracheal and esophageal fenestras, and the wound was closed. The patient convalesced uneventfully thereafter.

**Discussion:** Button-battery induced TEF has recently surfaced in pediatric patients requiring emergent surgical repair. In the acute setting, protective pH neutralization with honey, sucralfate and acetic acid limits esophageal injuries. Timely battery removal is essential as damage severity directly correlates to lodgment duration. Anesthetic risks include: ETT placement (size, position), RSI, aspiration, airway control/obstruction, bleeding, prolonged tracheal intubation and PPV. Conservative management includes endoluminal tracheal or esophageal stents. After DL-B, surgical management may involve single-stage TEF repair with cervical esophagectomy and/or gastrostomy with vascularized local tissue flaps.

**Conclusion:** In conclusion, we present a button battery-induced TEF that required emergent anesthesia for battery removal, tracheostomy, abscess drainage and TEF repair. We emphasize on essential communication between the ENT surgeon and anesthesiologist for the care of these critical patients.

**References:**
Separation of conjoined twins: the role and challenges of anesthesiology team

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Background: Conjoined twins is rare (1:80,000 live births) and more frequent in females (3:1). Thoracopagus is the commonest (19%) and carries higher mortality. Almost always there is some degree of liver fusion and other malformations.

Case Report: A 22-year-old woman with triplet pregnancy; twin T (T1) and twin 2 (T2) thoracopagus, monoamniotic-monochorionic, were born at 32 weeks after premature aminorrhoea. T1-T2 weighed 3600g and required CPAP. Imaging showed fusion of costal cartilages and liver. T3 got home after 22 days in intensive care unit (ICU). After 4 months, definitive separation surgery was done. The operating room was organized to accommodate 2 teams working in parallel, each with 3 anesthesiologists. A simulation had been performed few weeks before the surgery. Inhalation induction with sevoflurano was done, T1 first, then T2. They were slightly lateralized to obtain better position for orotracheal intubation (OI). Anesthesia was complemented with fentanyl, midazolam and cisatracurium. Central venous catheter and radial artery puncture was assured. It was necessary to start norepinephrine during positioning. The anesthetic procedure lasted for 6 hours and volume replacement was achieved with plasmalyte. T1 needed red blood cells transfusion, also. The critical surgical times were: sternotomy, hepatotomy (using the argon plasma scalpel to ensure minimal bleeding), sternorraphy and wall closure. The closure of T2’s wall was more difficult, resulting in ventilatory difficulty. They remained intubated for 2 weeks in the ICU. In the postoperative period, both had dehiscence of the surgical wound and severe gastroesophageal reflux (GER). Hospital discharge was obtained 4 months after surgery, and they are under outpatient follow-up.

Learning points: Intraoperative PTH allows patients stratification according to their risk of hypocalcemia. High and medium patients receive intravenous an oral calcitriol and oral calcium. High oral calcium doses are given (up to 150 mg/kg/day). If hypocalcemia, calcium levels should be measured 72 h after discharge.

Learning points: Our patient hypocalcemia was early identified by intraoperative PTH measurements. Correct identification of the patient at risk was not accurate enough to prevent hypocalcemia. It is necessary to study the preoperative levels of vitamin D, to implement a hypocalcemia prevention protocol while in hospital, and to treat - with both vitamin D and high doses of calcium - patients at risk after discharge.

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Intranasal Phenylephrine in the Operating Room - How Many Drops Are Too Much?

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Background: ENT (Ear, Nose and Throat) surgeries commonly use topical vasoconstrictors (TV) to control bleeding in nose, throat or ear. These drugs are used in a variety of concentrations, and the total dose of administered drug often is unmeasured and not documented on the medical record. This case describes an anesthetic complication and its management after topical phenylephrine use in a bilateral turbinectomy surgery.

Case Report: A 13 years old boy, ASA I, was proposed for bilateral turbinectomy. The airway was secured with orotracheal tube and anesthesia was maintained with sevoflurane. Surgery was performed without complications. In the end of the procedure surgeons packed both nostrils with cotton balls soaked in phenylephrine 2.5% and normal saline fluid. 5 minutes later, cardiac frequency decreased for 44 bpm, with a BP of 119/68 mmHg (mean 88 mmHg). Atropine 0.5mg was given, resulting in an increase of the CF to 138 bpm and of BP to 220/150 mmHg. At this time, we started vagal manoeuvres and labetalol 2.5mg was administered with persistence of tachycardia and high blood pressures. Hemodynamic changes only reverted after nasal packing removing with CF and BP returning to normal ranges. Patient was extubated and was discharged the day after surgery.

Discussion: It is important for all anesthesiologists to be aware of the clinical problems associated with TV. There are some reported cases of severe hypertension with reflex bradycardia, acute pulmonary edema, cardiac arrest and death after topical use of phenylephrine. Phenylephrine overdose preferentially distributes blood to the pulmonary vascular beds. The natural protection of the pulmonary vascular overload is to maintain cardiac output. Since β 1 receptor blockades reduces cardiac output, treatment of phenylephrine-induced hypertensive crisis with β-adrenergic blocking is contraindicated. Despite the potential problems caused by use of TV, neither surgeons nor anesthesiologists know the exact quantity of drug administered in each procedure. There are some studies that suggest safe initial doses for children and adults - 20 µg/kg and 0.5µg/ml, respectively. The total dose of phenylephrine was unmeasured and not documented on the medical record. This case describes an anesthetic complication and its management after topical phenylephrine use in a bilateral turbinectomy surgery.

4822

Update in a multidisciplinary protocol of thyroidecrtomy after severe hypocalcemia in a child

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Background: Children have a higher incidence of post-thyroidectomy complications compared to adults. Postoperative hypocalcemia represents one of the major challenges. The Anesthesiology and Endocrinology Services of our institution designed together a protocol for pediatric thyroidectomy. This study has to goals: firstly, presenting a patient who developed severe hypocalcemia despite the good preoperative evaluation and the anticipation of possible difficulties to be faced increased the safety of the multidisciplinary teamwork.

5114

2y old girl with bidirectional Glenn procedure for transposition of great arteries suffers ileus and pneumoperitonem

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Background: TGA is rare, but life-threatening congenital malformation lath needs urgent surgical treatment. Bidirectional Glenn procedure connects superior vena cava and pulmonary artery providing temporary improvement of cardiac function. Nevertheless, chronic hypoxemia leads to tissue suffering, organ dysfunction, including state of ieuus and gastrointestinal malfunction.

Case Report: 2y old girl with situs inversus and TGA, undergone BDGP at the age of 4m, was presented to the clinic with ileus and pneumoperitonem- somnolent, reduced tonus and reactivity, capillary refill >5s, T (rectal) 35C, peripheral vasospasmos, acrocyanosis, tachypnea 50/min, SaO2 83%, tachycardia 220/min, BP 51/28mm Hg, extremely balloonied abdomen, miserere, melena. She was immediately intubated, a CVL was inserted in v. jug. int., rehydrated, put on catecholamine support: Dobutamine 15mcg/kg/min, Dopamine 15mcg/min.
Norendrenaline 0.5mcg/kg/min. Urgent surgery was held: Laparotomy- peritonitis totalis (chemical), perforato ventriculi (10cm), epiploitis gangrenosa; Revisio. Sutura. Omontectomia. All intestines were livid, pnummatic, with reduces pulsation of mesenteric vessels. Extremely severe postoperative period with high oxygen demand and catecholamine needs, unstable hemodynamics, tachycardia, arterial hypotension, tachypnea, oligo-anuria, hemorrhagic syndrome despite medications. 24h after surgery, exitus letalis was registered.

Discussion: Congenital heart diseases may cause severe chronic hypoxemia and hypoxia, damaging various tissues and organs. It may lead to gastrointestinal malfunction, intestinal congestion, thinning of organs’ walls, resulting in spontaneous perforation or rupture.

References:

Learning points:

5340
Immediate resuscitation & management of anaesthesia for the newborn with laryngotracheoesophageal cleft associated with laryngeal web

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Background: A laryngo-tracheo-esophageal cleft (LEC) is a congenital malformation characterized by an abnormal, posterior, sagittal communication between the larynx and the pharynx, possibly extending downward between the trachea and the esophagus. We report the case of a Laryngotracheoesophageal cleft in a preterm newborn associated with laryngeal web.

Case Report: Newborn presented with respiratory distress immediately after birth. In attempt to intubate, found to have type-IV congenital laryngeal web. Initially emergency tracheostomy was done with LMA under sevoflurane and local infiltrate and later diagnosis of laryngo-tracheo-esophageal cleft type IV was made via oesophagossopy. As saturation was not maintained even after tracheostomy intu laryngo-tracheo-esophageal cleft repair was done. The patient’s family reviewed the case report and gave written permission for the authors to present / publish the report.

Discussion: Though, a not so common finding, this shows the importance of thorough clinical examination of newborns, especially preterm, keeping in mind congenital abnormalities. Early diagnosis and proper repair of laryngeal cleft are essential to prevent pulmonary damage and associated morbidity. Child should be assessed properly, and the surgical approach should be individualized based on the symptoms, other associated findings on airway endoscopy, and type of cleft.

References:

Learning points: Good Clinical Examination. Use of Supraglottic airway device. Opioid free regional anesthesia.

5505
Management of a patient with Ullrich syndrome: a case report

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Background: Ullrich syndrome (US) is a rare congenital hypotonic-sclerotic miidistrophy in which affected children develop progressive scoliosis, disabling contractures of the neck and trunk muscles, and joint limps. Affection of respiratory muscles is frequent and ventilatory support may be required intermittently or permanently. Recurrent pulmonary infections can complicate the clinical course. Typical facial stigmata, micrognathia and a high arched palate can lead to a difficult airway scenario. Altogether, US patients are usually a challenge for the anesthesiologist.

Case Report: We present the case of a 17-year-old female US patient, ASA IV, with acute febrile neutropenia related to chemotherapy for Hodgkin lymphoma, scoliosis, respiratory failure requiring BIPAP therapy during sleep and when laid down, severe malnutrition and wheelchair dependency for locomotion; that was proposed for a scoliosis surgery.

Anesthetic management and ventilation can be challenging. Proper planning is necessary, and care should be taken to not expose the patient to hypothermia, hypoxia, damaging various tissues and organs. It may lead to gastrointestinal malfunction, intestinal congestion, thinning of organs’ walls, resulting in spontaneous perforation or rupture.

管理和一个乌尔里希综合征的病人：一个病例报告

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背景：乌尔里希综合症（US）是一种罕见的先天性低张力-硬化性肌营养不良症，其中受影响的儿童会发展出进行性脊柱侧弯，颈部和躯干肌肉的挛缩，以及关节僵硬。呼吸肌肉的受累是常见的，可能需要间歇性或永久性通气支持。反复的肺部感染可能使临床过程复杂化。典型的面部特征，微小的下颌和高拱的上颚可能导致困难的气道场景。总的来说，US患者通常是挑战性的。

病例报告：我们报告了一个17岁的女US患者，ASA IV，急性发热性中性粒细胞减少症与化疗后的霍奇金淋巴瘤，脊柱侧弯，呼吸道衰竭需要BIPAP治疗在睡觉和躺下时，严重营养不良和轮椅依赖性。

麻醉管理和通气可能会有问题。需要做好充分的规划，以避免体温过低、低氧，造成各种组织和器官的损伤。
Airway management (laryngeal mask airway vs. endotracheal intubation) may influence the need of postoperative respiratory support for laser coagulation treatment of retinopathy of prematurity

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Background and Goal of Study: Laser coagulation for retinopathy of prematurity (ROP) is performed on premontiure premature babies, where anesthesia with endotracheal intubation (ETI) may result in prolonged postoperative mechanical ventilation (MV). We studied if airway management with laryngeal mask airway (LAM) vs. use of ETI may influence the need of postoperative respiratory support. Material and Methods: In this retrospective audit data from 128 consecutive patient were reviewed who underwent ROP laser coagulation between 07.2014 and 12.2017. After anesthesia induction with sevoflurane inhalation airway management was performed with either LMA or ETI at the discretion of the anesthesiologist. Following laser coagulation patient were observed at perinatal intensive care unit and received respiratory support (supplemental O2, non-invasive respiratory support with CPAP/BiPAP/HFNC or ETI and MV) as needed at the discretion of the neonatologist. Data are presented as mean±SD and t-test or chi square test were used as indicated. *p<0,05 was regarded as significant.

Results and Discussion: Airway management was performed with ETI (ETI group) in 44, and LMA (LMA group) in 84 cases, respectively: Gestation age (ETI 25.9±1.8 weeks; p=0.02), birth weight (ETI 875±301 g; p=0.11) and duration of previous MV (ETI 20±17 days; LMA 15±14 days; p=0.08) were comparable. Patients needed intubation were significantly younger (ETI 34.5±1.9 weeks; ETI 37.0±3.2 weeks; p=0.01) and had lower body weight (ETI 1687±432 g; LMA 2231±638 g; p=0.01) at the time of intervention. In case of endotracheal intubation duration of anesthesia (ETI 147±45 min; LMA 102±37 min; p=0.01) and surgery (ETI 100±40 min; LMA 67±29 min: p=0.01) were longer. Use of LMA was associated with significantly less frequent (LMA 30%; ETI 72%; p=0.01) and shorter use (LMA 0.6±1.5 days; ETI 4.5±8.5 days; p=0.01) of any kind of postoperative respiratory support. None in the LMA group but 21 patients in the ETI group needed postoperative MV with ETI (p=0.01). Fewer patient in the LMA group developed complications (ind. apneas/desaturation/bradycardia, sepsis, necrotizing enterocolitis) during postoperative observation period (LMA 12%; ETI 30%; p=0.01).

Conclusion: During ROP laser coagulation of premature babies the use of LMA for airway management (compared to ETI) was associated with fewer cases and shorter duration of postoperative respiratory support.

Midazolam vs the game ‘HospiAvontuur’ to reduce preoperative anxiety in children undergoing surgery. A randomized clinical trial

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Background and Goal of Study: Midazolam premedication is widely used as indicated. P<0,05 was regarded as significant.

Results and Discussion: From November 2017 to June 2019, 31 children were randomized into the HospiAvontuur group (46%) and 36 children into the control group (54%). No significant difference in preoperative anxiety in the intervention group versus the control group was observed at T1 (28.2 ± 6.2 vs 28.6 ± 10.4, p=0.06) or T2 (43.2 ± 25.9 vs 35.5 ± 14.2, p=0.08). Postoperative delirium was significantly lower in the control group compared to the HospiAvontuur group (8.2 ± 5.8 vs 10.8 ± 5.1, p=0.04) at PACU arrival. This difference disappeared during the following measurements at 5, 10 and 15 minutes.

Conclusion: Information provision with the HospiAvontuur game prior to surgery seems to be equally effective in the reduction of preoperative anxiety compared to the administration of midazolam premedication in children undergoing surgery.
Effect of sugammadex and pyridostigmine bromide for reversal agent in short-term pediatric surgery: relationship of recovery and emergence agitation

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Background and Goal of Study: Sugammadex reverses rocuronium-induced neuromuscular blockade quickly and effectively. Herein, we compared the efficacy of sugammadex and pyridostigmine in the reversal of rocuronium-induced light block or minimal block in pediatric patients scheduled for elective entropion surgery. Materials and Methods: A prospective randomized study was conducted in 60 pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevofluran-procuronium block or minimal block in pediatric 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Primary outcomes were time from administration of reversal agents to TOF ratio 0.9 and TOF ratio 1.0. Time from the administration of reversal agents to extubation and postoperative adverse events were also recorded. Four point agitation score (FPAS) was checked at 5min after arriving postoperative care (PACU) and pediatric anaesthesia emergence delirium (PAED) scale and visual analogue scale (VAS) were checked at 20, 40 and 60min in PACU.

Results and Discussion: There were no significant differences in the demographic variables. Time from the administration of reversal agents to TOF ratio 0.9 and TOF ratio 1.0 were significantly shorter in the sugammadex group than in the pyridostigmine plus glycopyrrolate group: 1.30 ± 0.84 vs. 3.53 ± 2.73 min (P < 0.001) and 2.75 ± 1.00 vs. 5.73 ± 2.83 min (P < 0.001), respectively. Extubation time was shorter in the sugammadex group. Adverse events, such as skin rash, nausea, vomiting, and postoperative residual neuromuscular blockade (airway obstruction), VAS were not statistically different between the two groups. Incidence emergence agitation, FPAS and PAED 20 scale were 5/30(20%), 1.57 ± 1.07, 7.57 ± 2.8 in the sugammadex group, 15/30(50%), 2.23 ± 1.25, 10.50 ± 3.43 in the pyridostigmine group.

Conclusion: Sugammadex provided more rapid reversal of rocuronium-induced neuromuscular blockade in pediatric patients undergoing surgery than did pyridostigmine plus glycopyrrolate. Incidence and score of emergence agitation were lower in the sugammadex group, because of more rapid recovery and extubation compared with the pyridostigmine group.

5317
Anesthesia approach for bronchogenic cyst in an infant causing pneumothorax

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Background: Bronchogenic cyst in infants is congenital, benign lesion of lung or mediastinum. Although congenital bronchogenic cyst can often be asymptomatic rarely in infants and small children it can cause severe and life-threatening symptoms.

Case Report: A one month and six days old infant was hospitalized to Pediatric Intensive Care Unit due to respiratory failure. X-ray showed complete right pneumothorax with a diaphragm suppressed caudally and a heart pushed to the left. The right chest was drained and placed on continuous suction. Next five days the baby breathes spontaneously with no signs of respiratory insufficiency. But the chest x-rays showed presence of pneumothorax. Then the CT scan showed a 25x30x40mm bronchogenic cyst in the right lower lobe. The infant was scheduled for toracotomy and excision of the cyst. Induction was with sevofluran, fentanyl and propofol. During the induction of anesthesia until thoracotomy the right chest PEEP titration improved oxygenation (ΔTI-TII PaO2/FiO2, secondary outcomes were changes in PaCO2, dynamic compliance (Cdyn) and frequency of postoperative desaturation. Delta value (A) was used to evaluate effect of PEEP titration. Independent sample t test was used to test size effect differences between groups and Fishers exact test was used to test the differences in frequency of postoperative desaturation between groups.

Results and Discussion: PEEP titration improved oxygenation (ΔTI-TII PaO2/FiO2: I group-30.3 vs C group 0.52±0.001) and lung compliance (ΔTI-TII Cdyn: I group -3.2 vs C group 0.63±0.001);produced hyperventilation in I group (ΔTI-TII PaCO2 group 2.91 vs C group 0.17, p<0.001). There was no difference in frequency of postoperative desaturation (p=0.19; 1 patient in I group vs 4 in C group).

Conclusion: Stepwise PEEP titration could be beneficial in preserving lung function in children with healthy lungs on mechanical ventilation. Other ventilator parameters should be adjusted to avoid hyperventilation.

Acknowledgements: Design and write up assisted by dr Chulananda Goonasekara via ESA 2018 mentoship scheme.

5875
Anesthetic management of neonate with polycamountative syndrome

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Background: Polymalformative Syndromes cluster a large number of syndromes characterized by multiple congenital malformations. Many of them require surgery in the first few days or weeks of life. The anesthetic management of this patients is a challenge both by age and by associated malformations.

Case report: We present a case of a 4 day old female patient (weight: 2160g) with the following diagnosis: aberrant origin of the right subclavian artery, congenital diaphragmatic hernia, cystic mass in left hemidiobdomen of undetermined origin. She required respiratory support, finally proceeding to endotraqueal intubation due to respiratory failure. A percutaneous central venous catheter was inserted on the
great saphenous vein at the right ankle. The patient arrived to the operating room intubated, sedated with a intravenous fentanyl infusion, hemodynamically stable. Routine monitoring of non-invasive blood pressure, ECG, oxygen saturation and continuous temperature monitoring (rectal probe) were stablished. Intraoperative patient temperature was regulated with an air warming device and a regulated room temperature (26°C). We used a lung protective ventilation strategy (PCV: PIP 12, FR 33, I:E 1:1.5, PEEP 5). Anesthetic induction was performed with sevoflurane, fentanyl (5mcg) and rocuronium (1mg). We exchanged the uncuffed endotracheal tube to avoid air leak (Cormack 1). For anesthetic maintenance we used sevoflurane, intravenous fentanyl infusion and rocuronium. The surgical procedure: repair of the diaphragmatic hernia, pancreatic mass resection, appendectomy and intraoperative cholangiography was performed with no complications. The patient remained hemodynamically stable with a dopamine infusion <5 mcg/kg/min, with minimal blood loss. After the surgery the patient was transferred to the intensive care unit, the dopamine infusion was tapered 48 hours after the surgical procedure and the extubation was uneventful on the second post-operative day.

Discussion: Providing anesthesia for neonates, has peculiarities that differentiate it from the rest of the age groups. Therefore, this type of surgical interventions should be performed by anesthesiologist with specific training in neonatal anesthesia. In recent decades, the improvement in perioperative critical care management of this patients have led to an increase in survival.

References:
2. Pinto A. M.*, Costa C., Loução M. R.*
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Learning points: Anaesthesiologists are responsible for airway management. This case report shows the difficulty in airway management and the importance of airway evaluation and preparation in neonates with craniofacial anomalies.

5816

Anaesthesia management of patient with frontonasal dysplasia undergone craniofacial surgery

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Background: Frontonasal dysplasia (FND), or median facial cleft syndrome, is a very rare congenital anomaly. There are three types of FNDs caused by the ALX gene mutation. Severity of symptoms varies according to the types of FNDs. Most common symptoms are hypertelorism, wide nose bridge, Widow’s peak, bifid nasal tip and median cleft lip (1). Airway pathologies, difficulty in positioning and limited neck movement could make endotracheal intubation difficult in FND. We aimed to present the anesthesia and airway management of a patient with type 3 (most severe) form of FND undergoing craniofacial surgery.

Case Report: A 6-year-old and 18 kg male patient with type 3 FND was admitted to the operating room for craniofacial surgery. Turri切pharyngeal, flattened nasal root, high palate, conchal opacity, microphthalmia and hypertelorism were seen in his physical examination. Difficult airway preparation was performed because of its phenotypic properties. In addition to standard monitoring, invasive arterial monitoring was performed. Anesthesia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium. There was no difficulty in two handed mask ventilation. Videolaryngoscopy was used for intubation with a 5.5mm sized endotracheal tube. Anesthesia was maintained with 50 % O2, 50 % air, and 2 % sevoflurane concentrations. 1mcg/kg fentanyl was applied in bolus. Then, 0.1 mcg/kg/min remifentanil infusion was performed. There was a total of 250 ml blood loss during operation. 100 ml fresh frozen plasma and 100 ml eritrosit suspension were administered. Hemoglobin levels were 9.4, 8.9, 8.0 and 8.5 mmHg respectively. Operation lasted in 7 hours. At the end of the operation, 4 mg/kg sugammadex was applied for reversal. The patient was extubated and transferred to the intensive care unit.

Discussion: Midline defects are one of the most challenging cases in terms of difficult airway in anesthesia practice. In our patient, both airway difficulty and the need for strict hemodynamic control due to major craniofacial surgery made our anesthesia management difficult.

References:

Learning points: We should be aware the difficulty of airway management and hemodynamic control in children with FND syndrome, which is rarely seen in anesthesia literature.

6168

Anaesthetic management of a child with Apert’s Syndrome: A case report with good outcome

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Background: Apert’s syndrome is due to a rare autosomal dominant defect on fibroblast growth factor receptor gene. This leads to craniosynostosis, midface hypoplasia and symmetrical syndactyly besides cardiac, renal and gastrointestinal alterations which can be very challenging for the anaesthesiologist.

Case Report: A 9-year-old male child with Apert’s syndrome was referred to dental extraction under general anaesthesia on day surgery. Pre-operative evaluation with history of tracheostomy since his first month until 4y, craniosynostosis correction at 4 months, syndactyly release and cleft palate repair at 18 months and multiple myringotomies before 4y without anaesthetic complications. Physical examination with pectus arcuatum and scoliosis, followed on paediatric surgery, cardiology and orthopaedics consultations, without signs/symptoms of cardiopulmonary disease. Airway evaluation with midfacial hypoplasia involving maxillary and zygomatic bones with orbital proptosis, and good open mouth. Laboratory studies, electrocardiogram and echocardiogram without alterations. Intraoperatively, ASA standard monitoring was achieved. General anesthesia was performed with inhalatory induction with O2, air and sevoflurane, followed by an intravenous (iv) access, lidocaine iv (1mg/Kg) and tracheal intubation with Macintosh laryngoscope under spontaneous breathing. Maintenance with fentanyl (1ug/Kg) and sevoflurane under spontaneous breathing, and paracetamol (15mg/Kg) and ketorolac (1 mg/Kg) for post-operative analgesia. Surgery lasts 1.5 and an early extubation was performed as the patient emerged uneventfully without complications. Postoperative follow-up occurred in level one recovery unit during 3h, with discharge after that.

Discussion: Anaesthetic management of Apert’s syndrome can be very challenging due to airway dysmorphism and the possibility of difficult intravenous access due to limb deformity. This case highlights that with exhaustive preparation and planned actions to deal with eventual difficulties, general anaesthesia can be performed with safety standards.

References:

Learning points: Knowledge of the specificities of the disease, anticipation of difficulties and performance of an action plan will lead to a good management of these patients reducing complications intra and post-operatively.

6299

Airway approach to an unexpected giant valvular cleft in an infant

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Background: Valvular cysts are a rare cause of upper airway obstruction in children and have high incidence of recurrence1. They present with respiratory or feeding complications at a small age. Depending on size and airway obstruction they can be life threatening, complicating ventilation, airway visualization and intubation2. This case report describes the airway approach of a large asymptomatic valvular cyst diagnosed in an infant during induction of general anaesthesia for an elective ENT procedure.

Case Report: A 9-year-old male, 37 kg, ASA I, Mallampati I, with no airway symptoms besides roncopathy, proposed for elective amigdalectomy. We performed IV induction and there was difficulty ventilating with face and laryngeal mask. Direct laryngoscopy revealed a large mobile valvular cleft obstructing the airway. We were able to insert a 5.5 cuffed tube by dislocating the cyst laterally with the laryngoscope blade. The surgeon drained the cyst and surgery was postponed. Two months later the patient was rescheduled and he presented recurrence as seen in the preoperative MRI. Intubation was similar to the previous one and the surgical team removed the cyst. There were no complications postoperatively and the patient is still followed by the ENT surgeons since it has high recurrence rate.

Discussion: Stridor, increase work in breathing, chest wall retraction, cyanosis, apnoea or failure to thrive are frequent symptoms in large obstructing airway cysts.

References:

Learning points: Anaesthesiologists are responsible for airway management. This
Ultrasound assisted midline approach of a lumbar epidural catheter insertion for a fifth redo genital hypoplasia surgery in a five-year old child

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Background: The use of epidural catheters for intraoperative and postoperative pain relief in children is growing each year. Because the insertion of the epidural catheter in the pediatric population is done under general anesthesia and the anatomical structures are smaller it represents a challenge to the anesthesiologist. The use of ultrasound guidance enables visibility of the ligamentum flavum, dural structures and depth of the epidural space (1).

Case Report: A five year old child, weighing 22kg, was scheduled for a fifth redo genital hypoplasia surgery. Because of the estimated long duration of surgery and postoperative analgesia, we decided to insert an epidural catheter using ultrasound assistance for intraoperative and postoperative analgesia under balanced general anesthesia using sevoflurane induction and maintenance, opioids and rocuronium. After the induction to general anesthesia, the child was placed in a lateral position for epidural catheter placement. Ultrasound imaging was performed with a linear 5-10Hz probe which was applied to obtain a paramedian, longitudinal view of neural structures. The sonographic measurements included distance from skin to dura and skin to epidural space. The epidural puncture was performed at the level of L3-L4 lumbar vertebrae, using a 19G Tuohy 50mm needle and 24G catheter.

Discussion: The measurements of the distance from skin to epidural space using ultrasound and the palpation loss of resistance technique were used and compared. The incomplete ossification of the vertebra allowed ultrasound visualisation and localisation of the depth of epidural space (1). The difference between the palpation technique and ultrasound assisted technique in obtaining depth of epidural space was 2 mm.

References:

Learning points: Epidural anesthesia in children can provide safe and effective analgesia if the right approach is chosen. Ultrasound imaging can be helpful for localising the right puncture site, needle trajectory and measure the depth of the epidural space from the skin.

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Erector spinae block for thoracic pain relief in a paediatric patient. Case report

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Background: Erector spinae plane block was described by Forero at all. in 2016 as a new analgesic technique in adult patients with thoracic neuropathic pain. This approach has been considered as a reasonable alternative to invasive neuraxial techniques. Further publications have opened a wide discussion on its mechanism of action, efficacy and safety profiles. However, there are only a few case reports about the use of ESPB as a method of choice of prolonged perioperative analgesia in children. Our experience shows that this novel technique can be used as an alternative to neuraxial blocks for pain management of posterior thoracic wall pain in a daily practice of paediatric anaesthetist.

Case Report: A 12-year-old boy, weight 36 kg with a history of fall from a jet ski. After admission to Emergency Unit, he was diagnosed with multiple fractures of L3-L4 lumbar vertebrae. The incomplete ossification of the vertebra allowed ultrasound visualisation and localisation of the depth of epidural space (1). The difference between the palpation technique and ultrasound assisted technique in obtaining depth of epidural space was 2 mm.

References:

Learning points: Epidural anesthesia in children can provide safe and effective analgesia if the right approach is chosen. Ultrasound imaging can be helpful for localising the right puncture site, needle trajectory and measure the depth of the epidural space from the skin.

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Bilateral ultrasound guided erector spine plane block as a complementary regional technique for postoperative multimodal analgesia in neuromuscular scoliosis surgery in pediatric patient, a case report

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Background: Postoperative pain in scoliosis surgery is frequent, given the complexity, extent and duration of the procedure. Multiple techniques have been described to diminish pain, but recently it has been proposed that administration of local anesthetic at the deep plane of the spinal erector muscle in the thoracolumbar region can provide adequate pain relief in this procedure due to its multimodal dispersion. In pediatric population there are few literatures found of this innovative technique and even less in patients with previous instrumentation of the spine like this case we present.

Case Report: We describe the case of a 12-year old female patient who has a neuromuscular thoracolumbar scoliosis with Cobb’s Angle of 76. The spirometry shows a moderate restrictive pattern, an echocardiogram with normal ventricular function and patient presents a history of myelomeningocele surgically corrected previously, with sequelae of neurogenic bladder and four previous surgeries for placement of the Vepter lengthening system. TIVA (total intravenous anesthesia) was given throughout the surgery, and the intraoperative analgesia administered was ketamine at the beginning and at the end, dipyrone, lidocaine and magnesium sulfate infusion with morphine before waking up. The patient did not report pain in the first two hours of the postoperative period, only 3 mg of morphine were used in the first day and 2 mg in the second day with maximal pain score of 3,5/10, the patient only reported nasal pruritus as a side effect.

Discussion and learning points: We consider that the use of the ESP block is effective as a complementary technique to an intraoperative opioid-saving regimen, postoperative multimodal analgesia with diminishing opioid consumption, reducing pain scores and adverse effects observed in this pediatric population for the first 48 postoperative hours, even in patients with previous scoliosis surgery instrumentation. We think in the future anesthesiologist can consider protocolizing this strategy for the management of the pediatric patient that will be taken to spinal fusion surgery.

References:
Effect of Rocuronium and Sugammadex Under Sevoflurane and Desflurane Anaesthesia in Children

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Background and Goal of Study: This prospective and randomized study investigated the efficacy of sugammadex and changes in peak inspiratory pressure (PIP) in reversing the block of rocuronium in children under sevoflurane/desflurane anaesthesia. The effects of rocuronium on hemodynamic parameters after sugammadex and the differences in both groups were aimed to be observed.

Materials and Methods: After the Ethical Committee has approved the study (no:34/25), it was conducted in 148 patients between 2-18 years of age. The patients were divided into two groups as Group S (sevoflurane, n=73), Group D (desflurane, n=75) and 2 subgroups as 2-5, 10 years. Hemodynamic parameters and PIP were recorded during the procedure. Acceleromyography monitoring was performed. After anaesthesia induction, the TOF device was calibrated. Sevoflurane/desflurane was set 1 MAC. Rocuronium was given 0.6 mg / kg. The time of TOF value from 100% to 0 was recorded as T1 and otrachael intubation was performed. TOF measurements were continued throughout the operation. When TOF was 25%, it was recorded as T2 and sugammadex 2 mg/kg was administered. The time from TOF 25% to TOF=90% was recorded as T3. At the same time, systolic, diastolic blood pressures, heart rate and PIP and side effects were recorded for both groups after sugammadex injection.

Results and Discussion: Time to reach TOF 0 to 25% was significantly higher in Group S. T2 duration after induction in Group S was significantly higher and T3 duration in Group D. The duration of rocuronium was longer in Group S. Time to reach TOF 90% with Sugammadex was shorter in Group S. PIP was significantly higher in Group S for 5-10 years. PIP measurements were higher at 2, 5 and 10 minutes after sugammadex injection in Group D compared to 0 minutes.

Conclusion: The duration of rocuronium was longer in Group S. Time to reach TOF 90% with Sugammadex was shorter in Group S. PIP was significantly higher in the desflurane group after sugammadex but it was insignificant in clinical terms. No side effects of sugammadex were observed, and a rapid and effective recovery was achieved from a single dose of 0.6 mg/kg rocuronium.

Are our paediatric airway complications comparable to other large paediatric centres? A retrospective audit of all paediatric cases in a large, Australian metropolitan teaching hospital over 12 months

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Background and Goal of Study: Serious paediatric airway complications are relatively rare in modern anaesthesia practice, but the paediatric airway can be precarious for the novice paediatric anaesthetist. Minor airway and respiratory events are common, resulting in respiratory compromise. The most common complication is as a result of laryngospasm, other aetiologies include bronchospasm, airway obstruction, unrecognized oesophageal intubation and aspiration. APRICOT (the Anaesthesia PRactice in Children Observational Trial) found an incidence of 3.1% of all paediatric anaesthetics has a respiratory complication, laryngospasm in 1.2%, bronchospasm in 1.2%, post-operative stridor in 0.7% and aspiration in 0.1%, we decided to examine all paediatric cases and ensure that we were comparable.

Materials and Methods: We conducted an audit of all paediatric anaesthesia cases in a large children’s hospital over 12 months. We specifically wanted to establish our rate of laryngospasm, desaturation and other airway complications, and ensure that we were comparable:

Results and Discussion: A total of 523 paediatric cases were performed on our centre throughout 2019. The ages ranged from 6 months - 16 years old. The cases were predominately ASA 1 and 2, needing ENT, orthopedic, plastic surgery, radiological procedures or general surgery. There were documented desaturations in our paediatric population (1.14%). There were 8 cases of laryngospasm (1.53%), there was no documentation of a difficult paediatric airway, and there were 3 cases of bronchospasm needing intervention with bronchodilators (0.57%). There were a number of other airway complications such as a vomit on extubation (1 case), an endotracheal tube change (1 case) and a case of an anaesthetic machine failure during the case, with no clinical consequences to the patient.

Conclusion: We can conclude that our paediatric anaesthetic practice is as safe as other centres. There will always be some laryngospasm and desaturation in the paediatric population, which should resolve quickly in the right hands.

References:

Anesthesia management of pediatric patient with Bardet Biedl syndrome and Congenital methemoglobinemia

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Background: Bardet Biedl syndrome (BBS) is characterized by polyactyly, retinal dystrophy, renal and cardiac anomalies, truncal obesity, hypogonadism and mental retardation. Difficult intubation is manifested frequently in BBS. Methemoglobinemia (MH) is a serious medical condition associated with cyanosis and respiratory failure. MH is more common as an acquired form caused by toxic exposure. MH might also be appeared as congenital methemoglobinemia (CMH). CMH can be present as isolated to a patient with BBS and CMH undergoing polyactyly and pes equinovarus surgery.

Case Report: A 3-year-old male patient with BBS and CMH was consulted for polyactyly and pes equinovarus surgery. He had phenotypic features of difficult intubation. He was examined and consulted to Hematology Clinic due to an increased methemoglobin level (22%). He was approved the operation when his methemoglobin level decreased to 1.7% after vitamin C and methylene blue factors affect standard monitoring and preoperative difficult airway management, anesthesia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium. There was no difficulty in mask ventilation. Videolaryngoscopy was used for intubation with a 5.5mm sized endotracheal tube. Anesthesia was maintained with 50 % O2, 5% air, lower in Group S for concentrations. T1 was defined as the time when TOF 25% to TOF>90% was recorded as T3. At the same time, systolic, diastolic blood pressures, heart rate and PIP and side effects were recorded for both groups after sugammadex injection.

Results and Discussion: To study the duration of rocuronium was longer in Group S. Time to reach TOF 90% with Sugammadex was shorter in Group S. PIP was significantly higher in Desflurane group after sugammadex injection but it was insignificant in clinical terms. Methemoglobinemia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium. There was no difficulty in mask ventilation. Videolaryngoscopy was used for intubation with a 5.5mm sized endotracheal tube. Anesthesia was maintained with 50 % O2, 5% air, lower in Group S for concentrations. T1 was defined as the time when TOF 25% to TOF>90% was recorded as T3. At the same time, systolic, diastolic blood pressures, heart rate and PIP and side effects were recorded for both groups after sugammadex injection.

Conclusion: The duration of rocuronium was longer in Group S. Time to reach TOF 90% with Sugammadex was shorter in Group S. PIP was significantly higher in Desflurane group after sugammadex injection but it was insignificant in clinical terms. Methemoglobinemia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium.

Anesthesia for patient with Friedreich's ataxia and cardiomyopathy: a case report

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Background: Friedreich ataxia (FA) is a rare autosomal recessive disease which is characterized by ataxia which is marked in the lower limbs and may be accompanied by dysarthria, nystagmus and skeletal muscle weakness. The disease may also cause cardiomyopathy, diabetes and restrictive lung disease.1 Since these factors affect anaesthetic management, special care is required.

Case Report: Twelve year old male patient who was diagnosed with FA, hypertrophic cardiomyopathy, scoliosis was consulted for posterior spinal fusion. The patient was transferred to the operating room after 8h of fasting. After standard monitoring and sedation with intravenous (IV) midazolam 0.025 mg/kg, train-of-four (TOF) monitor for neuromuscular monitoring with 5 min intervals was placed on the left forearm. Anesthesia was induced with IV propofol 2 mg/kg, fentanyl 1 µg/kg and rocuronium 0.6 mg/kg. The patient was intubated with a 6.5 Fr cuffed reinforced endotracheal tube approximately 150 sec after the administration of neuromuscular blocking agent (NMBA). Propofol and remifentanil infusion were used for anesthesia maintenance. Additional 0.1 mg/kg rocuronium was administered 115 min after the first dose. TOF was observed from the moment of first NMBA administration until the full recovery. The total duration of the operation was 5h and 15 min. No complications occurred and the patient was stable hemodynamically during the operation. After the first hour of the operation patient developed hypoxia, and respiratory failure. The patient was transferred to the Intensive Care Unit.

Discussion: FA is a syndrome in which difficult intubation is common. The presence of CMH differed in our case from other BBS patients in terms of anaesthesia management. Consequently, avoidance of drugs that might trigger methemoglobinemia, close monitoring of methemoglobin levels, and possession of methylene blue during the operation should be considered in anesthesia management of the patients with BBS, besides preparation for difficult airway intubation.

Learning Points: Effective preoperative evaluation and close intraoperative follow-up is essential in anesthesia management of these patients.
presence of cardiomyopathy, with careful monitoring and close follow-up.


Learning points: The patients with Friedreich's ataxia presenting for surgery should be screened for accompanying pathologies. It should also be kept in mind that although it is safe to use non-depolarizing NMBA's, proper neuromuscular monitoring is mandatory in patients with FA.

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**Tube or no tube? A subglottic challenge**

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**Background:** Around 85% of cases of glottic stenosis in children are acquired, mostly related to prolonged tracheal intubation. Endoscopy is an essential diagnostic and therapeutic technique, and endoscopic dilation of airway stenosis is expanding as a treatment option due to its minimal invasiveness and good outcomes. A multidisciplinary approach involving Anesthesiologists, Interventional Pneumologists and ENT surgeons is needed to avoid possible serious consequences.

**Case Report:** Male infant, 22 months old, with a diagnosis of sickle cell anemia and previous history of prolonged intubation and subsequent need for tracheotomy due to severe respiratory infection on September of 2018. On February of 2019, tracheotomy was closed after an ENT evaluation, without immediate complications. Nonetheless, on first post operative day, stridor was observed and a diagnostic bronchoscopy revealed a 70% subglottic stenosis (Grade II) and an upper tracheal granuloma. After 2 weeks of failed conservative management, an endoscopic therapeutic approach was decided. A 3.5 mm bronchoscope was used to dilate the subglottic stenosis under total intravenous anesthesia and high frequency jet ventilation. However, on anesthetic emergence, severe stridor and respiratory failure were noted. This clinical scenario was ascribed to airway edema related to the procedure and the patient was immediately sedated, intubated and transferred to the Pediatric ICU. 3 days after the procedure, after another failed extubation attempt, a new tracheotomy was performed in order to prevent a prolonged oral intubation. The infant was discharged 23 days later with no respiratory symptoms. An endoscopic tracheal dilatation program was to be scheduled after hospital discharge.

**Discussion:** Prolonged intubation is associated with several complications, namely, most cases of acquired subglottic stenosis in children. Removal of the tracheotomy in infants must be done after a thorough multidisciplinary evaluation in order to prevent an emergent airway approach. Evidence is lacking on the best anesthesia conduct for endoscopic dilation of tracheal stenosis in infants in order to address challenges related to airway and anesthesia maintenance, ventilation and risk of subsequent airway edema and immediate respiratory failure.

**Learning points:** Subglottic stenosis is a frequent complication of prolonged tracheal intubation. Tracheal dilations can cause airway edema and an invasive airway approach might be necessary.

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**Perioperative management of a 3-years-old infant with Pompe disease**

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**Background:** Pompe disease is a rare autosomal recessive disease due to acid alpha glucosidase deficiency. Clinical features develop due to lysosomal accumulation of glycogen, especially in cardiac and skeletal muscle, leading to cardiomyopathy and respiratory muscle weakness.1,2

**Case Report:** A 3-year-old female was proposed to adenoidectomy, partial tonsillectomy and bilateral myringotomy due to significant airway obstruction. She presented history of Pompe disease, with cardiovascular and severe respiratory involvement, on enzyme replacement therapy since 2017 every two weeks. No history of previous surgeries. Preoperatively, a full blood count, blood chemistry, coagulation study, cardiac assessment (electrocardiogram and echocardiogram) and consultation with a paediatric cardiologist and a pneumonologist was obtained. Difficult airway was not anticipated. Intraoperatively, ASA standard monitoring was used. Induction was made with 50:50 oxygen and nitrous oxide, sevoflurane and fentanyl. Bradycardia ensued and was readily treated with atropine. Following tracheal intubation, 50:50 oxygen and nitrous oxide and sevoflurane were used, targeting BIS® 40-60. Muscle relaxants were not used. Surgery lasted for 2 hours and she remained haemodynamically stable, without periods of oxygen desaturation. Intravascular volume status was maintained. Emergence from anesthesia occurred without complications. Full resuscitation equipment was always available. Postoperative period occurred in a paediatric intensive care unit without complications, with hospital discharge after 48 hours.

**Discussion:** Pompe disease has an incidence of 1:40000. Literature concerning perioperative period is poor with most demonstrating serious complications.2 Besides the high anesthetic risk, this case highlights that with exhaustive preparation and proper measures, general anesthesia can be performed with safety standards. With the introduction of enzyme replacement therapy, patient survival has increased as well as the need for surgical intervention under general anesthesia.


**Learning points:** Proper knowledge of the disease and extensive preparation will lead to a better management of these patients with minimum complications and a good recovery.

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Paediatric Anaesthesiology

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**Anesthetic Management in child with the Hardikar Syndrome**

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**Background:** Hardikar syndrome is a multiple congenital anomaly syndrome, first characterized in 1992 by Hardikar et al. described two individuals with cholestasis, cleft lip / palate, retinal pigmentation, intestinal abnormalities and genitourinary abnormalities.1 There are very few publications in the literature on this pathology and no information on the anesthetic management of these patients. The relevance of the case of a potentially serious patient undergoing surgery due to the syndrome is evident.

**Case report:** Female patient, 1 year and 9 months, with Hardikar Syndrome, submitted to anesthetic intervention for esophagastroduodenoscopy (EGD): research of esophageal varices. Previously performed pre-anesthetic and the father informed about the syndrome and about the patient's vast anesthetic-surgical past. The hospital anesthesia team was informed about the case and scheduled elective EGD. Anesthesia was pure inhalation (8% sevoflurane) under mask and the child breathed spontaneously uneventfully.

**Discussion:** Hardikar syndrome is extremely rare: between 1992 and 2002, 4 people were reported in the literature.1 Given the severity and rarity of the disease, studies are needed for better anesthetic management of these patients. Due to the presence of cleft lip and previous surgery, airway management can be challenging and the presence of difficult airway material should be left in the operating room. In addition, as the patient underwent various surgical procedures (mainly abdominal or genitourinary surgeries), she became part of the high risk group for latex allergy and a “latex free” environment can be considered. As the syndrome progresses with the evolution of liver dysfunction, it is prudent for the anesthesiologist to request evidence of liver function, as liver failure would cause several anesthetic implications, such as reduced drug metabolism and coagulation disorders.


**Learning Points:** Patients with rare syndromes have a large challenge for doctors. The Hardikar patient demands extreme caution and reiterates that planning and previous studies can improve postoperative outcomes.
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Challenges of the anesthetic management on a newborn with giant encephalocele due to Amniotic Band Syndrome

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Background: Encephalocele is a protrusion of the skull content beyond its normal limits, through associated congenital bone malformation or, more rarely, through normal cranial foramen or fissures. The anatomical location of this anomaly together with other factors: such as hernial sac content, extent of malformation, associated CNS and/or systemic injuries, determine patient's treatment and prognosis.

Methods: We conducted a retrospective, observational cohort study comparing 2 groups of neonates with encephalocele, with presence of extensive brain content protruding out of the cranial cavity secondary to the defective closure, was referred to the surgical center. Induction was made with 6% sevoflurane, 0.25mcg/kg sufentanil, 3mg/kg propofol and 0.5mg/kg atracurium. During orotracheal intubation, anteriorization associated with left airway deviation was observed, however, the procedure was performed uneventfully under a medium difficulty. During the surgical procedure, the patient presented massive bleeding accompanied by hemodynamic instability, requiring volume replacement guided by blood gas analysis and vasopressor. Inhalation agents were used for the induction and maintenance of anesthesia. A rapid turnover system based on the ‘quick laryngoscopy’ technique was employed for rapid intubation. The patient was extubated, without the use of vasoactive drugs, stable and with no neurological changes.

Results: We report the clinical experience of the first neonate with encephalocele to undergo general anesthesia including induction and surgical intervention, without IV access.

Conclusions: This case represents a new successful experience in the anesthetic management of newborns with encephalocele presenting a complex airway, with relevant risk factors for intubation. The encephalocele was managed without IV access and a rapid turnover system was employed following the ‘quick laryngoscopy’ technique. The patient was extubated without the use of vasoactive drugs, stable and with no neurological changes.

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Hemoadsorption: a promising rescue therapy in the treatment of critical ill paediatric patients

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Background and Goal of Study: Extracorporeal blood purification therapies are increasingly applied in the field of intensive care medicine. Compared to filtration-based methods mainly used for renal replacement therapy, newest adsorptive approaches have shown to specifically target the inflammatory cascade by the effective removal of relevant mediators. In the neonatal and pediatric setting however, the application of these methods brings with it various challenges but also profound technical difficulties. Recently, a promising extracorporeal device for cytokine adsorption (CytoSorb) was introduced. However, data for its application in critically ill pediatric patients remains sparse. We describe the use of CytoSorb in combination with standard therapy, in pediatric patients with multiple organ failures of various etiologies. The aim was to assess the effects on the inflammatory status, hemodynamics, and clinically relevant outcome parameters as well as the feasibility and safety of CytoSorb pediatric application.

Materials and Methods: The study comprised 16 critically ill pediatric patients admitted from May 2016 to October 2019 and treated in our neonatal and pediatric general intensive care unit. They underwent combined treatment with continuous renal replacement therapy (CRRT), plasmapheresis and CytoSorb as rescue choice.
Results and Discussion: We observed a marked decrease in inflammatory mediators, a reduction in catecholamine dosages and an improvement in organ functions, which was particularly pronounced in patients who survived. An early onset of treatment (at best within 24-48 hours after diagnosis of sepsis) seemed to be beneficial for eventual survival.

Conclusions: This case series is the first documentation of a set of pediatric/neonatal patients in which a combined therapeutic approach of hemadsorption and CRRT showed promising results with regard to hemodynamic stabilization, control of the inflammatory response, improvement in organ functions as well as safety and feasibility. Further prospective randomized controlled studies in the pediatric field are necessary to elucidate the full potential of hemadsorption in this set of patients.

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Anaesthetic Management of a Child with Limb-Girdle Muscular Dystrophy type 2C

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Background: Limb-girdle muscular dystrophies are a heterogeneous group of genetic muscular diseases, characterized by a dysregulation between lesions and muscular repair responses. Its incidence is estimated to be 1:15,000 with either an autosomal dominant transmission (type 1) or recessive one (type 2), various subtypes being described according to the mutation (1). Most prevalent worldwide is subtype 2A (2). Manifestations can arise in childhood or adult life. Clinically, manifests as muscle weakness at pelvic/scapular areas. Anaesthetic implications are described such as malignant hyperthermia susceptibility, anaesthetic hypersensitivity, cardiac dysrhythmias and difficult airway. As such, regional anaesthesia remains a valid and preferable option in many cases. Given the low prevalence, few cases of anaesthetic management are described in the literature, especially regarding the rarest subtypes. In this abstract, we report the anaesthetic management of a 13-year old child, diagnosed with limb-girdle muscular distrophy type 2C, proposed for open repair of distal femur fracture.

Case Report: The child presented without focal deficits and a risk of difficult airway on our preoperative evaluation. Regional anaesthesia, with sequential spinal epidural anaesthesia was administered with 12.5 mg of intrathecal bupivacaine and, afterwards, 12mg of 0.2% epidural ropivacaine initiated 30 minutes before the end of surgery. However, due to intraoperative anxiety and agitation, sedation with propofol 6 mg/kg/h and ketamine 2 mg/kg/h was needed, preserving spontaneous ventilation. Besides this, no other complications were noted. Motor block reversal occurred 130 minutes after the sequential anaesthetic technique. The postoperative analgesic regimen comprised epidural ropivacaine 0.2% for 38h and 1g paracetamol iv B12h.

Discussion: To our best knowledge, anaesthetic management of this condition is not reported in the literature. Regarding our clinical case, regional neuraxial anaesthesia was a suitable technique, without complications. However, intraoperative sedation required elevated doses of both propofol and ketamine, without the reported hypersensitivity to these drugs described in the literature.

References:

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Anaesthesia and Spinal Muscular Atrophy type I under new drug treatment

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Background: Spinal muscular atrophy (SMA) is an autosomal recessive neuromuscular disease, characterized by progressive symmetrical muscle weakness. At SMA type I (a category of the disease in which) symptoms manifest before 6 months of age. Recently 2 new treatments have been approved. Onasemnogene abeparvovec-xioi (Zolgensma®), not yet approved by EMA, is given intravenously, requires concomitant corticotherapy and is associated with elevated liver enzymes and thrombocytopenia. Nusinersen is administered intrathecally by lumbar puncture and has been linked to reports of communicating hydrocephalus.

Case Report: A 5mo female diagnosed with SMA type I had already received 3 treatment sessions of Nusinersen and 1 of Zolgensma®. She presented with nystagmus and ocular inversion. Blood tests revealed transaminases elevation. CT scan suggested exuberant tetraventricular hydrocephalus in relation with Blakes Pouch and associated hydrocephalus. The administration of nusinersen has been linked to at least 4 cases of communicating hydrocephalus in children with SMA I. We hypothesize that intrathecal administration may have triggered the hydrocephalus. In contrast, there’s only one case report associating SMA I and BPC, not related to this treatment or any trigger. Additionally, anesthetic concerns of Zolgensma® are yet to be clarified.
Intraoperative evaluation of the nociception level index in paediatric patients under general anaesthesia

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Background and Goal of Study: Anaesthetized patients cannot experience pain, since the cerebral cortex does not interpret the noxious signal, so it is more accurate to evaluate the nociception measured by the autonomic nervous system. The nociception level (NoL™) is an index of nociception based on nonlinear combination of heart rate, heart rate variability, photoplethysmograph wave amplitude, skin conductance, skin conductance fluctuations, and their time derivatives. The authors evaluated the abilities of the NoL index to discriminate between noxious and nonnoxious stimuli in pediatric patients under general anaesthesia (1).

Materials and Methods: An observational evaluation of intraoperative nociception was performed using NoL™ technology in four paediatric patients under general anaesthesia; three of them also received a nerve block (one patient an external popliteal sciatic nerve block- case 1- and two patients an epidual anaesthesia - case 2 and 3) and one patient (case 4) received total intravenous anaesthesia.

Results and Discussion: During general anaesthesia in paediatric patients, an adequate monitoring of nociception could be observed; revealing that maintaining the same harmful level and increasing the level of analgesia or performing a nerve block, an adequate level of nociception was reflected (NoL™ values between 0-25).

Conclusions: Adequate monitoring of intraoperative nociception in anesthetized patients is important for the correct use of analgesics, since insufficient use of them may favor post-operative pain and post-surgical persistent chronic pain. The NoL index changes proportionately with paediatric patients’ response to various clinical noxious stimuli under general anaesthesia and discriminates noxious from nonnoxious stimuli.

References:

5467

Anaesthesia management of an infant with Donnai Barrow Syndrome

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Background: Donnai Barrow syndrome (DBS) is an autosomal recessive disorder, first described in 1993 and characterized with wide anterior fontanel, hypertelorism, exophthalmos, myopia, sensorineural hearing loss, congenital diaphragm hernia or omphalocele, and skeletal abnormalities (1). The diagnosis is based on characteristic clinical features and determination of the biallelic LRP2 pathogenic variant (2). We aimed to share our anesthetic management experience in a patient with Donnai Barrow Syndrome.

Case Report: A 2 years old 11 kg male patient with DBS was scheduled for orchiopexy surgery. He had central hypothyroidism. Eventhough he was prescribed with sodium valproate, levetiracetam, sulfiame and levotheroxine for epilepsy and hypothyroidism, he had seizures for 1-2 times per week. The lab tests were between normal limits. In his physical evaluation, hypertelorism, exophthalmos, atypical facial features, and a mouth opening of 2 cm were seen. His physical status was ASA II. He consulted to pediatric hematology and neurology clinic in preoperative period. Before the operation, he was premedicated with oral midazolam of 1mg/kg. He was monitored in operating theatre and then IV cannula was placed. Following the induction with 3mg/kg propofol and 1mg/kg fentanyl, a laryngeal mask of size 2 was placed. Anaesthesia maintained with an infusion of propofol of 10 mg/kg/hr and 0.07 mcg/kg/min remifentanil. The patient’s vital signs were stable all along with the surgery. Postoperative analgesia provided with 15 mg/kg paracetamol. The patient was discharged with no problems.

Discussion: To the authors’ knowledge, our case report is the first about anaesthesiology management of DBS. We suggest extra caution is needed for these patients which there are no publications that will help to foresee possible complications to come.

References:

4446

Risk of neurodevelopmental disorders in children exposed general anesthesia: A National Population-Based Cohort Study

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Background and Goal of Study: Exposure to general anesthesia has been reported to induce neurotoxicity, impair learning, memory, attention, motor functions, as well as affect behavior in adult rodents and nonhuman primates. This study was designed to investigate the differences in risk of neurodevelopmental disorders among children exposed to general anesthesia compared to matched unexposed individuals.

Materials and Methods: A population-based cohort study was conducted with a longitudinal dataset spanning 2000 to 2015 from the Taiwan National Health Insurance Research Database (NHIRD). Procedure codes were used to identify children who received anesthesia. Neurocognitive outcome was measured by presence of ICD-9-CM codes related to neurodevelopmental disorders. Cox regression models were used to obtain hazard ratios of neurodevelopmental disorders with different exposure, duration, and frequency of anesthesia.

Results and Discussion: A total of 25550 children who received general anesthesia before six years of age, along with 25550 unexposed children (matched by gender and age) were enrolled in this study, not accounting for the 11644 individuals who met the exclusion criteria. There were 8649 who received general anesthesia before six years of age with neurodevelopmental disorders, and 7407 patients with neurodevelopmental disorders in the control group were included. Increased risk of neurodevelopmental disorders was observed in the exposure group with a hazard ratio of 1.223 (95% CI 1.184–1.264, P < 0.001). Children exposed to general anesthesia before four years of age showed increased risk of neurodevelopmental disorders (hazard ratios 1.420–3.987, CI 1.347–4.271, P < 0.001). Subgroup analysis demonstrated further elevated risks of neurodevelopmental disorders with longer (> 2 hours) anesthesia durations (hazard ratios 1.376–1.644, CI 1.172–2.645, P < 0.001) and multipleg (> 1) anesthesia exposures (hazard ratios 1.397–1.786, CI 1.197–2.678, P < 0.001) compared with children unexposed to anesthesia.

Conclusion: Children exposed to general anesthesia before four years of age increased risk of neurodevelopmental disorders. This risk is further elevated with extended duration and frequency of anesthesia. The findings of this study should prompt clinical practitioners to proceed with caution when assessing young patients and planning managements involving procedures requiring general anesthesia.
The factors affecting oral intake on POD1 after tonsillectomy in children

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Background and Goal of Study: Significant pain and severe functional limitation after tonsillectomy persist for at least 1 week postoperatively. In the US, parents tend to overestimate their child’s pain and providers tend to oversedate children, which introduces excess opioids into the community. In Japanese society, where parents and medical providers have negative attitudes to opioids, pain after tonsillectomy for children is usually treated only with acetaminophen. The goal of this study is to assess which factors have influence on the amount of oral intake, one form of functional limitations and to discuss about “favorable pain control” after tonsillectomy in children.

Materials and Methods: Retrospective observational study was conducted on 24 patients (16 males and 8 females, aged 3-14 years) who underwent tonsillectomy in Juntendo University Hospital from August 4th 2017 and November 1st 2019. Dividing them into two groups: Group1 (oral intake on POD1 was less than half) and Group2 (more than half), the patient backgrounds (age, sex, weight, height) and peri-operative factors (operating time, opioid, acetaminophen, and dexamethasone) were compared between the two groups. The data were statistically analyzed with t-test using GraphPad Prism version 8.0.2 (159).

Results and Discussion: 15 patients were allocated in Group1 whose oral intake on POD1 was less than half and 9 in Group2 whose oral intake on POD1 was more than half. There were no significant differences between the two groups in the backgrounds of the patients: age (p=0.31), sex (p>0.99), height (p=0.79), and weight (p=0.70). Group1 received significantly less acetaminophen intra-operatively than Group2 (p=0.030). There were no significant differences in other factors: intra-operative dose of fentanyl (p=0.27) and dexamethasone (p=0.63), post-operative dose of acetaminophen (p=0.78), and operating time (p=0.59). The amount of oral intake on POD1 after tonsillectomy is influenced by the dose of intra-operative acetaminophen but not other factors.

Conclusion: The pediatric patients who could eat more than half of their meals on POD1 after tonsillectomy received more acetaminophen intra-operatively than those who could not eat.

Effect of nutritional status on induction and awakening during Sevoflurane anaesthesia in children

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Background and Goal of Study: Malnutrition is a major problem in developing countries like India. 43% of children under 5 years of age are underweight and 48% are stunted. Modern inhalational agents like Sevoflurane provide a safe and pleasant way to induce anaesthesia in children who would not otherwise allow placement of an intravenous cannula. There are no studies till date elucidating the relationship between anthropometric measures of nutrition status and inhalational agent induction and awakening times.

Materials and Methods: 71 children between the ages of 1 to 9 years were recruited into the study between November 2017 and November 2018 at the All India Institute of Medical Sciences, New Delhi, India. Anthropometric data (height, weight, mid-arm circumference, waist circumference, hip circumference) and demographic data was noted for every child before the anaesthetic. Anaesthesia was induced using the study protocol and time to achieve various study parameters was noted. The volume of Sevoflurane was calculated using Dion’s method. The primary outcome was correlation of anthropometric measurements to awakening times. Secondary outcomes were correlation between anthropometric measurements and induction time and total sevoflurane requirement.

Results and Discussion: 82 patients were recruited in the study. Median (IQR) age of patients was 4 (2-6) y and 36 of them were female. Multiple linear regression analysis revealed that total sevoflurane consumption was dependent upon age [coefficient (SE) 0.02 (0.006); p=0.01], weight [coefficient (SE) 0.10 (0.04); p=0.01], mid-arm circumference [coefficient (SE) 0.26 (0.1); p=0.007] and waist circumference [coefficient (SE) 0.08 (0.03); p=0.01] of the patients after adjustment of total duration of anaesthesia. However, BMI (p=0.23), height (p=0.17), head circumference (p=0.09) and waist-hip ratio (p=0.67) were not significantly correlated with total sevoflurane consumption.

Conclusion: Induction time was correlated with mid-arm circumference (p=0.02) and awakening time was not correlated with any of the anthropometric parameters after adjustment for the total duration of anaesthesia.

Emergence delirium in children: a Brazilian survey

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Background and Goal of Study: Pediatric emergence delirium is presented as a disturbance of consciousness and attention, with disorientation and perceptual alterations, including hypersensitivity to stimuli and hyperactive motor behaviors. Many studies evaluated risk factors and pharmacological regimens to prevent or treat emergence delirium. There have been two reports on the practice of anesthesiologists concerning diagnosis, prevention, and treatment of emergence delirium. We aimed to know the practice of Brazilian anesthesiologists regarding the concept, risk factors, diagnosis, prevention, and treatment of emergence delirium in children.

Materials and Methods: A REDCap® web-based survey was sent to all anesthesiologists associated with the Brazilian Society of Anesthesiology by SMS and e-mail. Considering a population of 24 thousand anesthesiologists in Brazil, a 95% confidence interval and a 5% margin of error, a sample size of 854 responders was required for this study.

Results and Discussion: We obtained 671 responses. Of respondents, 92.6% reported the presence of emergence delirium as a relevant adverse event and 39.6% reported that emergence delirium interferes “too much” in the quality of anaesthesia in their institution. High levels of childhood anxiety, using sevoflurane and previous history of emergence delirium were considered as risk factors for 79.6%, 79.2%, and 72.3%, respectively. More than 90% also considered untreated postoperative pain as a risk factor. More than half of responders reported that evaluate their patients regarding emergence delirium, but 95.1% did not routinely use a validated score tool. Sixty-seven percent reported not routinely using pharmacological strategies to prevent emergence delirium. Propofol and clonidine were the most common anesthetic given to prevent emergence delirium (15.7% and 15.4%, respectively). Midazolam, propofol, and dexmedetomidine were the most common medication given for treatment (25.8%, 34.5%, and 10.6%, respectively).

Conclusion: Although the majority of responders considered emergence delirium as an important adverse event, many still confuse it with postoperative pain and few use pharmacological strategies to decrease emergence delirium in high-risk children. Also, as PAED is not validated in Brazilian Portuguese, diagnosis is underestimated leading to inadequate prevention and treatment.

References:
congenital etiology therefore basal values had to be considered bearing in mind that abnormal starting point. The evident improvement in NIRS values upon VM ligation made us expect a subsequent clinical improvement which did happen, making NIRS a helpful tool with prognostic implications.

Conclusion: Brain and somatic NIRS in pediatric patients is a non-invasive, safe and very useful tool to detect haemodynamic variations even before they have clinical significance. NIRS may also have a prognosis value.

References:

5376
Postoperative behavioral changes in pediatrics: an observational study
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Background and Goal of Study: postoperative behavioral disturbance is common in children, although the etiology remains unclear. The incidence is wide ranging in the literature from 10% to 80% (1). It is usually a self-limited phenomenon, but can be severe. The aim of this study was to determine the incidence of behavioral changes within our institution and identify which children are at increased risk.

Materials and Methods: a prospective observational study of 198 children aged 1 to 12 undergoing elective major surgery under general anesthesia. Data collected: sociodemographic, type of procedure, anaesthesia technique, and child anxiety. The presence of preoperative anxiety was assessed in the PACU using the m-YPAS (modified-Yale Preoperative Anxiety Scale), and the presence of negative postoperative behavioral changes (NPoBC) were assessed using the PHBQ (Post-Hospital Behavior Questionnaire), completed by parents 7-28 days postoperatively.

Results and Discussion: 60.1% of children the exhibited preoperative anxiety. The incidence of behavioral changes occurred in 18.1% on day 7 and 21.7% (43/198) on day 28. Multiple logistic regression identified the following risk factors: age, child anxiety and previous hospitalizations. There were no association between type of surgery, duration of surgery, sex and behavior changes.

Conclusion: Postoperative negative behavioral changes, such as nightmares and separation anxiety, may occur in up to 30% of all children undergoing general anesthesia. Data collected: sociodemographic, type of procedure, anxiety technique, and child anxiety. The presence of preoperative anxiety was assessed in the PACU using the m-YPAS (modified-Yale Preoperative Anxiety Scale), and the presence of negative postoperative behavioral changes (NPoBC) were assessed using the PHBQ (Post-Hospital Behavior Questionnaire), completed by parents 7-28 days postoperatively. Data were analyzed using logistic regression, with P<0.05 considered statistically significant.

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What’s in a name? – Revisiting the syndromatic appearing child (SAC) for surgery, post-diagnosis
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Background: Walker-Warburg syndrome (WWS) is a rare entity (~1:100,000) and is a marginalia of this case report. Professional and ethical dilemmas arise in anesthetizing a premature neonate pre- and post- his disorder’s diagnosis. We skipped possible MH triggers by TIVA, despite the 1st surgery. On day 118, MRR was sent to community nursing care.

Discussion: As we show above – what flew the first time can mean possible harm a second one. Previous case reports of WWS were uninformative as to a “second hit” effect, post-diagnosis.

References:

Learning points: SAC genetic status must be verified ad hoc preop.

5735
Separation of omphalophagous twins with a non-viable twin immediately after birth
Neonates, Anaesthesia, paediatric
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Background: Conjoined twins are a rare malformation occurring in 1:200,000 births. In some cases, such as when there is an non-viable fetus, separation must be done immediately after birth, because the death of the non-viable twin carries a high risk of death to the other twin (1).

Case Report: A 18-year-old pregnant woman with prenatal diagnosis of imperfect conjoined twin pregnancy (omphalophagous and heterophagous fetuses) during the third trimester of pregnancy. According to ultrasound, one of the fetuses (fetus 2) had multiple malformations (non-viable twin). The babies were born of elective CS in the third trimester of pregnancy. According to ultrasound, one of the fetuses (fetus 2) had multiple malformations (non-viable twin). The babies were born of elective CS. After delivery, a VP-shunt was inserted on day three. We anesthetized him as per hydrocephalus, brain-stem insufficiency and hypotonia percutaions on volatiles. He convulsed on day 7 and was put on anti-epileptics, albeit negative EEG. Definitive WWS diagnosis arrived on day 29. We were scheduled to anesthetize him on day 53, for a gastrostomy insertion and were grappling with the new percautions WWS entails. We skipped possible MH triggers by TIVA, despite the 1st surgery. On day 118, MRR was sent to community nursing care.

Discussion: As we show above – what flew the first time can mean possible harm a second one. Previous case reports of WWS were uninformative as to a “second hit” effect, post-diagnosis.

References:

Learning points: SAC genetic status must be verified ad hoc preop.
Parental anxiety for the surgical operation and anesthesia of their children and the need of informational programs

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Background and Goal of Study: Preoperative anxiety in children and their parents may lead to negative postoperative responses, which may cause long-term behavioral problems. The aim of this study was to assess the effect of specific demographic characteristics in parent’s and children’s preoperative anxiety and to investigate the desirable ways to control it.

Materials and Methods: A total of 228 Greek speaking children (1-14 years of age) who underwent routine surgery in our hospital. Before surgical operation the Spielberger State-Trait Anxiety Inventory questionnaire was completed by the parents. Children’s preoperative anxiety was evaluated using the Modified Yale Preoperative Anxiety Scale.

Results and Discussion: Independent predictors of increased anxiety levels in parents were child’s age (p=0.024) and gender (girls p=0.008), living in rural areas (parents: p=0.001; children: p=0.009), being a mother (p=0.046), high or low education level (p=0.031), a no premedicated child (p=0.007) and high baseline parental anxiety (p=0.003). Previous hospitalization (p=0.019), high situational parental anxiety (p<0.001), no premedication (p=0.014) and being the only child in the family (p=0.045) are found to be the main determinants of preoperative anxiety control in children. 74.2% of parents would like to be present at induction in anesthesia of their child. Mothers, younger parents (<35 years) with younger children (<5 years) and higher anxiety level, as well as parents whom third or older child is going to be operated express a greater desire to be present at induction in anesthesia. Other strategies that could help parents control their anxiety, according to their opinion, include a more detailed preoperative interview and informational program (89.5%), behavioral and psycho educational interventions (35.2%), clowns, toys and distraction activities (32.8%) and alternative medicine strategies like hypnosis, acupuncture and music therapy (10.2%).

Conclusion: Targeted policies of reducing preoperative anxiety should include parent’s presence during induction of anesthesia, a detailed preoperative interview and informational programs, behavioral and psycho educational interventions and various distraction activities. It is needless to point out that National European Societies of Anesthesiology should take care of creating national guidelines on how to manage this situation, regarding the presence of parents during anesthesia induction.

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Intranasal dexmedetomidine versus oral midazolam premedication for emergence delirium in children undergoing strabismus surgery: A randomized controlled trial

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Background and Goal of Study: Dexmedetomidine is increasing popular used as a premedication in the pediatric population. We examined the hypothesis that the prevalence of emergence delirium would be lower with intranasal dexmedetomidine compared with oral midazolam premedication in children following strabismus surgery.

Materials and Methods: One hundred and fifty-six participants scheduled for unilateral strabismus surgery were enrolled. Participants were randomized in a 1:1:1 ration to receive premedication with intranasal dexmedetomidine 2 μg/kg (the dexmedetomidine group), oral midazolam 0.5 mg/kg (the midazolam group), or 0.9% saline (the saline group). The primary outcome was the incidence of emergence delirium by the Paediatric Anesthesia Emergence Delirium (PAED) scale. Secondary outcomes included inhalational induction quality, emergence time, postoperative pain intensity, length of PACU stay and length of PACU stay.

Results and Discussion: The peak PAED scores (median, IQR) were (6.5 to 7.1) in the dexmedetomidine group, (8.5, 8 to 12) in the midazolam group, and (9.8 to 12) in the saline group (Figure 1). The incidence of emergence delirium was lower in patients given dexmedetomidine (6 of 52, 11.5%) compared with that in patients given midazolam (22 of 50, 44%; P < 0.001) or saline (25 of 51, 49%; P < 0.001). Likewise, the incidence of PONV was lower in the dexmedetomidine group (2 of 52, 3.8%) than that in the midazolam (1 of 50, 22%; P = 0.008) or saline (15 of 51, 29.4%; P < 0.001) groups. However, there was no difference between groups concerning postoperative pain scores and length of PACU stay.

Conclusion: Among patients undergoing strabismus surgery, intranasal dexmedetomidine 2 μg/kg premedication decreases the incidence of emergence delirium and PONV, and enhances inhalational induction quality and parents’ satisfaction compared to oral midazolam 0.5 mg/kg.

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Neonatal lengthy sevoflurane exposure causes long-term deficits in microglial morphology

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Background and Goal of Study: Lengthy exposure of general anesthetics causes neurobehavioral disorders in developing brain. However, the molecular and cellular mechanisms remain largely unknown. Microglia are resident macrophages in the central nervous system which play important roles in brain development. A hallmark of microglia is their highly ramified morphology and highly dynamic nature. General anesthetics could influence microglial morphology and surveillance. These study aims to explore the long-term effect of neonatal lengthy sevoflurane exposure on microglia morphology.

Materials and Methods: Seven-day-old C57BL/6 mice were randomly assigned to 2 groups. In the Sevo group, mice were exposed to 2.5% sevoflurane for 4 h. In the control group, mice were exposed to carrier gas (30% O2/70% N2) for 4 h. Fixed brain slices from P14 mice were immunolabeled for IBA-1 to visualize microglia. Images were acquired under confocal microscope and morphological analysis was performed using ImageJ and Imaris software. Serial block face scanning electron microscopy (SBF-SEM) was performed to examine the ultrastructure of microglia and synapse in P21 mice.

Results and Discussion: Confocal images showed that microglia display altered morphology after length sevoflurane exposure. Microglia in the Sevo group displayed reduced total branches length and reduced arborization area compared to the control group. Morphological 3D reconstructions of microglia further showed that microglia in the Sevo group had larger soma volume. Consistently, SBF-SEM results showed that the Sevo group mice had lower microglia volume fraction and reduced microglia processed number. Subtle morphological changes of microglia may affect microglia–neuron interactions. The SBF-SEM results showed that the number of microglia contacted synapse number and synapse surface were decreased in the Sevo group.

Conclusions: The light and electron microscopic data together demonstrate that lengthy sevoflurane exposure disrupts microglia morphology. Microglia–neuron interactions were also altered with decreased synapses contacted by microglia after lengthy sevoflurane exposure.

References:
Position of the largest cross-sectional area of the heart in pediatric patients with pectus excavatum: Implication of cardiac compression during cardio pulmonary resuscitation

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Materials and Methods: This retrospective study investigated the position of the largest cross-sectional area of the ventricles to determine the optimal location and depth for chest compressions in pediatric patients with pectus excavatum (PE). Chest computed tomography images of 94 pediatric PE patients before and after correction surgery were compared with normal patients. The transverse level of the largest cross-sectional area of the ventricles (Vmax) was considered the optimal cardiac compression level. To evaluate cardiac displacement, the length from the suprasternal notch (SSN) to Vmax (SSN-Vmax) was divided by the sternal length (SL) from the suprasternal notch to the xiphisternal joint (SSN-Vmax/SL). At Vmax, the proportional leftward deviation of the center of the ventricles from the midline versus transverse diameter of the thorax (LIDev) was calculated. The remaining internal thickness was calculated assuming the recommended chest compression depth (one-third of the anterior to posterior diameter).

Results and Discussion: Compared with the normal population (SSN-Vmax/SL, mean=71[SD=10.3%], LIDev, 6.9[2.7%]), pediatric PE patients showed significant caudal displacement of Vmax (SSN-Vmax/SL, 98.2[15.1%] before correction, P<0.001; 100.4[13.5%] after correction, P<0.001) and LIDev (16.2[5.3%] before correction, P=0.001; 13.2[4.8%] after correction, P=0.001). The remaining internal thickness assuming cardiac compression was <10 mm in 57.4% and 19.1% of pediatric patients with PE before and after correction, respectively.

Conclusion: Pediatric PE patients showed significant caudal and leftward deviation of the ventricles compared with the normal population despite correction surgery. In addition, the currently recommended compression depth would injure intrathoracic structures of pediatric PE patients during cardio pulmonary resuscitation.

The effects of shoulder roll on leak pressure and fiberoptic laryngeal view through a supraglottic airway device, i-gel, for children

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Background and Goal of Study: A folded towel is often used as a shoulder roll to cause extension of the head and open upper airway when we induce general anesthesia for children. Despite the usual advantages of shoulder roll in bag-mask ventilation, the impact of shoulder roll on i-gel was not fully elucidated. Therefore, the current study was designed to investigate the effects of shoulder roll on leak pressure, and fiberoptic view of the epiglottis in using i-gel.

Materials and Methods: Twenty pediatric surgical patients with 10 to 20 kg of weight were enrolled in this study. Before anesthetic induction, a folded towel was placed under the patient as a shoulder roll. After stepwise inhalation of sevoflurane, the size #2 i-gel was inserted in each patient (Position S). The leak pressure, tidal volume, and the fiberoptic glottis view through the proximal end of the device were simultaneously examined. The evaluations were subsequently repeated when after removing the shoulder roll (Position N). The fiberoptic view through the i-gel was graded as follows; score 1=full view of vocal cords; score 2=more than 50% of the visible cords and epiglottis; score 3=less than 50% of the visible vocal cords, arytenoid cartilage, and epiglottis, and score 4=only the epiglottis was visible without vocal cords and arytenoid cartilage. Data are expressed as mean (SD) except those of the fiberoptic view (median [interquartile range]). Student’s t-test and Wilcoxon-Mann-Whitney test were used to determine significance (p < 0.05), as appropriate.

Results and Discussion: The age, height, or weight of the enrolled patients was 3.7 ± 1.4 years, 98 ± 10 cm, and 16.0 ± 2.9 kg, respectively. The leak pressure was similar in both position [23.6±21 cmH2O (Position S) vs. 22.6±18 cmH2O (Position N); P=0.68]. Similarly, the tidal volume was not significantly different in both positions [17 ± 5ml kg-1 (Position S) vs. 19 ± 8 ml kg-1(Position N), P=0.35]. The fiberoptic score was significantly deteriorated in Position N [3(IQR:2-4)] than Position S [1(IQR:1-3);P < 0.01]. Sufficient ventilation was possible in the presence or absence of shoulder roll. However, placing the shoulder roll achieved a better fiberoptic view. These results suggest that the i-gel where shoulder roll placed is a useful conduit for fiberoptic-guided intubation via the i-gel.

Conclusion: Fiber optic view through i-gel is better in shoulder roll position.
the patients' parents. Randomization was achieved using the closed envelope technique. Exclusion criteria included known allergies to local anesthetics, infection or redness at the injection site, anatomic anomalies or coagulation disorders, liver diseases, or unwillingness to participate in the study. All blocks were performed by the same anesthesiologist after placement of a ProSeal laryngeal mask airway before surgery. Wound infiltration was done by the surgeon at the same time. Analgesic consumption (ibuprofen) within the first 24 postoperative hours, pain intensity scores (FLACC scale) at 60 minutes, 2, 6, and 24 hours after surgery, time in which the first analgesia was required, satisfaction levels of the parents (0-10), adverse events related to systemic analgesia and time to hospital discharge were evaluated and registered.

Results and Discussion: We found differences between both groups in ibuprofen consumption (80mg vs 185mg; p<0.01) and pain scores (FLACC) within the first 24 postoperative hours at each interval (p<0.02 for every point in time analyzed). Time in which the first analgesia was required was longer for the TQLB group (16 vs 10 hours; p<0.05). Satisfaction levels of the parents were also higher in the first group (p<0.05). Adverse events related to medication and time to hospital discharge showed similar results.

Conclusion: The results of this study showed that in paediatric patients undergoing unilateral inguinal hernia or orchiopexy the TQLB provided longer and more effective postoperative analgesia compared with wound infiltration and systemic analgesia.

Background and Goal of study: Atelectasis occurs in the majority of children during induction of general anesthesia. In clinical practice, the recruitment maneuver (RM) might be useful to prevent atelectasis. It has been shown to improve oxygenation and restore lung volume, and may improve ventilation perfusion ratio. Recently, a new procedure of RM was suggested; positive end-expiratory pressure (PEEP) is increased step by step to target pressure. Therefore, we assessed the effects on total volume (TV) and hemodynamics change before and after this RM in pediatric patients.

Materials and Methods: The pediatric patients (ASA-PS: I-II, aged 3 month to 6 yrs) underwent general anesthesia for elective dental or oral surgery. They were divided into three groups; Infant group (0-12 months), preschool children group (1-6 yrs) and school children group (7-10 yrs). Following tracheal intubation, mechanical ventilation was commenced in pressure-controlled manner with 15 cmH2O and a PEEP of 4 cmH2O. RM was performed progressively in steps by 5cm H2O every four breaths up to 35 cmH2O. Before and after RM, TV, heart rate (HR), blood pressure (BP) and SpO2 were recorded. The difference of these parameters before and after RM were analyzed statistically by Mann-Whitney U test.

Results and Discussion: A total of 60 patients were included; 20 in each group. TV and HR (before vs after RM) were 60.7 ± 9.9 vs 78.8 ± 14.0 mL (p<0.001) and 142.3 ± 13.0 vs 144.5 ± 12.7 bpm (p<0.01) in infant group. 140.1 ± 30.4 vs 168.2 ± 37.7 mL (p<0.001) and 124.5 ± 15.3 vs 127.5 ± 12.6 bpm (p<0.001) in preschool children group, 225.8 ± 56.7 vs 255.6 ± 57.0 mL (p<0.001) and 113.4 ± 19.1 vs 117.0 ± 18.4 bpm (p<0.001) in school children group. BP decreased by 5-10% after RM in all groups. There were no patients with respiratory (desaturation, barotrauma) and/or hemodynamics (hypotension) complications. RM might improve pulmonary oxygenation with hemodynamic stability, although HR increased by 2-17% after RM.

Conclusion: The RM increased TV significantly by 5-10% (17-30 mL), which might indicate reduction in atelectasis in pediatric patients after induction of anesthesia.

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Should we correct the fluid deficit in children fasting longer than the recent Preoperative Fasting Consensus Statement?

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Background and Goal of Study: Although the most recent guidelines recommend shortening the fasting time for children undergoing surgery [1] which are now allowed to drink clear fluids until the last hour, some children still do not drink for a longer time. The goal of this study is to evaluate whether the correction of this fluid deficit would improve their hemodynamic. The response to fluid bolus administration was assessed measuring the transhantaric aortic velocity-time integral (AoVTI).

Materials and Methods: Observational, prospective study. 30 patients were included, aged 3 to 6, classified as ASA I and scheduled for one-day surgery. The mean fasting time for liquids was 9h54min (Standard deviation +/- 4h13min). Anaesthetic management was standardized; maintained by intraveinous sevorfunale kept at 1.0 MAC during the measurements. Heart rate, non-invasive blood pressure and the AoVTI (mean of 3 AoVTI measures) were registered 5 minutes after induction; after a passive leg-rease test (PLR); after a FBo of 20 ml/kg of a crystalloid solution. Stroke Volume (SV) was calculated by AoVTI × Area of Left Ventricular Outflow Tract. The cut-off was set at 15% increase of SV [2]. Data was analysed using Microsoft’s Corporation Excel 2019® and RStudio Desktop®. Correlation coefficients was used to compare the variation of the SV and the number of hours fasting. A ROC curve was built for the correlation between SV variation and the number of hours fasting.

Results and Discussion: No differences were found on the SV before and after the PLR. A 23% increase of the SV after the FBo was found. We found no linear correlation between the number of hours fasting and the variation of the SV (p=0.0820). The ROC curve showed no correlation between the fasting duration and the variation of the SV after FBo.

Conclusion: Our study did not find a relation between the duration of the preoperative fasting period and the responder status to a FBo. Therefore, in children aged 3 to 6, a prolonged preoperative fasting does not seem to reduce intravascular volume in a significant manner and the usual habit of correcting this deficit does not seem useful.

References:

5320
Dexmedetomidine provides neuroprotection against hypoxia-induced neurotoxicity via the inhibition of microglial NOX2 activation in the hippocampus of neonatal rats

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Background and Goal of Study: Perinatal hypoxia remains a major cause of death and neurodevelopmental disability. Microglial activation contributes to hypoxic injuries in the developing brain. NOX2 (also known as gp91phox), a key isoforms of NADPH oxidase, is a predominant source of reactive oxygen species (ROS) overproduction in microglia. Dexmedetomidine (Dex) exhibits potent neuroprotection in brain injury models. However, the mechanisms of Dex for hippocampal neuroprotection remain elusive. The aim of this study was to investigate the neuroprotective effects of Dex after neonatal hypoxic brain injury and examine in vivo and in vitro whether such actions reflected modulation of microglial NOX2 activation.

Materials and Methods: Postnatal day 3 (P3) rats were subjected to hypoxia exposure (5% O2, 2 h). The effect of Dex (25µg/kg) on hippocampal microglial activation and cognitive function was evaluated up to 28 days after hypoxic injury. By using a rat hippocampal neuronal-microglial in vitro co-culture model, we further assessed Dex modulation of hypoxia (1% O2 for 12 h) - induced microglial reactivity and neurotoxicity.

Results and Discussion: Dex significantly improved spatial learning and memory ability after neonatal hypoxia. The functional improvement with Dex was associated with suppressed microglial activation, reduced pyramidal neurons loss and improved synaptic plasticity in the hippocampus. Importantly, Dex attenuated hypoxia-induced oxidative stress, as evidenced by downregulated NOX2 protein expression.
Ultrasound-guided cannulation of the brachiocephalic vein in neonates and infants

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Background and Goal of Study: Central venous catheter (CVC) insertion in neonates and small infants is a challenging and high risk procedure. Ultrasound (US) guided cannulation increases the success rate and reduces procedural-related complications. US-guided supraclavicular cannulation of the brachiocephalic vein (BCV) in-plane approach is a new approach that may be advantageous in case of difficult central venous catheterization.

Materials and Methods: After obtaining Informed Consent from parents, the study was conducted as per the protocol approved by internal review board. We performed a retrospective analysis of all CVC cannulations placed in neonates & infants who underwent cardiac surgical operation and in NICU & PICU units during calendar year 2019 in our department. For cannulation of the BCV, an in-plane technique was used to guide the needle into the target vein. The use and management of a central line was reviewed by trained nurse and Pediatric anesthesia fellows until the patient was discharged from the hospital. Analysis of the data was performed using simple comparative statistical methods.

Results and Discussion: Ninety Six patients were identified, 41 were neonates weighing <3 kg and 55 were infants weighing >3 kg. Cannulation was successful in all patients. No significant late complications like thrombosis, infection or pneumothorax occurred. Catheters were well tolerated post-operatively, with no accidental dislodgement and no removal because of discomfort like redness or fever. CVCs were withdrawn within 6-15 days.

Conclusion: The US-guided Supraclavicular in-Plane approach to the BCV is a feasible and safe alternative in neonates and infants. It has lesser chances of pleural puncture. It is also well tolerated by Neonates & Infants.

References:

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The heart rate variability derived Newborn Infant Parasympathetic Evaluation (NIPETM) Index for monitoring intraoperative analgesia in children aged 0-2 years under general anaesthesia – an observational pilot study

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Background and Goal of Study: Depth of anesthesia measurement via protective EEG has become clinical standard in anaesthesia, whereas intraoperative nociception measurement is judged by indirect surrogate parameters such as heart rate or blood pressure increase. Intraoperative pain therapy may be improved by continuous measurement of the parasympathetic tone. Recent studies have shown that monitors that derive an index through variations in respiratory sinus arrhythmia have diagnostic value for detecting surgical stimuli in children 2 years and older1, but so far only few measurement data are available in neonates and infants <2 years. With the presented trial, we would like to investigate the feasibility and reliability of intraoperative nociception measurement with this new approach.

Materials and Methods: After approval by the local ethics committee, 54 children with a total of 63 surgical procedures were analysed (weight 6.5 +/- 3.3 [mean +/- s.d] kg). The derivation for the NIPETM monitor (MDMS, Germany) was non-invasive via the routinely derived ECG signal and data were recorded during general anaesthesia. A NIPE value below 50 and 70 is considered to be optimal, whereas values below 50 indicate a lack of analgesia and a sign of a hemodynamic reaction. Values above 70 indicate an overdose of analgesia. We considered the following as painful events to correlate with the NIPE value: venous access, skin incision, intubation and administration of propofol. The relative decrease of the NIPE-Index was analysed in dependence of the different noxious stimuli and correlated with an increase of the heart rate. The binominal test was used for statistical evaluation.

Results and Discussion: We could show a significant decrease of the NIPE-Index following the painful events, 19.2% after venous access, 16.5% after skin incision, 29.2% after intubation and 17.4% after propofol bolus, respectively (p<0.05). Analysis of heart rate variation was significantly less reliable than NIPE measurement in detecting painful stimuli.

Conclusion: The NIPE-Index reacts adequately – and more precisely than HR - to noxious stimuli of children under two years of age and might be a feasible tool for optimizing intraoperative pain management.

References:

Acknowledgements: This abstract contains part of the doctoral thesis of T. Babasiz.

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Confirmation of an intravenous catheter placement by normal saline flush test with color doppler imaging in pediatrics

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Background and Goal of Study: In recent years, the use of ultrasound (US) to facilitate intravenous (IV) access in children has increased. In addition to placement, US can also be used to confirm whether the IV cannula is properly positioned in the vein. One of the techniques used for this purpose is observation of a change of the color doppler imaging (CDI) at the proximal site when normal saline is injected. However, no previous study in adult or pediatric patients has determined the volume of normal saline for detecting the change of CDI when IV cannula is placed. The NIPE-Index reacts adequately – and more precisely than HR - to noxious stimuli of children under two years of age and might be a feasible tool for optimizing intraoperative pain management.

Materials and Methods: After IRB approval, we conducted an observational pilot study 54 children with a total of 63 surgical procedures were analysed (weight 6,5 +/- 3,3 [mean +/- s.d] kg). The derivation for the NIPETM monitor (MDMS, Germany) was non-invasive via the routinely derived ECG signal and data were recorded during general anaesthesia. We noted the amount of normal saline injected when the CDI was observed at a speed of 1 mL/second using a 5 mL syringe while observing the color doppler imaging. We performed the color doppler imaging (CDI) at the proximal site when normal saline is injected. We used and management of a central line was reviewed by trained nurse and Pediatric anesthesia fellows until the patient was discharged from the hospital. Analysis of the data was performed using simple comparative statistical methods.

Results and Discussion: We could show a significant decrease of the NIPE-Index following the painful events, 19.2% after venous access, 16.5% after skin incision, 29.2% after intubation and 17.4% after propofol bolus, respectively (p<0.05). Analysis of heart rate variation was significantly less reliable than NIPE measurement in detecting painful stimuli.

Conclusion: The NIPE-Index reacts adequately – and more precisely than HR - to noxious stimuli of children under two years of age and might be a feasible tool for optimizing intraoperative pain management.

References:

Acknowledgements: This abstract contains part of the doctoral thesis of T. Babasiz.
Right Ventricular Myocardial Performance Index as a marker of right ventricular suffering in children with Respiratory Distress Syndrome

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Background: As a noninvasive Doppler measurement of global ventricular function the right myocardial performance index (RVMPI) incorporates both systolic and diastolic function of the right ventricle (RV). RVMPI is defined as ratio of the sum of the isovolumic contraction time (IVCT) and isovolumic relaxation time (IVRT) divided by the systolic ejection time (ET) (1).

Case Report: We report a 6 months old male child admitted in our surgical PICU because of ileus and respiratory insufficiency due to pulmonary infection. At the 3rd day since PICU admission the child developed ARDS. During the PICU stay we made a few bedside echocardiographic examinations in which we found continuously progressive rise of the RVMPHI followed with right ventricular dilatation and poor gas exchange with elevated pCO2 levels and low pO2.

Discussion: RVMPI values provide comprehensive information regarding systolic and diastolic right ventricular function in real time (2). RVMPI was found to be elevated in pediatric patients with either idiopathic or secondary PAH. Development of secondary PAH in children with ARDS leads to right ventricular suffering and dysfunction. Because RVMPHI measurements and trends correlated with invasive measurements of mean pulmonary arterial pressure (MAPP) it can be considered as a marker of PAH. Studies in children with RV volume and pressure overload have demonstrated the feasibility of measuring this index in the pediatric age group (1). As we’ve found in our case, RVMPHI was increased in patients with combined pressure and volume overload according to Kubr et al. With repetitive measurements we found progressive rise of the RVMPHI values which correlated with the clinical presentation, severity and progression of the disease.

References:

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Clonidine for Tourniquet-related Pain in Children (CLOTCH) - Study: a pilot study protocol

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Background: Surgical tourniquets are used in pediatric limb surgery to facilitate fine tissue handling in a bloodless field. Severe post-procedural pain due to ischemia-reperfusion-injury (IRI) is a known complication. As a consequence, infants and children are likely to require supplementary opioid analgesics and prolonged stays in recovery, delaying mobilization and feeding. Clonidine, an alpha-2-adrenoceptor agonist reducing sympathetic outflow, might alleviate IRI-induced vasoconstriction and reduce pain and opioid use. We hypothesize that administration of clonidine to pediatric patients undergoing limb surgery with the use of inflatable tourniquets will reduce post-procedural pain.

Materials and Methods: In this randomized, double-blinded clinical study we will associate a single dose of clonidine (3mcg/kg) or placebo (isotonic saline) prior to tourniquet inflation and to amount of opioid administered from anesthesia induction to 24 hours postoperatively (T24). Further, time spent at recovery, pain during recovery and occurrence of emergence delirium (ED) will be assessed. Twenty children <15 years classified as ASA I-II and scheduled for limb surgery with tourniquet in general anesthesia (GA) will be included. On these pilot results we will base the sample size for a future trial. The study outline is illustrated in figure 1. Results: Primary outcome: morphine (mg/kg) administered from end-of-incision (TO) through T24. Secondary outcomes: total amount of morphine administered (mg/kg) from end-of-incision (TO) to transferal to the pediatric ward (TREC-END) and from TREC-END until T24. Further, duration of recovery (TREC-total), pain at Recovery by FLACC and VAS score and occurrence of ED by PAED scale will be assessed.

Conclusion: This randomized, double-blind, clinical pilot trial will be the first study to investigate the effect of single-dose administration of clonidine on opioid use and severity of pain in infants and children undergoing limb surgery with tourniquet use in GA. A positive association between clonidine and reduction of opioid use would suggest IRI as the pathophysiologic mechanism inducing tourniquet-related pain in children.
Complication of Hickman catheter placement in a pediatric patient. Case report

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Background: The channeling of a central venous catheter is an invasive technique, with an incidence of mechanical complications of 2% to 15%, and occasionally may become life threatening. One of the most common mechanical complications is accidental arterial puncture.

Case Report: We present the case of a 11 year old child, diagnosed with Ewing costal sarcoma. He's scheduled to channel the left subclavian vein with a Hickman for anatomical references. There was no incidence. Six hours after the procedure, the child begins with hypotension, tachycardia, breathing difficulty and anemization. A concentrate of blood is transfused, and we did a thorax radiography, where we observed a massive pleural effusion and collapse of the lung. We transfer the patient to the interventional radiology room to do an arteriography identifying occlusion of the internal mammary artery. The findings suggest the possibility that venous catheterization to the left subclavian vein by anatomical references is associated with a higher rate of complications. Using ultrasound to channel the subclavian vein can help to decrease the complications associated with puncture by allowing direct visualization of the vascular structures, needle and pleura during the procedure.

Discussion: Central venous catheter insertion is an essential procedure in critically ill children. In the paediatric population it is a more difficult technique due to the lower caliber of the vessels and the proximity of other structures, so the most effective and safest techniques need to be used in them. The channeling of the subclavian vein by anatomical references is associated with a higher rate of complications. Using ultrasound to channel the subclavian vein can help to decrease the complications associated with puncture by allowing direct visualization of the vascular structures, needle and pleura during the procedure.

References:
2. Central venous catheter insertion in small infants is a challenging and high risk procedure. Ultrasound guided cannulation increases the success rate and reduces procedural-related complications.

The importance of monitoring and fluid management of acute pancreatitis in the PICU: a case report

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Background: The incidence of acute pancreatitis (AP) in children has been increasing in recent decades. According to INSPPIRE criteria, a diagnosis of AP requires 2 of the following: abdominal pain compatible with AP, ≥3 times serum amylase and/or lipase values and imaging findings consistent with AP(1).

Case Report: We present 12 –yr- old female patient admitted in the PICU with clinical presentation of acute abdomen. Laboratory analysis and contrast-enhanced CT (CECT) were inconsistent, so the surgeon decided to make exploratory laparotomy. Intraoperatively edematous pancreas and ductoholcion were found and three intra-abdominal drains were placed. The patient was hemodynamically stable during the operation. Postoperatively we placed central venous catheter (CVC) and epidural catheter (EDC). In the first 48 hrs we maintained IV fluid therapy as a mainstay, gastroprotectives drugs, antibiotic therapy and epidural analgesia with continuous bupivacaine. Adjuvant opioid and non-opioid analgesia were also given.

Discussion: Postoperatively we placed central venous catheter (CVC) and epidural catheter (EDC). In the first 48 hrs we maintained IV fluid therapy as a mainstay, gastroprotectives drugs, antibiotic therapy and epidural analgesia with continuous bupivacaine. Adjuvant opioid and non-opioid analgesia were also given.

References:

Characteristics of Noninvasive Hemoglobin Monitoring in Children With Low Hemoglobin Levels

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Background and Goal of Study: Using non-invasive monitors for measurement of blood hemoglobin could save time and avoid excessive blood sampling especially in children. The accuracy of pulse co-oximetry-derived non-invasive hemoglobin (Sp-Hb) in children with low hemoglobin levels was not adequately evaluated. The aim of this work is to evaluate the accuracy of Sp-Hb in children with low hemoglobin levels.

Materials and Methods: A prospective observational study included children whom weight was between 3kg and 20 kg, with blood hemoglobin < 10 g/dL. Time-matched samples were obtained from the children to measure laboratory hemoglobin (Lab-Hb) with concomitant recording of Sp-Hb. Sp-Hb was measured using Radical-7 pulse co-oximeter, Maxima corporation, Irvine, CA). Pearson’s coefficient was calculated for the correlation between Sp-Hb and Lab-Hb. Bland-Altman analysis was performed for the mean bias and limits of agreement between the two monitors. Results and Discussion: Fifty-four samples were obtained from 36 children. Mean lab-hb for all samples was 9.2±1 g/dL and mean Sp-Hb was 9.4±1.42 g/dL. The correlation between both hemoglobin measures was moderate (Pearson correlation coefficient (r): 0.673). The mean bias between Lab-Hb and Sp-Hb was -1.2 g/dL with limits of agreement: -3.3 g/dL to 0.8 g/dL. The Sp-Hb values were higher than Lab-Hb in 40 pairs (89%) of readings.

Conclusion: Referring to the large mean bias (1.2 g/dL) and wide limits of agreement (-3.3-0.8 g/dL), Sp-Hb showed limited accuracy for measurement of blood hemoglobin in children with low hemoglobin levels. However, we reported the Sp-Hb overestimated the hemoglobin level in 89% of readings. Thus, if Sp-Hb had shown a certain value, we can suggest that Lab-Hb would have, most probably, a higher value.

Continuous Erector Spinae Plane (ESP) block as a therapeutic strategy for postoperative analgesia in surgery of Wilms Tumour: A case report

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Ultrasonography (US) guided Erector Spinae Plane (ESP) block is a readily effective procedure which has demonstrated to be safe as a regional anaesthetic strategy for postoperative analgesia in varied surgical fields. Currently its use as an analgesic technique has spread to areas such as major abdominal and thoracic surgical procedures along with paediatric interventions. There are few reports of ESP block in paediatric cases undergoing nephrectomy for Wilms Tumor. We report a case of a six year old, 16 kg patient who was diagnosed with stage III, right-sided kidney mass suggestive of a nephroblastoma and therefore scheduled for unilateral nephrectomy and tumour excision procedure, in which a US guided continuous ESP block in paediatric cases undergoing nephrectomy for Wilms Tumor. We report a case of a six year old, 16 kg patient who was diagnosed with stage III, right-sided kidney mass suggestive of a nephroblastoma and therefore scheduled for unilateral nephrectomy and tumour excision procedure, in which a US guided continuous ESP block was performed at T6 level by insertion of an epidural catheter. No complaint of pain was reported on immediate postoperative period not even up to the next 48 hours and opioid requirement was diminished. Despite there is a lack of randomized multicenter clinical assays evaluating ESP block effectiveness as an analgesic technique for post-nephrectomy pain treatment in paediatric patients, this procedure profiles as a promising strategy to be considered in paediatric anaesthesia.
Incidence of coagulation disorders in children undergoing surgery in an university pediatric hospital

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Background and Goal of Study: There is controversy surrounding coagulations test in the preoperative study. We aimed to determine the incidence of disorders in coagulation test in patients undergoing surgery and find out the incidence of altered partial thromboplastin time ratio, prothrombin time, platelets and fibrinogen in children without previously known coagulation disorders.

Materials and Methods: This retrospective observational study included children that were studied before a surgery from January to April of 2016 in the Pediatric Hospital Vall d’Hebron. We collected demographic data, previously diagnosed coagulation disorders, altered partial thromboplastin time ratio (aPTT), Prothrombin time (PT), platelets and fibrinogen. Collected data is reported in quartiles, median and mean. Mann-Whitney U test was used to analyse the statistical significance.

Results and Discussion: 1,087 cases were reported, the mean age was 5.89 years, 43.21% were women and 56.78% were men. 2.57% (28 patients) had previously known coagulations disorders. In this group, 8 patients (28.57%; 0.73% out of all the cases) had altered Prothrombin time, 13 patients (46.42%; 1.19% out of all the cases) had an alteration of aPTT ratio, altered fibrinogen was reported in 2 cases (7.14%; 0.19% out of all the cases) and 2 patients had altered platelets (7.14%; 0.19% out of all the cases). 1,069 cases out of 1,087 had no previously known coagulation disorders. In this group the following disorders were reported: PT in 75 cases (7.14%; 0.19% out of all the cases), aPTT ratio in 133 cases (12.60%; 12.23% out of all the cases), fibrinogen in 8 cases (0.75%; 0.73% out of all the cases) and platelets in 2 patients (0.75%; 0.73% out of all the cases). There is a statistically significant higher incidence of altered aPTT (p < 0.05) and PT (p < 0.05) in patients with known coagulation disorders than in not previously diagnosed coagulation diseases. There is no statistically significant difference in altered fibrinogen or platelets between patients with or without coagulation disorders.

Conclusion: Patients with coagulation disorders have more frequently altered coagulation test than patients without coagulation related diseases. TTPA is the most frequently altered value in coagulation tests in patients without known coagulation disease.

References:

Learning points: Newborns and infants are always at risk for difficult intubation. VL must be present at OR. If first attempt of intubation with DL could not achieved, second attempt should be tried immediately with VL no matter what size of blade is available.

Kids are tiny, blades are mighty: Size at age blades of videolaryngoscope may be a life-saver in an unexpected difficult intubation

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Background: Difficult intubation is more prevalent in premature/low birth weight newborns and infants and cause for mortality (1). Difficult airway equipment is still not adequate to manage newborn and low weight infants. Videolaryngoscope (VL) should always be ready for pediatric anesthesia. We present our intubation experience with mismatch VL equipment in three pediatric patients, one of them in emergency situation with CPR and the other one we used adult angulated blade of VL.

Case Report: Informed consents were obtained from all patients/parents. Patients characteristics and prognosis was summarized at Table 1. Induction and intubation conditions and characteristics was summarized at Table 2.

Discussion: More than two direct laryngoscopy attempts in children is associated with higher complication rates (2). There is no consensus on difficult intubation that which is a better option for infants, DL or VL. Difficult airway trolley should be ready for newborn and infants in OR even if there is no expectation of difficult intubation. If appropriate VL blade size is not accessible thereat, size at age blades and/or adult-sized angled VL blades in hand should be employed.

Practical and Cost-Effective Vascular Detection in Neonate by Transillumination: Can Flashlight of a Smart Phone be Used?

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Background: Peripheral vascular cannulation includes several difficulties for newborns and infants. In this case report, evaluation of efficiency and practicability of smartphone integrated flashlight for visualisation of peripheral veins by transillumination on a newborn with difficult vascular access is aimed.

Case Report: A two-day old, 2380 gr, term (38. gestational week) newborn with low birth weight was taken to operation theatre by Paediatric Surgery for elective colostomy opening surgery due to anal atresia. Although careful inspection of all four extremities, an apparent venous structure could not be observed (Figure 1). Upon this, flashlight of the smartphone was activated and the phone was placed from the opposite angle adjacent to the skin of the exposed extremity for venous access. Below the lateral malleolus of the right foot, an atypical area for peripheric vascular access, normally an unapparent and unpalpable vessel was highlighted horizontally via transillumination. After visualisation of the venous structure via transillumination, a 24G branule was placed to the vessel at the first attempt (Figure 2).

Discussion: Newborns and infants have extremely few peripheric venous structures available for venous access. Thus, requirement to devices that provide assistance and guidance for difficult venous access cases is gradually increasing. In conclusion; due to absence of randomized controlled trials on usage of phones flashlight for transillumination and possible technical characteristic variations between flashlights of different phone brands, it seems difficult to standardize the usage. But due its efficiency, cheapness and practicality; we believe that further studies can be helpful and provide great convenience to the operators.

References:
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Prevaling practices in airway management in an University Paediatric Hospital

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Background and Goal of Study: Airway management during anaesthesia has potential difficulties and risks. We aimed to investigate the current practice of the different techniques of airway management between the anaesthetists in a children’s hospital and determine the incidence of difficult intubation.

Materials and Methods: This is a single-centre retrospective observational study. All patients less than 16 years old undergoing elective and urgent surgery in 2018 in Vall d’Hebron University Hospital at the surgical area of the Children’s Hospital were included. Demographic data, difficult intubation (more than two attempts to intubate) and technique anaesthetic was collected and analysed. The incidences were represented as 95% confidence intervals (CI), categorical variables were represented as percentages.

Results and Discussion: A total of 3,435 patients were included, of which 61% were male. The median age was 6.38 years (IQR 2.46 – 11.17). Six per cent of the patients were transferred from other units with endobrachial tube or tracheostomy in situ. Sedation technique without instrumentation was performed in 8% of patients. Laryngeal Mask was used as the first equipment of choice for 46% of patients compared to tracheal intubation in 40%. We recorded 1,395 encounters that underwent intubation in operating theatre. The incidence of difficult intubation was 4.86% (95% CI: 3.64 – 5.94). Incidence of difficult intubation by age group (95% CI): - Neonate: 7.31% (1.91 - 21.00); < 1 year: 5.08% (2.50 - 9.73); > 8 years: 3.84% (3.51 - 7.55); < 8 years: 4.34% (3.13 - 5.98). The traditional Macintosh laryngoscope was used as the first-choice equipment in 96.5% of the cohort. Videolaryngoscopes were used in 3.23%, such as Airtraq (80%), GlideScope (20%). The rate of usage of flexible bronchoscopic-assisted intubation was <1%.

Conclusion: The incidence of difficult intubation was 4.66% and the age group with high percentage was neonates. This is similar to what was obtained in other studies. The traditional Macintosh laryngoscope is the prevailing practice for intubation in our institution. The most common videolaryngoscope used is the Airtraq.

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Multimodal anesthesia in a patient with congenital insensitivity to pain with anhidrosis (CIPA): case report

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Background: Congenital insensitivity to pain with anhidrosis (CIPA) is an inerfrquent (1/125.000.000 patients) autosomal recessive disorder characterized by insensitivity to pain, anhidrosis and recurrent episodes of hyperpyrexia. Patients with this disorder are more likely to develop perioperative complications, such as hyperthermia, hypotension or bradycardia, so the anaesthetic management must be adequately planned.

Case Report: A 15 year-old woman was scheduled for a surgical drainage of a L5-S1 spondylodiscitis secondary to a systemic dissemination of a chronic foot infection. She was diagnosed of CIPA at the age of 6 months, and, during her childhood, she presented various infections secondary to non-treated injuries. The drainage was performed under general anesthesia, using a multimodal analgesic protocol to control the hemodynamic response to surgical trauma that included fentanyl, ketamine, lidocaine and paracetamol. Apart from a mild and transient hemodynamic response observed during tracheal intubation, the intervention ran uneventfully. Once awake, the patient was transferred to the post anesthetic care unit, where she stayed for 18 hours with no pain or complications.

Discussion: Most perioperative complications in patients with CIPA are due to autonomic nervous system dysfunction, which should be prevented. An intraoperative multimodal analgesia titration could control the surgical stress response and promote hemodynamic and temperature stability. The low incidence of this disease limits the performance of randomized controlled studies to establish the most appropriate anesthetic management.

References:

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What is a paediatric anaesthetic fellowship and what are the key components of an advanced paediatric anaesthetic training program?

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Background and Goal of Study: Advanced paediatric anaesthetic training or ‘fellowships’ may vary widely. The term ‘fellowship’ is a particularly heterogeneous term. There is a paucity of guidance regarding the key components of fellowship training programs in paediatric anaesthesia. With no formal definition of a paediatric anaesthetic fellowship or the specific components or goals of training, it is difficult to design, evaluate or improve paediatric anaesthetic training programs. The aim of this qualitative research was to identify the key components of an effective advanced paediatric anaesthetic training program.

Materials and Methods: Focus groups and questionnaires were used to collect data from paediatric anaesthetic fellowship trainees and specialists in various Australasian tertiary paediatric centres. Deidentified data underwent rigorous thematic analysis to explore the opinions of paediatric anaesthetic advanced trainees and specialists to identify and determine the relative value of key components of an ideal paediatric anaesthetic training program. Educational methods, training goals and training expectations were discussed and evaluated. Trainees and specialists evaluated their local fellowship training program.

Results and Discussion: Trainees and specialists defined key components of a paediatric anaesthetic fellowship, with relatively similar results between groups. Trainees and supervisors identified that ideal training covered core types of surgeries, patients and procedures, with a minimum volumes and observed practice. Trainees and supervisors thought that learning by various methods was important but that effective feedback, supervised practice and increasing autonomy were most important in developing clinical skills. Trainees and specialists differed in their evaluation of their local training program.

Conclusions: A paediatric anaesthetic fellowship has widely variable definitions and components. Advanced paediatric anaesthetic training programs should ideally include clearly defined core components but also be individualised to encompass widely heterogeneous training requirements by trainees. Training goals should be regularly their achievement re-evaluated during training. Regular, appropriate feedback, supervised practice and increasing clinical autonomy were considered effective educational approaches.
The neurotoxicity of JM-1232(−): a novel isoidoline derivative

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Background and Goal of Study: In animal models, neonatal exposure to general anesthetics significantly increases apoptosis in the brain with persistent behavioral deficits in adulthood. Consequently, there is growing concern about the use of general anesthetics in obstetric and pediatric patients. JM-1232(−) is an isoidoline derivative being developed as a potential intravenous anesthetic agent, which acts through γ-aminobutyric acid (GABA) receptor. The current study sought to investigate the effects of JM-1232(−) on the developing brain in the mice.

Materials and Methods: Animals: C57BL/6 mice at postnatal day 6 (P6). Anesthesia: Mice were intraperitoneally administered (IP) as follows: 0 mg/kg (vehicle), 5 mg/kg, 10 mg/kg or 20 mg/kg of JM-1232(−), 1 mg/kg, 3 mg/kg, or 9 mg/kg of midazolam, and 1%, 2%, and 3% of propofol. Loss of righting reflex was used as a measure of sedative effect of drugs. Twenty minutes after the administration, the mouse was placed in the supine position and the time taken to correct its posture was evaluated. Apoptosis analysis: Apoptosis was evaluated by western blot analysis using anti-cleaved PARP antibody. Statistical analysis: Statistical analysis was performed using R (version 3.3.1) and GraphPad Prism 8. Comparisons of the means of each group were performed using a one-way ANOVA followed by Bonferroni post hoc test.

Results and Discussion: Similar sedative effects were demonstrated by 10 mg/kg of JM-1232(−), 9 mg/kg of midazolam, and 2% of propofol. The administration of JM-1232(−), midazolam, and propofol induced significantly more expression of cleaved PARP compared with vehicle controls with dose-dependent effects (one-way ANOVA: JM-1232(−): F=10.1, P=0.002, midazolam: F=21.8, P=0.001, propofol: F=94.9, P=0.001). At the dose of the same sedative effects, JM-1232(−), midazolam, and propofol induced a 2.1, 3.2, and 2.9-fold increase in the expression of cleaved PARP over the vehicle group. The PARP expression by JM-1232(−) was significantly less than the other two anesthetics (multiple t test, vs. midazolam: t=7.49, P<0.05, vs. propofol: t=6.25, P<0.001). Our results show that JM-1232(−) has a significantly less apoptotic effect on the developing brain compared with other intravenous anesthetics.

Conclusion: JM-1232(−) is less neurotoxic than other intravenous anesthetics.

Development New Model of Traumatic Brain Injury in adult rats

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Background and Goal of Study: A common experimental rodent model for stroke includes induction by a technique in which middle cerebral artery (MCAO) is occluded by catheterization. However, this model has prominent disadvantages which consist of the high variability of localization and size of the ischemic area, cases of intracranial hemorrhage and high mortality. Furthermore, the duration of a single MCAO operation takes about thirty minutes and requires highly trained staff.

In this article, we propose an alternative method which is based on laser-induced stroke in the motor cortex. In our research, we compared the original MCAO model and novel laser model.

Materials and Methods: A total of 210 male Sprague-Dawley rats weighed 300 to 350 g each was bought for this experiment. Initially, rats were randomly assigned to laser groups (120 rats) or to control MCAO groups (90 rats).

Results and Discussion: Compared with the impact of original MCAO technique on brain tissue, the minimally invasive laser model demonstrated a decrease in variability of body temperature, infarcted volume, blood brain barrier breakdown and brain edema. Furthermore, the novel model demonstrated a prominent decrease in mortality and intracranial hemorrhage. Additionally, damage to the brain tissue in laser groups occurred only in the region of the motor cortex, without involving the striatal area.

Conclusion: Model of laser irradiation can serve as an effective method of inducible brain cortical infarction and may lead to a better understanding of the pathophysiology of ischemic stroke and the future development of new drugs and other neuroprotective agents.

Assessment of three main parameters of brain injury after Middle Cerebral Artery Occlusion in Adult Rats

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Background and Goal of Study: One of the most common causes of morbidity and mortality worldwide is ischemic stroke. One of the animal models of simulating ischemic stroke is Middle Cerebral Artery Occlusion (MCAO). Infarct zone, brain edema and BBB brake-down are used as parameters that reflect the extent of brain injury after MCAO. At that moment, measuring these three items is only possible using different 3D technics applied on three different sets of rat brain sample. This represents a major limitation when it comes to economic and ethical approach for research. The following work examines an alternative way to measure these three items in the same set of rat brain, giving us a more efficient way for stroke study.

Materials and Methods: Adult male Sprague-Dawley rats weighing 350-400 gr were randomly divided in to two groups. The first group post-MCAO (n = 26) was used to measure infarct zone, brain edema and BBB permeability parameters. The second group was used as sham-operated control group (n = 16).

Results and Discussion: There was an increase in infarct volume (p<0.01), brain edema (p<0.01) and BBB breakdown (p=0.01) in rats following middle cerebral artery occlusion measured in the same set of rat brain sample and compared to the sham operated control group.

Conclusion: The results of this work demonstrate that measuring the three parameters for assessing brain injury, meaning- infarct zone, brain edema and BBB permeability, using the simulating method of middle cerebral artery occlusion can advantageously be used in the same set of brain sample where for this novel technic represents an important advance in ischemic stroke research and treatment.

Molecular dynamics of GSH, AKT and xCT expression for Sepsis Associated Encephalopathy in Cyclophilin D KO mouse

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Background and Goal of Study: Sepsis Associated Encephalopathy(SAE) is a diffuse brain dysfunction as a result of a systemic inflammatory response due to infection. Involvement with central nervous system effects and mitochondrial dysfunction has been suggested, but the mechanism is unknown. Involvement with reactive oxygen species production in mitochondrial dysfunction has been suggested. Some people suggest that Mitochondrial Permeability Transition Pore (MPTP) due to activation of Cyclophilin D (CypD) and plays a critical role of cell death. This time we focused on GSH, AKT (serine/threonine protein kinase) and xCT (cystine/glutamate antipporter) to consider the onset mechanism of SAE. AKT is known as a cell growth factor signaling molecule that contributes to growth promotion and cell survival, and involved in signal transduction related to xCT activation. Moreover, xCT takes an important role on an uptake course of cystine which is necessary for GSH production. So we analyzed the relationship between GSH, AKT and xCT for the molecular mechanisms of SAE.

Materials and Methods: Male C57BL/6J wild mice(WT group) and CycD KO mice(KO group) at 10-16 weeks of age were anesthetized with 4% sevoflurane and performed CLP(Cecal Ligation and Puncture). Sham group underwent a middle abdominal incision to expose the cecum, but was neither ligated nor punctured. All of mice were sacrificed at each experimental time point, 0h, 6h 18h after CLP or sham procedure, and liver and lung tissue samples were obtained. GSH, AKT and xCT activity was measured by metabolome analysis or western blotting, and comparison of two groups was performed (p<0.05 was considered significant).

Results and Discussion: Survival rate was significantly improved in the KO group(p=0.005) and significant increase of Glutathione(GSH) in KO group(p=0.022) compared to WT group. It is suggested that AKT is dephosphorylated by oxidative stress, in comparison of P-AKT, WT group has been dephosphorylated from 6 hours in WT group and KO group was more prone to dephosphorylation. AKT is known as a cell growth factor signaling molecule that contributes to growth promotion and cell survival, and involved in signal transduction related to xCT activation. Moreover, xCT takes an important role on an uptake course of cystine which is necessary for GSH production. So we analyzed the relationship between GSH, AKT and xCT for the molecular mechanisms of SAE.
Boswellic acid attenuates glutamate release and kainic acid-induced excitotoxicity in the rat hippocampus

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Background and Goal of Study: Excessive glutamate concentration induces neuronal death in acute brain injuries and chronic neurodegenerative diseases. Natural compounds from medicinal plants have attracted considerable attention for their use in the prevention and treatment of neurological disorders. 11-Keto-beta-boswellic acid (KBA), a triterpenoid found in the medicinal plant Boswellia serrata, has neuroprotective effects. Given that glutamate plays a crucial role in neuroprotection, we investigated the effect of KBA on glutamate release in vitro and kainic acid (KA)-induced glutamate excitotoxicity in vivo in the rat hippocampus.

Materials and Methods: Isolated nerve terminals (synaptosomes) purified from male Sprague-Dawley rat hippocampus were used to examine the effect of KBA on glutamate release evoked by 4-aminopyridine (4-AP). Pharmacological activators and inhibitors of protein kinase cascades were used to investigate the possible downstream signaling pathway. We further examined whether KBA executed a protective action in a rat model of excitotoxicity induced by an excitotoxin KA.

Results and Discussion: In rat hippocampal nerve terminals (synaptosomes), KBA dose-dependently inhibited 4-aminopyridine (4-AP)-evoked glutamate release. This effect was dependent on extracellular calcium and blocked by the vesicular transporter inhibitor bafilomycin A1. In addition, KBA reduced the 4-AP-induced increase in intrasynaptosomal Ca2+ levels. The N- and P/Q-type channel blocker omega-conotoxin MVIIIC and the protein kinase A (PKA) inhibitor H89 significantly suppressed the KBA-mediated inhibition of glutamate release, whereas the intracellular Ca2+-releasing inhibitors dantrolene and CGP37157, mitogen-activated protein kinase inhibitor PD98059 and protein kinase C inhibitor calphostin C had no effect. In the rat model of excitotoxicity induced by intraperitoneal KA injection, KBA administration (10 or 50 mg/kg) 15 min before KA injection considerably ameliorated KA-induced glutamate concentration elevation and CA3 neuronal death.

Conclusion: These data suggested that KBA inhibits glutamate release from the rat hippocampal synaptosomes by suppressing N- and P/Q-type Ca2+ channels and PKA activity, as well as exerts protective effects against KA-induced excitotoxicity in vivo.

Acknowledgements: This work was supported by the grants from the Ministry of Science and Technology of Taiwan, ROC (MOST-108-2314-B-418-006).

Neuroprotective effect of Retinoic acid on SH-SY5Y cells under ischemic condition

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Background and Goal of Study: Retinoic acid (RA) is a morphogen derived from vitamin A that plays important roles in cell growth, differentiation, and organogenesis. It is an essential biomolecule for embryonic development and adult body homeostasis. Retinoic acid, has a neurogenesis function on SYSYS cells which can make SYSYS cells differentiation into normal human neurons, and express a variety different makers. The aim of this study was to investigate the protection of Retinoic acid on neuronal cell line and the potential therapy mechanism under ischemia.

Materials and Methods: SH-SY5Y cells were subcultured into four groups: Sham (normal condition), Control and two Retinoic acid group (under ischemia), and three groups were subjected to 24 hours in ischemia chamber. Cells were prepared and collected after 24 hours ischemia. Western blot analysis was performed for MAPKs (Raf, Mek, JNK and ERK) and for mitochondria and apoptosis (Bax, Bcl2, Caspase 3, Cytochrome c, Parp-1). We also measured MTT for evaluation of toxicity of retinoic acid on SH-SY5Y cells.

Results and Discussion: MTT results showed retinoic acid treated cells have no toxic effect under 10μM and data showed high concentration of Retinoic acid contrary effect on cells under ischemia. Appropriative concentration of Retinoic acid improved cells viability after 24hours ischemia. Ischemia decreased the expression of p-raf, p-Mek, p-JNK and p-ERK, Retinoic acid reversed these effects. Similar mechanism of Retinoic acid inhibited apoptotic protein expression (Bax, Cytochrome C, and cleaved PARP-1) and increased anti-apoptotic protein expression Bcl2 protein expression after ischemia.

Conclusion: Retinoic acid improved neuronal cells viability under ischemia, but high concentration of Retinoic acid was adverse. Appropriative concentration increased MAPKs protein expression and inhibited apoplastic protein expression.

Neuroprotective effect of oleanuropein on Alzheimer disease transgenic mice

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Background and Goal of Study: Oleanuropein (OLE) is a polyphenolic compound present abundantly in extra virgin olive oil and believed to be the factor behind the health benefits of olive oil consumption. Several in vitro and in vivo studies reported the broad spectrum of pharmacological properties of oleanuropein such as anti-inflammatory, anti-diabetic, anti-oxidant, and neuroprotective. OLE supplementation improved cognitive performance through facilitating autophagy and reduced beta-amyloid deposition. Also, it has been shown that the administration of oleanuropein counteracted cognitive dysfunction induced by colchicine in the hippocampal. Tau protein expression is becoming highlight in recent years. The effect of oleanuropein in AD mice is under unknown.

Materials and Methods: Nine month of 5XFAD mice were grouped into three, 5XFAD control, oleanuropein 5ug, oleanuropein 10ug. Animals were anesthetized with secufalin and positioned in a stereotactic frame. We performed the cannula (Guide cannula 26Gauge from Plastic One) into the right lateral cerebral ventricle, following coordinates from Bregma: posterior = ~0.5 mm; lateral = ~1.1 mm; dorsal-ventral = ~2.5 mm, then mounted dental cement around cannula. Make sure dental cement totally dry and stabilization. After one week rest, mice performed different concentration of oleanuropein i.c.v. administration (Through internal cannula 33Gauge) with consecutive 30 days. With the aid of a pump, 5ug (2.5ul) and 10ug 4-aminopyridine (4-AP) were used to evaluate behavioral test after 30days. Animals were sacrificed immediately after behavior test.

Results and Discussion: Western blot showed that AT180, p-Tau 262, p-Tau 202/205, Tau-5 expression were markedly increased in 5XFAD mice compared with wildtype, has neuroprotective Effects. After 30 days oleuropein injection, result showed showed stronger effect on 5XFAD mice. AT180 Tau were performed in immunofluorescence experiment. AT180 expression was significantly suppressed after oleuropein treatment compared with control group.

Conclusion: Oleanuropein reduced the p-Tau and Tau5 expression on 5XFAD mice.

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Neuroprotective effect of Retinoic acid on SH-SY5Y cells under ischemic condition

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Background and Goal of Study: Retinoic acid (RA) is a morphogen derived from retinol (vitamin A) that plays important roles in cell growth, differentiation, and organogenesis. It is an essential biomolecule for embryonic development and adult body homeostasis. Retinoic acid, has a neurogenesis function on SYSYS cells which can make SYSYS cells differentiation into normal human neurons, and express a variety different makers. The aim of this study was to investigate the protection of Retinoic acid on neuronal cell line and the potential therapy mechanism under ischemia.

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Conclusion: Retinoic acid improved neuronal cells viability under ischemia, but high concentration of Retinoic acid was adverse. Appropriative concentration increased MAPKs protein expression and inhibited apoplastic protein expression.

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Divalent metal transporter 1 in gliomas: Association with the effects of propofol on oxidative stress and growth in vivo and in vitro

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Background and Goal of Study: Oxidative stress enhances tumor invasion and metastasis in brain cancer. The activation of divalent metal transporter 1 (DMT1), which is regulated by glutamate receptors, can result in the increase of oxidative stress and cancer risk. Propofol, an anesthetic with antioxidant capacity, has been shown to reduce oxidative stress in several cancers. However, the underlying mechanism is unclear. Therefore, we aimed to elucidate the mechanism underlying the suppression of oxidative stress in glioma cells by propofol. DMT1 is an iron importer protein responsible for ferrous iron influx. It is regulated by NMDA receptors in neurons. However, NMDA receptor expression in glioma cells is low. AMPA receptors are vital glutamate receptors that are Ca2+-permeable (CPARs). We used propofol to evaluate if propofol may inhibit oxidative stress in gliomas via suppressing CPARs-DMT1 signaling.

Materials and Methods: Male Wistar rats with C6 gliomas, which were established by intracranial injection of C6 glioma cells, were untreated or treated with propofol for 6 h before being terminated. The levels of AMPA receptor subunit GluR2 and DMT1 protein expression were assessed using western blotting, respectively. The levels of AMPA receptor subunit GluR2 and DMT1 protein expression were assessed using western blotting, respectively. The relationship between CPARs and DMT1 was confirmed in vitro using the AMPA receptor activator (R, S)-AMPA. glutathione and reactive oxygen species assay kits were used to evaluate tumour oxidative stress.

Results and Discussion: Propofol infusion at either 20 or 40 mg kg-1 h-1 increased GluR2 levels and downregulated DMT1 expression as well as glutathione content markedly in the periphery compared with that in the glioma core. In vitro results revealed that (R, S)-AMPA increased DMT1 expression and reactive oxygen species level, which were partly reversed by propofol treatment.

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Silymarin suppresses depolarization-evoked glutamate release in rat cerebrocortical nerve terminals via mitogen-activated protein kinase signaling pathways

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Background and Goal of Study: Silymarin is the polyphenolic flavonoid extracted from dried fruit of Silybum marianum and is most commonly used for the treatment of liver diseases over several centuries. In addition to the hepatoprotective activity, silymarin has been found to possess neuroprotective effect. However, the underlying mechanisms of the neuroprotective property of silymarin have not been fully explored. Given that glutamate plays a crucial role in the pathology of many brain diseases, the goal of this study was to investigate the effect of silymarin on glutamate release and elucidate the underlying mechanisms.

Materials and Methods: Truncated nerve terminals (synaptosomes) isolated from male Sprague-Dawley rat cerebral cortex were used to investigate the effect of silymarin on glutamate release evoked by a chemical depolarizer, 4-aminopyridine (4-AP). Pharmacological inhibitors of protein kinase cascades were used to investigate the possible downstream signaling pathway.

Results and Discussion: Silymarin reduced the release of glutamate release evoked by 4-AP in a concentration-dependent manner. This inhibitory effect was associated with a reduction in the 4-AP-evoked intrasynaptosomal Ca2+ concentration elevation and was not due to an alteration of the synaptosomal membrane potential. The inhibition of glutamate release by silymarin was markedly reduced or eliminated in the presence of the Cav2.2 (N-type) and Cav2.1 (P/Q-type) channel blocker ω-conotoxin MVIIIC and the mitogen-activated protein kinase (MAPK) inhibitor PD98059. The intracellular Ca2+-release inhibitors dantrolene and CGP37157, or the protein kinase A inhibitor (PKA) H89 failed to affect the action of silymarin.

Conclusion: Our results suggest that silymarin inhibits glutamate release from rat cerebrocortical synaptosomes through the suppression of presynaptic voltage-dependent Ca2+ entry and MAPK activity. These findings may delineate the possible neuroprotective mechanisms of silymarin.

Acknowledgements: This work was supported by the grants from the Ministry of Science and Technology of Taiwan, Republic of China (MOST-108-2314-B-418-007).

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Spinal vs general anesthesia for lumbar microdiscectomy: cost comparison analysis

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Background and Goal of Study: Lumbar spinal surgery and microdiscectomies in particular can be safely performed under different anesthetic techniques including general endotracheal anaesthesia (GA) or spinal anesthesia (SA) with or without sedation. A growing number of studies have been conducted to compare different aspects of both types of anesthesia, the most of them showing definite advantages of SA although the common anesthetic technique being GA. Among other advantages we hypothesized that SA would result in lower costs. The goal of this study was to investigate the possible downstream signaling pathway.

Materials and Methods: A retrospective analysis of 262 patients who underwent elective lumbar microdiscetomy from 2016 to 2018 in a tertiary care university affiliated academic institution was performed. Patients were divided into 2 groups: 121 patients were operated under GA and 141 patients - under SA. To achieve the maximum possible homogeneity in both groups and to minimize the potential influence of patient and operative procedure characteristics on the costs, only American Society of Anesthesiologists (ASA) I physical class patients operated by a single faculty senior surgeon were enrolled in the study. Patients who failed intraoperative SA and were converted to GA were categorized as cases of SA (5 patients). These few conversions occurred because either SA was wearing off rapidly or it had not distributed properly due to spinal canal stenosis. We compared mean values of costs directly related to anesthesia, surgical procedure, Post-anesthesia care unit (PACU) stay and total costs in both groups. Cost data were obtained from hospital databases, while all other data were obtained from patient records. Comparisons of cost categories between two patient groups were performed with the Mann-Whitney U test for non-parametric continuous data and a p-value of <0.05 was used to establish a statistical significance. IBM SPSS Statistics version 25 was used for data analysis.

Results and Discussion: SA was associated with 72.2% lower direct anesthesia cost (p<0.001), 12.8% lower direct operating procedure cost (p<0.001), 44.2% lower PACU cost and 43% lower total cost (p<0.001) as compared to GA.
Conclusion: SA is less costly than GA when used in patients undergoing lumbar microdiscectomy, in addition, it contributes to the reduction of other non-anesthesia related costs and overall cost of treatment.

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Major spinal surgery without pain. This is a myth?

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Background: Major spinal surgeries are associated with intense pain in the postoperative period (1). Adequate pain management in this period has been seen to correlate with improved outcome, early discharge and decrease rate of the complications. It is critically that pain treatment is effective with a minimum of side effects and reduce postoperative morbidity.

Case Report: 28-year-old woman with the diagnosis: idiopathetic thoracolumbar scoliosis was undergoing surgical scoliosis correction (Th4-L2). Anaesthesia was performed with propofol induction and maintained with sevoflurane. Fentanyl boluses, NSAIDs were used for intraoperative analgesia. Postoperative analgesia was decided to perform with prolonged IV infusions of dexmedetomidine, morphine hydrochloride 1% and paracetamol 3000 mg/day. Dexmedetomidine (0.3 mcg/kg/h) has been started 30 min before the end of the surgery without a loading dose. Morphine infusion has been started 10 minutes after extubation in the initial dose of 0.0014 mg/kg/h. Patient pain assessment (VAS) has been performed every 2h during the first 24h after surgery and every 6h during next 48h after surgery.

It showed that pain level has not been more than 3 even during activization. Analgesia has been stopped 68h after surgery and the patient has been discharged 4 days after surgery.

Discussion: This postoperative analgesia strategy allowed our patient to be active, alert and felt no pain. It did not have any side effects or instability. VAS scale score was maximum 3 during the first 24h and 1-2 during 2days after surgery.

References:
2. Combination of dexmedetomidine, opioids analgetics and paracetamol could be a new approach of postoperative analgesia for patients after major spinal surgeries.

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The effects of blood pressure elevation on transcranial electrical stimulation motor evoked potential (Tc-MEPs) amplitudes during spinal surgery. Preliminary results of a prospective observational study

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Background and Goal of Study: Tc-MEPs are widely used to monitor the motor pathways during spinal surgery. Tc-MEP amplitude decreases can be caused by surgical or by non-surgical factors. The latter include the effects of anesthetic drugs, body temperature and blood pressure. The exact influence of blood pressure has never been rigorously investigated. The aim of this study is to investigate the effects of pharmacological blood pressure elevation on Tc-MEP amplitudes.

Materials and Methods: After informed consent, 13 patients (age range 14 – 46 years) without neurological motor deficits scheduled for elective spinal surgery were included. Anaesthesia was induced and maintained with propofol and remifentanil (target bispectral index 50; nomocarbia), and an arterial line inserted for invasive blood pressure monitoring. After prone positioning noradrenaline infusion was used to gradually increase the mean arterial pressure (MAP) to 100 mmHg. Every two minutes Tc-MEP measurements were performed, stimulating with supramaximal voltage. The measured amplitudes were log-transformed. A linear mixed model was used to investigate the relationship between Tc-MEP amplitude and MAP, for the left and right tibialis anterior (TA), and abductor hallucis (AH) muscles.
**Results and Discussion**: A significant positive correlation between MAP and MEP amplitude was found for all four muscles (TA left p=0.016, TA right p=0.028, AH left p=0.002, AH right p=0.002) (see figure 1). There were however, large inter-individual differences in magnitude of the increase in amplitude during blood pressure elevation. The cause of these inter-individual differences may be explained by differences in efficiency of cerebral autoregulation. The use of a cerebral near-infrared spectroscopy monitor could help to better explain the influence of autoregulation on the effect of noradrenaline on Tc-MEP amplitudes.

**Conclusion**: The results suggest that pharmacological blood pressure elevation from ±50 mmHg to 100 mmHg, significantly increases Tc-MEP amplitudes of the TA and AH muscles. The causes of the large inter-individual variability in the response to noradrenaline should be further explored.

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**Effects of desflurane and propofol anesthesia on cerebral oxygenation during spinal surgery in prone position**

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**Background and Goal of Study**: Postural change during anesthesia has a complex effect on the systemic and cerebral circulations. The goal of this study was to evaluate the effects of desflurane and propofol on cerebral oxygenation during spinal surgery in prone position.

**Materials and Methods**: Study was approved by Scientific and Ethics committee of Pappanikolou Hospital (EU PAS 16641). Fifty two patients scheduled for spinal surgery were randomly allocated to propofol (n=25) and desflurane (n=27) groups. Anesthetic agents were maintained to obtain bispectral index of 50-55. SAPDAPHR,SP02,ETO2 and right and left rSO2 were assessed at seven-time points: supine position without oxygen administration (T1), supine position with oxygen administration (T2-baseline), intubation in supine position (T3), just after prone positioning (T4), 10 minutes after prone positioning (T5), at the end of surgery in prone position (T6) and at the end of surgery (T7). Partial pressure of carbon dioxide, partial pressure of oxygen and hemoglobin were also recorded at T3 and T7. Statistical analysis was performed with t-test, Mann Whitney, chi-square and two-way mixed Anova tests. P value < 0.05 was considered significant.

**Results and Discussion**: Demographic data, pre-oxygenation hemodynamic variables and rSO2 were comparable between groups. There was no significant difference between groups in SAPDAPHR,SP02, and ETO2 (p=0.095, p=0.061, p=0.357 respectively). PC02, PO2 and Hb were not significantly different between groups (p=0.542, p=0.394, p=0.768 respectively). rSO2 values were not significantly different between groups (rSO2: p=0.958 (T2), p=0.954 (T3), p=0.646 (T4), p=0.397 (T5), p=0.709 (T6), p=0.689 (T7)). In propofol group rSO2 was significantly higher at T3 (68.7 ± 9.41 vs 66 ± 8.7, p=0.017) and significant lower at T5 (62.22 ± 6.33 vs 66 ± 8.7, p=0.019) and at T6 (63.07 ± 5.6 vs 66 ± 8.7, p=0.028) compared to baseline. Left rSO2 decreased significantly from baseline at T5 (63.19 ± 7.56 ± 66.22 ± 9.39, p=0.026) in propofol group. Left and right rSO2 in desflurane group decreased significantly from baseline at T5 (69.92 ± 11.32 vs 66.08 ± 10.21, p=0.0004 and 60.96 ± 11.02 vs 63.68 ± 9.14, p=0.0115).

**Conclusion**: In prone position desflurane and propofol were associated with significant decrease in rSO2 without differences between these anesthetics.

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**4759**

**The use of SpHb in pediatric patients undergoing major surgery associated with reduced morbidity**

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**Background and Goal of Study**: To date, perioperative blood transfusion management has traditionally been based on estimated blood loss and measuring hemoglobin (Hb) values by conventional methods. However, this method is time consuming and causes a delay in decision of transfusion. Hemodynamic instability can be prevented by detecting sudden decreases in Hb concentration by continuous Hb monitoring and pH, BE, HCO3, lactate and glucose values of the patients in two groups; managed for transfusion therapy by intermittent blood gas sampling (Group 1, n=30) or SpHb measurement (Group 2, n=30) using the Rainbow 1 20 L probe (Massimo, Irvine, CA) connected to the Radical-7 Pulse CO-Oximeter device. The aim of this study was to determine the effect of SpHb monitoring on perioperative blood transfusion, mortality and morbidity in patients undergoing craniosynostosis surgery.

**Materials and Methods**: Following the Ethics Committee approval and parent consents, fifty-two patients aged between 2-24 months who underwent craniosynostosis surgery were included in the study. Patients were divided into two groups; managed for transfusion therapy by intermittent blood gas sampling (Group 1, n=30) or SpHb measurement (Group 2, n=30) using the Rainbow 1 20 L probe (Massimo, Irvine, CA) connected to Radical-7 Pulse CO-Oximeter device. Hb monitoring and pH, BE, HCO3, lactate and glucose values of the patients in both groups were recorded hourly using arterial blood gas analysis during the perioperative period. In the SpHb group, Hb values were recorded by SpHb measurement and simultaneous blood gas sampling was also performed in sudden decreases. Perioperative blood and fluid transfusion, the duration of surgery and anesthesia, urine output, vasopressor requirement, the length of intensive care unit (ICU) stay, postoperative drainage, transfusion rate, Hb values and vital signs were recorded.

**Results and Discussion**: The duration of ICU stay was significantly higher in Group 1 (p <0.05). Lactate levels at the beginning of the operation were higher in the case group, but higher in Group 1 at the end of the operation (p <0.05). Postoperative drainage, red blood cell and fresh frozen plasma (FFP) transfusion in ICU were significantly higher in the control group (p <0.05). There was a positive correlation between ICU stay, FFP transfusion and postoperative drainage (p <0.05).

**Conclusion**: Noninvasive continuous hemoglobin monitoring in major hemorrhagic surgeries in pediatric patients might be effective in reducing morbidity not only by reducing the amount of transfusion and but also leading to less metabolic and hemodynamic instability.
the synaptic transmission in the cerebral cortex. Dex is a d2-agonist that produces analgesia, sedation and sympatholysis. It changes EP amplitude at clinically nonsignificant levels and may be used in IOM at up to 1.2µg/kg/h. Lidocaine preserves EP while reducing doses of other anesthetics. Ketamine increases EP and promotes analgesia. IOM requires the maintenance of physiological variables, steady-state alveolar and serum concentrations of the agents employed.

References:

Learning points: The addition of sevofluorane 0.4 MAC combined with reduced doses of various intravenous anesthetics adjuncts such as Dex, lidocaine or ketamine can be used as components of balanced anesthesia without affecting IOM.

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Intraoperative spinal and neurogenic shock: exceptional and lethal complication

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Background: The spinal shock is an entity produced after an insult to the spinal cord (secondary to multiple causes as trauma or ischemia) and is characterized by motor and sensory alterations. The neurogenic shock often occurs simultaneously to the spinal shock and it’s clinically recognized by bradyarrhythmia and hypotension due to autonomic alteration.

Case Report: 47-year-old woman diagnosed with breast cancer and D2 metastasis was scheduled for a D2 corpectomy and C6-D4 arthrodesis. A combined anesthesia was performed (general anesthesia + intrathecal administration of morphine) and motor and sensitive evoked potentials were monitored. After 7 hours of surgery, during the manipulation of the vertebral body, a sudden loss of motor and sensitive potentials was reported. Concomitantly accumulative loss of blood of 1.5L and need of norepinephrine to treat the hypotension appeared. Because normal evidence of the thromboelastometry test, we started aggressive hydration, blood transfusion and high doses of vasoactive drugs (norepinephrine + epinephrine) were increased as the patient developed a refractory shock. Severe hypotension followed by extreme bradycardia and cardiac arrest (asystole). Surgery was stopped and advanced CPR maneuvers were required. After 6 minutes of CPR the patients recovered sinusal rhythm. The transesophageal echocardiography showed normal contractility and absence of thrombus. The diagnostic orientation considered was spinal and neurogenic shock and 500mg of methylprednisolone was administrated. After 24 hours of hospitalization, the patient was discharged with paresis of both legs.

Discussion: The motor and sensory deficit of the spinal shock is due to the damage of anterior horn (motor) and/or posterior horn (sensory). The autonomic alterations of the neurogenic shock as bradycardia and hypotension are due to a damage of the rostral ventral lateral medulla (RVL). If a neurogenic shock is produced at a higher level than D6, without vasodilatation and predominance of parasympathetic lead to life-threatening adverse event. Early recognition is mandatory; treatment consists in keeping the spinal perfusion and, in some cases, lumbar drainage is required. Methylprednisolone can improve neurologic outcomes.

References:

6327

Acute Hemorrhage of Spinal Arteriovenous Malformation in a child with Congenital muscular dystrophy: Case Report

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Background: Congenital muscular dystrophies (CMDs) are a group of early onset muscle disorders with histologic evidence of dystrophy. The merosin-deficient CMD subtype accounts for 30%. Patients present with severe muscle weakness, contractures, lung disease and cardiac disorders.1 They present a challenge to anesthesiologists when in need of surgery. Spinal arteriovenous malformations (SAVMs) are vascular lesions located within the spinal canal that in case of rupture can cause sudden-onset pain accompanied by myelopathy or radiculopathy.2

Case Report: 7yo, 15kg, with merosin-deficient CMD, previously capable of ambulation, presented to the emergency department with spontaneous intense pain in both legs and back which evolved into numbness and paraplegia within 15min. Diagnosed with complete spinal syndrome below D5. The MRI showed an extensive intra-spinal hematoma. Urgent surgical intervention ensued. In the OR, severe contractures of all limbs and skin frailty mandated tailored ventral positioning and padding. Total intravascular anesthesia was used with propofol and sufentanil guided by processed EEG, rocuronium with neuromuscular monitoring and ketamine. Sugammadex was used at emergence. Characterization and excision of intradural SAVM was successful under 7 hours. The child was extubated prior to ICU transfer. Pain was controlled with paracetamol and gabapentine. Gradual partial recovery of sensation and mobility of the lower limbs was observed within 23 days.

Discussion: Overall prevalence of CMD is 0.99 per 100,000, 80% are children. Spinal AVMs are uncommon, and even rarer in children.1 The latter present with acute hemorrhage in 70% against 45% in adults.2 Intraoperative management was particularly interesting due to: tailored positioning; the use of propofol, avoiding volatile agents (risk of rhabdomyolysis and hyperkalemia); the use of sugammadex, avoiding neostigmine induced side effects. Low dose ketamine is safe and together with gabapentine provided optimal pain management. Due to the rarity of both findings mentioned, no reports were find about CMD children operated on SAVM with acute hemorrhage.

References:

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Anesthetic considerations in the syringopleural shunt: case report

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Background: Syringomyelia represents a pathology of the spinal cord that consists of the formation of a cavity filled with fluid within the spinal cord. It appears more commonly associated with the malformation of Chiari type I, although it may also be due to congenital malformations, secondary to an infection or inflammation. Syringomyelia can be asymptomatic, being discovered incidentally on an MRI or presenting with pain, progressive neurological deficits and other symptoms secondary to the compression the spinal cord. Decompression of the foramen magnum remains the recommended surgical treatment. The recurrence of syringomyelia after decompressive treatment has been described in up to 66% (1). In this situation, syringopleural shunt is one recommended therapeutic option.

Case Report: We present the case of a 54-year-old woman who underwent surgery for syringopleural shunt placement. The patient was operated in 2012, performing haemilaminectomy and syringopleural shunt after detection of the syringomyelic cavity that extended from T5 to T9. Seven years later, the patient consulted again for worsening neurological symptoms. The intervention was performed under general anesthesia and in prone position. Once the old catheter was located after the opening of the dura, obstruction was observed in its proximal end, so it was removed, placing a new one. Once the pleura was exposed, after thoracotomy on a previous scar, we caused a 4-second apnea to facilitate pulmonary descent during the opening of the pleural space and the placement of the distal end of the new catheter, thus avoiding complications derived from puncture of the pulmonary parenchyma.

Discussion: The literature on anesthetic management in syringopleural shunt is nil. This procedure requires important anesthetic considerations, such as airway management in patients with possible abnormalities, complications caused from prone position, intra and postoperative neurological control and adequacy of ventilation when accessing the pleural cavity to prevent lung complications. In our knowledge this is the first time that a case of syringopleural shunt is presented from the anesthetic point of view.

References:
1. Jehud a Soleman et al. Treatment failure of syringomyelia associated with Chiari I malformation following foramen magnum decompression: how should we proceed? Germany: Neurosurgical review; 2018.
Conclusion:

A significant difference was observed in other postoperative complications between these two groups. The length of stay in the impaired group is significantly longer than their normal counterparts (p=0.043). However, no significant differences were observed in other postoperative complications between these two groups.

Materials and Methods:

This study was approved by the Institutional Review Board. Informed consent was obtained from patients scheduled for esophageal cancer surgery. EEG data was obtained by BIS system during 6 minutes on the day before surgery as the patient data. Their preoperative cognitive function was evaluated with Mini-Mental State Examination. The patients were divided into two groups based on their Mini-Mental State Examination scores. The impaired group showed significantly lower scores than the normal group (p=0.012). Patients in the impaired group show a higher frequency of delirium compared with patients in the normal group. Therefore, we divided the patients into two groups: impaired (n=61) and normal (n=156). Baseline characteristics, intraoperative data, and clinical outcomes were compared between the two groups.

Results and Discussion:

Twenty-five patients completed the study schedule and were analysed. Seven of them experienced delirium and 18 of them did not. The average age and the percentage of male patients were significantly higher in the impaired group. The average age of the alpha, beta, and delta waves were not significantly different between the impaired and normal groups. Although we reported that delirious patients showed significant EEG changes, preoperative EEG data obtained by BIS were not significantly different from delirious and non-delirious patients. This result suggested that preoperative delirium and EEG changes might be observed by surgery and anesthesia. Conclusion(s): Before surgery in patients who did not receive anesthesia and surgery, the prediction of development of delirium using EEG in the current bedside practical analysis has a room for discussion.

References:

2. Echizen. ASA annual meeting in San Francisco 2018 poster presentation.

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4723

Preoperative cognitive impairment is associated with adverse outcomes in elderly patients undergoing major surgeries: a prospective cohort study

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Background and Goal of Study: Objective: To explore the association between preoperative cognitive status with postoperative outcomes in elderly patients undergoing elective total knee or hip surgery. According to the alpha, beta, and delta waves, the waveforms were analyzed using EEG obtained by BIS system. The patients were divided into impaired and normal groups. The results showed that preoperative cognitive status was significantly lower in the impaired group compared with the normal group. The average age of the alpha, beta, and delta waves were not significantly different between the impaired and normal groups. The results showed that preoperative cognitive status was significantly lower in the impaired group compared with the normal group. The average age of the alpha, beta, and delta waves were not significantly different between the impaired and normal groups. The results showed that preoperative cognitive status was significantly lower in the impaired group compared with the normal group. The average age of the alpha, beta, and delta waves were not significantly different between the impaired and normal groups.

Results and Discussion: The length of stay in the impaired group is prolonged compared with the normal group (p=0.012). Patients in the impaired group showed a higher incidence of postoperative delirium than the normal group (p=0.001). During the 5-year observation period, the survival rate in the impaired group is significantly lower than their normal counterparts (p=0.043). However, no significant difference was observed in other postoperative complications between these two groups (p=0.05).

Conclusion: Our study confirms previous studies that preoperative cognitive status is associated with adverse outcomes in elderly patients undergoing elective total knee or hip arthroplasty.

4732

Scalp Block is Associated with Favourable Progression-Free Survival in Patients with High-Grade Glioma

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Background and Goal of Study: High-grade glioma is notorious for high recurrence rates. High-grade gliomas are highly related to the genetic profile of tumour, including isocitrate dehydrogenase (IDH) mutation and Ki-67 index. Regional anaesthesia can reduce opioid consumption and stress responses, thereby improving the preservation of intraoperative immune function. We have shown that scalp block (SB) is associated with favourable recurrence profile for glioma, but the influence of genetic profile has not yet been investigated.

Materials and Methods: Patients undergoing resection cranio-metry between 1 January 2014, and 30 September 2016 for World Health Organization (WHO) grade III and IV glioma with complete reports of IDH and Ki-67 index were included in analyses. Exclusion criteria comprised 1) recurrent tumour, 2) awake craniotomy, 3) stereotactic biopsy, 4) presurgery radiotherapy or chemotherapy, 5) current pregnancy, and 6) age of less than 20 years. SB was performed using 1 ml of levobupivacaine 10 mg/ml, 0.5% Bupivacaine, and 1:200,000 epinephrine for each side of the scalp at the day before surgery.

Results and Discussion: Total 108 patients were included, 56 of whom received SB. The characteristics of the groups are comparable. SB was associated with improved progression-free survival (PFS) (median PFS:15.17 [95% confidence interval: 8.33–37.37] vs. 11.9 [95% CI:7.53–39.53] months, P=0.0301). Cox analysis revealed that SB (hazard ratio [HR]:0.115, 95% CI:0.020–0.675, P=0.0168), gross total resection (HR:0.143, 95% CI:0.023–0.897, P=0.0379), adjuvant chemotherapy (HR:0.001, 95% CI:0.001–0.256, P=0.0012), and IDH mutation (HR:0.003, 95% CI:0.001–0.203, P=0.0070) were associated with better PFS. WHO grade IV instead of III (HR:10.305, 95% CI:1.062–100.035, P =0.0443), intraterroral tumour (HR:16.707, 95% CI:1.115–250.300, P =0.0415), and Ki-67 index (HR:1.963, 95% CI:1.013–1.116, P=0.0134) were risk factors for worse PFS.

Conclusion: The application of SB is associated with favourable PFS in high-grade glioma.

References:


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4742

Personify premedication in the structure of general anaesthesia in neurosurgical patients with intracranial neoplasm

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Background and Goal of Study: Preoperative evaluation of psycho-emotional status and functional state of autonomic nervous system (ANS) in neurosurgical patients with intracranial neoplasm is actually for the personify premedication.

Materials and Methods: 178 ASA II-III neurosurgical patients (110 female, 68 male, age 47,34,3,8yo) with supra- and subtemporal intracranial neoplasm were examined using: 1) intergative anxiety test (IAT) (L. Wasserman, et al., 2005) for differentiated assessment of anxiety and its severity; one day before the operation and in the morning of the operative day after premedication. To standardize the results were translated to scores of General anxiety scale and an auxiliary scale, stani scale (SN) (standard nine); 2) methods of functional examination of supra- and segmental parts of the ANS with Kerdo, Hildebrant indexes, Dagnini-Ascher scales (SN) (standard nine); 3) methods of functional examination of supra- and segmental parts of the ANS with Kerdo, Hildebrant indexes, Dagnini-Ascher scales (SN) (standard nine). SB was performed using 10 mL of levobupivacaine with 1:200,000 epinephrine for each side of the scalp, 3) stereotactic biopsy, 4) presurgery radiotherapy or chemotherapy, 5) current pregnancy, and 6) age of less than 20 years. SB was performed using 10 mL of levobupivacaine with 1:200,000 epinephrine for each side of the scalp.

Results and Discussion: The length of stay in the impaired group is prolonged compared with the normal group (p=0.012). Patients in the impaired group showed a higher incidence of postoperative delirium than the normal group (p=0.001). During the 5-year observation period, the survival rate in the impaired group is significantly lower than their normal counterparts (p=0.043). However, no significant difference was observed in other postoperative complications between these two groups (p=0.05).

Conclusion: Our study confirms previous studies that preoperative cognitive status is associated with adverse outcomes in elderly patients undergoing elective total knee or hip arthroplasty.

Preoperative evaluation of psycho-emotional status and functional state of autonomic nervous system (ANS) in neurosurgical patients with intracranial neoplasm is actually for the personify premedication.
benzodiazepine anxiolytic for the 3 group. The score of effective premedication according IAT results and demonstrated vegetative stability in all investigated patient groups was mathematically reliable (p<0.05 compared of two stages of assessment - before the operative day and in the morning of the operative day).

Conclusion: The intracranial hypertension, functional ANS and emotional state of the patients with intracranial neoplasm determine the personify premedication before neurosurgical operation.

5295

Frequency of Postoperative Shivering in Patients After Craniotomy Under General Anesthesia by Sevoflurane and Desflurane:
A Single-center Randomized Trial

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Background and Goal of Study: Shivering in the process of recovery is one of the adverse side effects of general anesthesia (GA). The incidence of postoperative shivering ranges from 5% to 66%. To assess the incidence of shivering during recovery of GA based on Sevoflurane and Desflurane in patients after removal of brain tumors of supratentorial localization.

Materials and Methods: We conducted an observational study of 30 patients who were operated on for brain tumors supratentorial localization under GA (group 1 - 15 patients, where the main anesthetic was sevoflurane, group 2 - desflurane). Patients in groups 1 and 2 had no statistically significant differences in age (52.4±7.3 and 51.4±10.7), level of consciousness assessed on the GCS (15 and 15), anesthetic risk assessed on the ASA scale (3 and 3), function of the GA (320±21 min and 318±22 min) respectively. Routine methods were used during surgery to maintain normothermy in operated patients: thermoblanks, warming infusion solutions. The temperature in the operating room was controlled by a wall thermometer and maintained at the range of 22-23°C. Assessment of the presence and severity of postoperative shivering was assessed on a scale Crossley and Mahajan.

Results and Discussion: Shivering during recovery after GA were absent in 12 (80%) patients of Sevoflurane group and in 11 (73.3%) of Desflurane group. In the group Desflurane, shivering of 1st degree in form of slight muscle twitches occurred in 1 (6.7%) patient. Shivering of 2nd degrees in form of muscle contractions in one muscle group in both the Sevoflurane and Desflurane groups occurred in 1 (6.7%) patient.

Conclusion: When Desflurane was used as the main anesthetic, a higher incidence of postoperative shivering was observed than with Sevoflurane by 6.7%, but without statistically significant differences. Routine methods for the prevention of postoperative shivering are reasonably effective and frequency of postoperative shivering in patients after removal of brain tumors of supratentorial localization does not exceed 26.7% with GA by inhalation anesthetics.

4830

Short-term complications in adult patients submitted to elective craniotomy surgery: a Retrospective Audit in a Portuguese Tertiary Center

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Background and Goal of Study: Major postoperative complications after craniotomy surgery have great impact in patient outcome. Post-operative hemorrhage, cerebral oedema and convulsions are severe but less frequent, many times preceded by the more common ones, PONV and pain. The aim of this audit was to determine the incidence of postoperative complications during the first 24h after craniotomy surgery and evaluate the characteristics of the studied population.

Materials and Methods: Retrospective audit using clinical records of patients submitted to elective craniotomy from January to July 2018. Clinical and demographic data included age, gender, ASA Classification, preoperative neurologic exam, tumor type and location, peritumoral oedema and anaesthetic technique. Complications in the first 24h included reintervention, convulsions, haemorrhage on scan control, decrease in GCS >3 points, new motor deficits, venous thromboembolism, PONV, pain, diabetes insipidus and death.

Results and Discussion: 85 patients analysed, 20 excluded (urgent craniotomy and incorrect surgical classification). 55% female, medium age 57,1 years old (±13,3, min 23, max 82), 9% ASA I, 58% ASA II, 33% ASA III. 17% were cases of tumor relapse. 33.8% presented with headaches, 27.7% motor deficit, 21.5% convulsions, 16.5% cranial nerve deficit and 16.5% consciousness depression. 9% had a normal exam. 40% meningiomas, 30.7% gliomas e 10.7% brain metastases. 49% were frontal location and 22% temporal. 51% had peritumoral oedema. All were submitted to TIVA, two awake craniotomies. 33.8% of the cases had complication. 14 presented de novo motor deficits, one had haemorrhage on CT scan control. There were two cases of reintervention, two of convulsions and two of with deterioration of consciousness. Minor complications: three cases of PONV, four of postoperative pain and one case of Diabetes Insipidus. There were no reports of death or thromboembolism. There were no correlations between the preoperative features and complications in the postoperative period.

Conclusion: Craniotomy implies significant morbidity. The incidence of complications overlapped with the literature. We found a lower relative incidence of PONV and pain, which may be explained by the anaesthetic technique. In a centre with this kind of surgery, it is advisable that the immediate postoperative period should take place in a unit dedicated to neurocritical patients.

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Early discharge to the neurosurgical ward after elective supratentorial brain tumor resection

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Background and Goal of Study: Postsurgical care after craniotomy at an intensive care unit (ICU) is associated with utilization of limited resources and high costs while meeting early discharge criteria. For patients following craniotomy may be discharged to the neurosurgical ward after 6 hours seems feasible in patients meeting early discharge criteria.
5343

Use of high oxygen concentration in pediatric patients is associated with increased morbidity

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Background and Goal of Study: Pulse oximetry is a frequently used device in our daily routine practice as a marker of hypoxemia. However, the most important limitations of the hypoxemia precursors are either 100% of peripheral oxygen saturation until the arterial oxygen level falls below 80 mmHg, or no value about the presence of hypoxemia. The oxygen reserve index (ORI) forms an index based on the pulse oximeter. This index serves as a clinically important stimulant both in the detection of hypoxemia and hypoxemia. Our primary goal in this prospective randomized study is to evaluate the effects of intubation induction with different concentrations of inspiratory oxygen (FiO2) on ORI value and morbidity rate.

Materials and Methods: This study was planned as an observational and cohort study. Following the Ethics Committee approval and parental consents, 30 patients who were scheduled for craniosynostosis, were included. Patients were randomized into two groups: 80% inspiratory oxygen concentration + air (Group 1, n=15) and 60% inspiratory oxygen concentration + air (Group 2, n=15) during volatile induction after routine monitoring. At the time of induction, arterial blood gas and ORI hemodynamic follow-ups were recorded at 60, 120, 180 and 240 min after tracheal intubation. Postoperative complications, length of hospital and intensive care unit (ICU) stay were recorded. Statistical analyses were performed using IBM SPSS Statistics 22. The results were evaluated at 95% confidence interval and a p value of less than 0.05 was accepted as significant.

Results and Discussion: Since two patients were excluded from the study, the data of 28 patients were evaluated. Demographics were similar in groups (p>0.05). The duration of surgery, hospital and ICU stay were significantly higher in Group 1 (p<0.05). There was no statistically significant difference between the ORI values of patients at all times (p>0.05). It was found that the duration of surgery, ORI value at 5th min and FIQ2 in induction were statistically significant (p<0.05).

Conclusion: The high oxygen concentration used in volatile induction in pediatric patients increases the length of hospital and ICU stay. New oxygen monitoring methods have been found to be more effective in preventing the use of high concentrations of oxygen than traditionally used methods.

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Position-related complications after neurosurgery: a case of airway obstruction

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Background: Position-related complications concern anesthesiologists, since patients are unable to express discomfort under general anesthesia. Neurosurgical patients are prone to present them, since some positions differ from the standard ones. In our case, after having a meningioma removed, a patient presented progressive swelling of the neck, requiring reintubation and a tracheostomy.

Case Report: A patient underwent left suboccipital craniectomy. Standard and specific monitoring were used during the procedure. Anesthetic induction and intubation had no difficulties. The patient was placed in the park-bench position. Surgery was carried out with no complications and, when finished, the patient was extubated and transferred to ICU. After six hours, the patient started developing a progressive swelling of the neck, requiring reintubation and a tracheostomy.

Results and Discussion: Since two patients were excluded from the study, the data of 28 patients were evaluated. Demographics were similar in groups (p>0.05). The duration of surgery, hospital and ICU stay were significantly higher in Group 1 (p<0.05). There was no statistically significant difference between the ORI values of patients at all times (p>0.05). It was found that the duration of surgery, ORI value at 5th min and FIQ2 in induction were statistically significant (p<0.05).

Conclusion: The high oxygen concentration used in volatile induction in pediatric patients increases the length of hospital and ICU stay. New oxygen monitoring methods have been found to be more effective in preventing the use of high concentrations of oxygen than traditionally used methods.

4872

Effect of equiosmolar solutions of hypertonic saline and mannitol on cerebral oxygenation and brain debulking during elective supratentorial craniotomy surgery

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Background and Goal of Study: Hypersomolar therapy is the mainstay for brain volume reduction and thus surgical exposure optimization. This study aims to elucidate the impact of equiosmolar solutions of mannitol (M) or hypertonic saline (HTS) on brain relaxation, cerebral oxygenation and intracranial pressure, during supratentorial craniotomy surgery.

Materials and Methods: Fifty-two adult patients scheduled for elective supratentorial craniotomy were randomized to receive either 20% M (4.6mL/kg) or 7.5% HTS (2mL/kg) 30 min before dura opening. Hemodynamic variables were monitored by ClearSight System at following time points: before hypertonic agent infusion (T0), 15 (T15), 30 (T30), 60 (T60), 90 (T90), 120 (T120), 180 (T180), and 240 (T240) min after infusion conclusion. Blood samples from the jugular
Low-dose droperidol reduces the amplitude of transcranial electrical motor-evoked potential: a randomised, double-blind, placebo-controlled trial

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Background and Goal of Study: Although low-dose droperidol (15–20 µg/kg) is a widely used antiemetic, it suppresses the amplitude of transcranial electrical motor-evoked potential (TCE-MEP), as reported in a recent case report. However, there are no randomised controlled trials to demonstrate the effects of low-dose droperidol on the TCE-MEP amplitude. The present study was to test our hypothesis that low-dose droperidol reduced the TCE-MEP amplitude.

Materials and Methods: Twenty female patients with adolescent idiopathic scoliosis, aged 12–20 years, and scheduled to undergo corrective surgery were randomly allocated to receive droperidol (20 µg/kg) or saline. General anaesthesia was maintained with continuous infusions of propofol and remifentanil. After recording the baseline TCE-MEP, the test drug was administered, followed by TCE-MEP recording every 2 min up to 10 min. The baseline amplitude and onset latency were defined as 100%. The primary outcome was the minimum relative TCE-MEP amplitude (peak-to-peak amplitude, percentage of baseline value) recorded in the left tibialis anterior muscle. The secondary outcomes were the minimum relative TCE-MEP amplitudes (percentage of baseline values) recorded from the other 11 muscles and the relative onset latencies of TCE-MEP (percentage of baseline values).

Statistical analyses were performed using the Mann-Whitney U test. A p-value of <0.05 was considered statistically significant.

Results and Discussion: Two patients from the saline group were excluded from the analysis. The data are expressed as the median [interquartile range]. The TCE-MEP amplitude of the left tibialis anterior muscle was significantly reduced in the droperidol group as compared to that in the saline group (37% [30–55%] and 76% [58–93%], respectively, p<0.01). In the other muscles, the amplitudes were reduced in the droperidol group except for the bilateral abductor pollicis brevis and the left quadriceps femoris muscles. The relative onset latencies were not significantly different between the two groups. Our results showed that low-dose droperidol (20 µg/kg) reduced TCE-MEP amplitudes to around the alarm point. Anaesthesiologists should pay attention to the timing of droperidol administration during intraoperative TCE-MEP recording.

Conclusion: Low-dose droperidol reduced the TCE-MEP amplitude.
Intraoperative seizures in anesthetized and curarized patient recorded on spectrogram

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Background: Anesthetic management of an epileptic patient is challenge for the anesthesiologist. Induction of general anesthesia is often associated with the administration of drugs that lower the epileptogenic threshold, so in these patients we question the need for more adequate brain function monitoring and drug management.

Case report: We report the case of a 57-year-old man with a history of controlled epilepsy (without seizures for more than 5 years), who presented two episodes of seizures in two consecutive peripheral vascular surgeries (15 min after endotracheal intubation, about 5 min duration), captured by the spectrogram of two different monitoring devices. We used balanced general anesthesia in the first surgery and intravenous general anesthesia in the second (Induction Fentanyl 2 mcg/kg, Propofol 1mcg/kg, Rocuronium 0.6mg/kg, maintenance respectively with Sevoflurane and Propofol). The convulsive episode stopped after phenytoin 500 mg IV administration in the first surgery and dopamine 10 mg IV in the second surgery.

Discussion: Literature regarding intraoperative seizure activity in neurosurgical patients is abundant, but there’s less evidence in the other surgical patients. Although there are still conflicting positions on this subject, monitoring of anesthesia depth and intraoperative EEG are now part of good anesthetic conduct. Identifying a seizure in the commonly used raw EEG in anesthesia may be difficult, but this was facilitated by the use of the spectrogram in this case. Propofol may have myogenic activity that stimulates a seizure, but this is unlikely as both seizures occurred with the curarized patient and with neuromuscular block monitoring. The patient apparently had no metabolic, mechanical or electrical triggers that could explain this episode, which points in the direction of drug-induced seizures (could be Fentanyl but it has been described for other drugs too).

Learning points: This case highlights the need of brain activity monitoring that is of the uttermost importance in patients with epilepsy – where spectrogram may offer tools that raw EEG lacks – given that, with our drugs, we may be lowering the seizure threshold of the patient.

5761 Influence of Cerebral Desaturation on the Spectral Entropy of the Electroencephalogram (EEG)

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Background: Perioperative neurological complications may be reduced by neuromonitoring. Concerning cardiac anesthesia, near-infrared-spectroscopy (NIRS) guided monitoring can help to ensure adequate cerebral oxygenation. Although there is no specific NIRS threshold for appropriate brain saturation, NIRS can reduce neurological complications(1). EEG-based patient monitoring allows estimation of the anesthetic level(2). Similarly, ischemia influences the raw and consequently processed EEG(3). We hypothesize that an identification of desaturation-induced or anesthetic-induced EEG changes is possible. Hence, we assessed the influence of cerebral desaturation on the spectral entropy (SpEnt) of the EEG.

Material: We analyzed frontal NIRS and EEG recordings during cardiac surgery. We visually selected 9 patients with a desaturation event at stable isoflurane concentration and without the occurrence of EEG burst suppression. We calculated SpEnt from a 10-second EEG-period including for the 0.24 to 31.98 Hz range, at either high or low saturation within each patient. We defined the cerebral desaturation as ‘mild’ (not below 50%) and ‘severe’ (below 50%) NIRS and compared the change of SpEnt between the high and low saturation for each patient.

Results: For all patients, except for one with mild cerebral desaturation, we observed a decrease in SpEnt, a parameter behavior observed with increasing anesthetic level, whereas we found a SpEnt increase for all patients with severe desaturation. An increase in SpEnt can also indicate an arousal reaction. Figure 1 presents the individual cases.

Conclusion: With this analysis we could identify a biphasic behavior of SpEnt dependent on the extent of cerebral desaturation. In terms of ‘mild’ desaturations, SpEnt declines with decreasing NIRS level. In terms of ‘severe’ desaturation however, SpEnt increase may be caused by a depression of neuronal activity. This biphasic course could influence EEG-based monitoring devices and lead to an index increase during a severe cerebral desaturation.

blood pressure control. There was strict control of temperature, hydroelectrolytic balance and diuresis during the intervention. For adequate hemodynamic control, norepinephrine was initiated (0.05-0.1μg/kg/min).

Discussion: Stevens-Johnson Syndrome is a skin hypersensitivity reaction usually due to drugs (anticonvulsants and antibiotics are commonly implicated). Advanced age and immunocompromised states have been described as risk factors. There is hardly information about intraoperative anesthetic management. Optimal intraoperative management would consist of replacing with fluids and electrolytes, maintaining ambient temperature, using a servo heater, skin cures, nutritional support (enteral route is preferred), pain control, and monitoring of superinfections.

The daily wound water loss in burn patients with more than 50% of affected skin could be 3 liters. In this case they may require up to 7 liters of crystalloid solutions in 24 hours. A urinary flow of 0.5-1 ml/kg/h should be maintained to avoid water over-resuscitation.

References:

Learning points: Stevens-Johnson Syndrome has no anesthetic management described. Control of hydroelectrolytic balance, diuresis, temperature and nutritional support increase survival.

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**6003**

Abnormal EEG patterns and sudden drop on bispectral index monitor as pattern suggestive of seizures. Case report

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Background and Goal of Study: We report the case of a 57-year-old male who developed generalized tonic-clonic seizures during general anesthesia accompanied by changes in bispectral index, suppression ratio and abnormal morphology of EEG EES EEG patterns.

Materials and Methods: A 57-year-old ASA II patient with benign prostatic hyperplasia was programmed for elective cefobiprol fistula repair via middle cranial fossa. Preoperative assessment was strictly normal. The patient was monitored with non-invasive blood pressure, oxygen saturation and ECG. Bispectral index monitor (BIS) quantitative NMT monitoring (TOFF CUFF) and capnography. General anesthesia was established with tracheal intubation and target-controlled infusion (TCI) of remifentanil 3 mcg/ml and propofol 5 mcg/ml plus rocuronium 0.6 mg/kg. NMT block was allowed to spontaneously recover for monitoring the manipulation of the temporal lobe for accessing the fistula the patient presented. Anesthesia was maintained with TCI propofol and remifentanil titrated to BIS 40-50 and median arterial pressure of 60 mmHg. During manipulation of the temporal lobe for accessing the fistula the patient presented generalized tonic-clonic movements. BIS was 50 showing epileptiform spikes on the EEG. Seizures lasted <1 min and were treated with bolus of 40 mcg propofol, and 2 mg midazolam. After the seizure BIS dropped to 0 with a suppression index (SI) of 49, and recovered to baseline in 5 min. NMT blockade was instutated and after 20 min a new burst of epileptiform activity was seen in BIS reenacting the same pattern of post-ictal suppression. Venous and arterial gasometry were analyzed, and all findings were within normal range. Surgery was continued and patient was extubated without showing any neurological symptoms.

Conclusion: Intraoperative tonic clonic movements during general anesthesia pose several challenges to the anesthesiologist. They require the establishment of differential diagnostics, rapid recognition, management, and treatment of reversible causes. BIS might be useful in orienting diagnosis in patients who present with tonic clonic movements during general anesthesia. It could also be helpful to take into account that patients with sudden drop of BIS preceded by abnormalities in EEG with NMT block might be having a seizure, to allow for initiation of the differential diagnosis and treatment of any precipitation factors, as well as contemplating treatment, continuation of surgery, choice of agent for maintenance of anesthesia and postoperative plan.

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**4737**

“Awake” versus “asleep” deep brain stimulation surgery in Parkinson’s disease

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Background and Goal of Study: Deep brain stimulation (DBS) for Parkinson disease is an alternative for drug-resistant patients. Advancements in neuroimaging have led to image-based targeting of subthalamic nucleus under general anesthesia (GA), or “asleep DBS”) without the use of microelectrode recording (MER) or intraoperative test stimulation (performed under conscious sedation, CS). Our aim was to compare the anaesthetic concerns and complications of these two procedures.

Materials and Methods: Retrospective observational analysis comparing patients who underwent DBS surgery (2014-19), performed under CS or GA. Data collected included demographics, ASA, comorbidities, difficult airway criteria, intraoperative monitoring, duration of surgery and hospital admission. Intraoperative and postoperative complications were registered.

Results: 78 patients were analysed in 2 groups: CS 36 (47.4%) and GA 42 (52.6%). 25 women and 53 men, mean age 60.9 y (33-75). Four CS patients met difficult airway criteria and 7 in GA group. Globally, 23 patients suffered an intraoperative complication, 19 (52.7%) in CS group and 4 (9.5%) in GA group, being arterial hypertension the most frequent (8 [22%] in CS group and 1 [2.4%] in GA group) (table 1). Six patients (16.6%) presented agitation and 4 (11.1%) had a minor airway obstruction in CS group. Procedures under CS were performed in two surgical times. Total mean duration was 5.4 h (3.5-9.2 h) in CS and 4.7 h (3.1 -9.2 h) in GA (p = 0.002). Length of admission was reduced from 8.7 to 3.9 days in the CS group to 3.7 ±4.0 in the GA group (p < 0.0001).
Conclusion: Asleep DBS is associated with reduced morbidity compared with traditional DBS surgery under CS. Arterial hypertension was the most frequent incidence. Factors such as claustrophobia, severe off-medication symptoms or a fear of being awake during the surgery are reduced, leading to an increased number of surgical candidates. Asleep DBS can be performed in one surgical time, which reduces the surgical and admission time.

References:

Materials and Methods: We retrospectively studied intraoperative hemodynamic parameters and perioperative medication in 5 patients undergoing DBS surgery. The focus of this study was investigating patient's vital signs including BP and HR. The secondary focus was observing patient's cooperation when required and feeling comfortable throughout the perioperative period. Bilateral scalp block (1.5% lidocaine + 0.25% bupivacaine) and 0.4-0.5 mcg/kg/hr dexmedetomidine infusion without loading dose were performed during DBS surgery.

Results and Discussion: BP and HR were stable without hemodynamic reaction and patients' respiration were stable. Patients' consciousness level was sedative, but they showed an accurate response to ITS and communication.

Conclusion: DBS using scalp block and low dose dexmedetomidine infusion can be performed safely for parkinson's disease patients with comfortable condition during surgery and good clinical outcomes.

References:
A retrospective cohort review comparing post-anesthesia recovery after “awake” craniotomies under regional anesthesia and “asleep” craniotomies under general anesthesia

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Background: An “awake” craniotomy (AC) is indicated for tumors near eloquent regions of the cortex, and it is associated with enhanced post-operative recovery and reduced hospital stay. As AC is often conducted under regional anesthesia (RA), these benefits in recovery are largely due to RA providing pain management in the post-operative period. To investigate these potential benefits in our institution, we compared the post-anesthesia course of craniotomies conducted under RA or under general anesthesia (GA).

Methods: A retrospective chart review was conducted in patients undergoing a craniotomy for supratentorial intra-axial tumors with a peritonal surgical exposure from January 2016 to December 2017. Patients with chronic opioid use and emergent cases were excluded. Primary outcome included pain scores on a numerical rating scale (NRS), opioid use as oral morphine milligram equivalence (OMME), first time to opioid, nausea, and sedation on the Richmond Agitation and Sedation Scale (RASS). These assessments were recorded until the second postoperative day (POD). Secondary outcomes included seizures, Karnofsky Performance Scale (KPS) status, and hospital length of stay.

Results: Of the 91 patients identified to meet the above criteria, 56 underwent an AC under RA and 35 underwent surgery “asleep” under GA. Demographics and operative characteristics were similar between both groups except for lower intraoperative opioid use in the RA group compared to GA [mean mg of fentanyl 152.23 vs 293.57 (p=0.01) respectively]. A significant reduction in postoperative pain and opioid use was noted in the RA group compared to GA [first postoperative pain score 2 vs 5 (p<0.01); POD 0 median pain scores 2.5 vs 4 (p=0.01); mean time to first opioid dose 7.23 vs 3.42 hours (p <0.01); POD 0 mean opioid in mg 24.43 vs 14.49 (p=0.01)respectively]. Somnolence was less in the RA group compared to GA with RASS less than zero in 23% vs 43% (p=0.05) of the patients on POD 0 and 7% vs 20% (p=0.06) on POD 1. Nausea was experienced in 27% vs 40% (p=0.19) of the patients on POD 0 between RA and GA respectively, and no other differences in were outcome noted.

Conclusion: AC under RA provides better post-operative pain control and a reduction in opioid use, and utilization of RA has the potential to minimize masking the postoperative neurological exam with opioid related side-effects such as somnolence.

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Effects of botulinum toxin on bispectral index monitor and electromyographic activity

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Background and Goal of Study: The use of botulinum toxin with aesthetic purpose began in the 90’s. With the popularization of the technique for the treatment of expression lines, the number of surgical procedures in applied botox patients has increased expressively. The aesthetic paralysis of the facial muscles with botulinum toxin may affect the bispectral index monitor (BIS), which requires muscular activity in addition to an awake EEG to generate values, indicating the patient is awake. The aim of this study is to evaluate the influence of botulinum toxin used in facial muscles on BIS values and electromyographic activity.

Materials and Methods: Three female volunteer patients were admitted to undergo the procedure of applying botulinum toxin A in the upper third facial area for aesthetic purposes. The applications were conducted by the same plastic surgeon. Each patient was evaluated in 3 different periods, observing the following parameters: BIS with bilateral sensor and electromyography (EMG) bilaterally. The evaluations were completed before application, 15 days after and 90 days after the application. Results and Discussion: In the analyzed cases we observed a variable reduction in electromyographic values when compared to the pre-application values of the toxin. Furthermore, there were some recovery of motor activity, as evidenced by the partial increase in electromyography. In one patient, it was observed that electromyography values remains similar 15 days and 3 months after application. Conclusion: This study shows that brain monitoring is influenced by the application of botulinum toxin on the face, which requires special attention from the anesthesiologist. The local effect of the toxin decreases muscle contractility and dystonic movements, an effect that remains for a variable time, and may last for more than 3 months after application of the product. Since decreased electromyography values in the evaluation of anesthetic depth is affected, negative outcomes are possible.
Thromboelastometric (ROTEM) versus standard coagulation test (SCT) results in patients with traumatic brain injury (TBI) undergoing craniotomy

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Background and Goal of Study: Coagulopathy (CP) is a common finding in TBI patients associated with secondary brain damage. However, there is no clear guidance to the clinician on how CP should be managed. SCT have significant limitations. Viscoelastic tests (e.g. ROTEM) reflect whole blood coagulation from initiation to fibrinolysis and may add important information. We aimed to identify dynamic changes in coagulation, and to clarify associations between SCT and ROTEM results in patients with TBI undergoing craniotomy.

Materials and Methods: We present preliminary results of a prospective study in adult TBI patients undergoing urgent craniotomy. Patients with polytrauma (AlExxtreme>3), hematologic disease, use of anticoagulants or antiplatelets, were not included. Blood was collected pre- (day 0) and post-operatively (days 1, 2, 3) and analyzed with SCT (prothrombin time index [PTI], partial thromboplastine time [APTT], platelet count [PLT], fibrinogen concentration [FIB]), and ROTEM assays (EXTEM, INTEM, FIBTEM). CP was considered as any deviation from normal coagulation test values. Dynamic changes of ROTEM and SCT results as well as interrelationships between them were investigated. Significance level for comparisons, p<0.05.

Results and Discussion: 69 patients were included. Patient coagulation profile was generally good and coagulation test abnormalities were mild. Significant negative trends were observed in PTI, APTT and PLT until day 2, whereas FIB increased from day 1. CP prevalence according to SCT increased from 36.2% (day 0) to 71.9% (day 2). Notably, ROTEM parameters generally improved from day 1, and CP prevalence according to ROTEM decreased from 36.2% (day 0) to 16.4% (day 3). EXTEM and INTEM CFT, A10 and MCF showed significant correlations (mostly moderate to strong) with PLT and FIB. FIBTEM A10 and MCF correlated strongly with FIB. Relationships between APTT and PTI with INTEM CT and EXTEM CT, were weak or absent. ROTEM improvements despite negative trends in SCT reflect that viscoelastic tests represent patient coagulation status from a different perspective and overall clot quality in some individuals may be adequate or even improved despite abnormalities found in standard coagulation tests.

Conclusion: PLT and FIB are the main determinants of clot quality. Mild APTT and PTI abnormalities are rarely clinically significant as reflected by ROTEM, and may trigger unnecessary procoagulant interventions in neurosurgical patients.

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Anesthetic management of severe pulmonary arterial hypertension in a patient undergoing craniotomy under general anaesthesia

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Background: Chronic Thromboembolic Pulmonary Hypertension (CTPH) represents a challenge in the perioperative anesthetic management with up to 3.5% mortality in non-cardiac surgery1. Guidelines available offers few recommendations regarding the evaluation and management of these patients. We present the case of a patient with a recent diagnosis of severe pulmonary artery hypertension (PAH) undergoing craniotomy under general anaesthesia.

Case Report: A 73-year-old, scheduled for a suspected high-grade glioma resection surgery was diagnosed of CTPH during cancer extension study and pre-operative assessment. He presented NYHA class II; right heart catheterization showed: CI: 2.29 L/min-1·m-2, PAP: 93/18 (41) mmHg, PVR: 652 dyn·sec·cm-5, compatible with precapillary PAH and right ventricle (RV) dysfunction, with a compatible echocardiography. Enoxaparin treatment was instituted. Epoprostenol infusion was started, increasing it daily, up to the maximum dose, with good patient tolerance. Inferior vena cava filter was placed the day before surgery. Extensive intra-operatively hemodynamic monitoring was performed, including TEE and pulmonary artery catheter. Total intravenous anaesthesia was used, with good patient tolerance. No significant changes in hemodynamics were observed.

Conclusion: CTPH represents an important comorbid condition in patients undergoing craniotomy under general anaesthesia. Preoperative evaluation and management is crucial to improve patient outcomes. The best approach in this situation is a multidisciplinary team, including anesthesiologists, cardiologists, and surgeons.
Concentration gradients of routine laboratory analyses in serial lumbar cerebrospinal fluid aspirates

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Background and Goal: Analysis of Cerebrospinal fluid (CSF) may illuminate the neurobiology of diverse neuropsychiatric disorders. As many of the molecules of interest are produced by or excreted from the brain, it is important to know whether there is a rostro-caudal gradient (RCG) in concentration. Limited evidence from patients with neurological disorders suggests a RCG for blood-derived proteins such as albumin, fibrinogen, and lipoprotein(a)

Materials and Methods: This was a sub-study of the Anaesthetic Biobank of Cerebrospinal Fluid (ABC) for which CSF is obtained from patients undergoing elective surgery under spinal anaesthesia. Subjects were patients ≥18 years old, who were healthy, did not use any medication, and had a BMI<30. Immediately prior to intra-thecal local anaesthetic administration, CSF was aspirated sequentially into 5 x 2 ml syringes. The 5 fractions were immediately transported to the laboratory where routine analyses (albumin, total protein, glucose, leucocyte and erythrocyte count) were performed.

Preliminary results: Thirteen patients have been enrolled (62% male; 77% ASA status I). Median age was 36 years (range 21-77 years), and duration of CSF aspiration 1 to 4 minutes. Within each fraction there was broad intra-patient variability in albumin and total protein concentration (overall ranges 0.04 - 0.33 g/L and 0.13 - 0.55 g/L respectively). There were significant changes in albumin and total protein concentrations across the CSF fractions (RMANOVA, P values 0.008 and 0.043 respectively) with concentration decreasing from the first to the last fraction (Figure 1). There was no significant change in glucose concentration, and erythrocyte and leucocyte count across fractions.

Conclusion: We confirmed a RCG for albumin and total protein. Further work is required to investigate RCG’s for other CSF biomarkers and molecules of interest. When RCGs exist, comparisons among subjects and/or studies are only valid if standardized CSF sampling procedures are followed.

Analysis of cerebrospinal fluid in diagnosis of postoperative meningitis in neurosurgical patients with subarachnoid hemorrhage

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Background and Goal of Study: The accurate incidence of postoperative bacterial meningitis in neurosurgical patients is unknown due to lack of gold standard and brain-derived proteins. The purpose of this study was to determine if there is a RCG in the results of routine laboratory CSF assessments.

Materials and Methods: We conducted a retrospective descriptive study and collected data of cerebrospinal fluid cellularity (leucocyte and erythrocyte count), lactate, protein and glucose level and level of C reactive protein in peripheral blood. Correction of leucocyte count in cerebrospinal fluid was made according to erythrocyte value in cerebrospinal fluid.

Results and Discussion: Of the 35 patients, 18 were women (51.43%) and 17 were men (48.57%). The average year was 59.11 years and median was 60 years. According to biochemical analysis of cerebrospinal fluid glucose was decreased in 15 (42.86%), normal in 9 (25.71%) and elevated in 11 (31.43%) patients. Lactate were increased in 34 (97.14%) and normal in 1 (2.86%) patients. Total proteins were normal in 2 (5.71%) and increased in 33 (94.29) patients nad C reactive protein in cerebrospinal fluid was normal in 9 (25.71%) and increased in 26 (74.29%) patients. Corrected leucocyte count was increased in 33 (94.29%) and decreased in 2 (5.71%) patients. C reactive protein from peripheral blood was elevated in all 35 (100%) patients. Pleocytosis in cerebrospinal fluid as well as high C reactive protein level in peripheral blood can be a part of inflammatory response due subarachnoid hemorrhage. Lactate level in cerebrospinal fluid is good marker in diagnosis of postoperative meningitis according to inflammatory response.

Conclusion: High levels of lactate and protein in cerebrospinal fluid in regard to glucose levels are better markers in diagnosis of postoperative meningitis. Pleocytosis was significantly expresses in patients with subarachnoid hemorrhage even after correction of leucocyte count.

Correlation between the measurement of the diameter of the optical nerve coat and tomographic findings of intracranial hypertension of a population from a University hospital in Colombia

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Background and goal of study: Intracranial hypertension requires the use of CT scan images of the skull to document the displacement of vascular and parenchymal structures, however, the tomograph is not always available in certain situations. Our hypothesis was that the ultrasound is a safe, economical and accessible method that can be used for the measurement of the optic nerve sheath diameter (ONSD) when CT scan is not an option.

Materials and Methods: This was an observational, descriptive, prospective, cross-sectional pilot study, approved by the Ethics committee of the Universidad del Valle code 226-016. All participants signed the informed consent. 25 patients conformed the intracranial hypertension group and 25 patients without intracranial hypertension conformed the control group. For the ultrasound measurement of the ONSD we used the SONOSITE TURBO ® ultrasound. The tomographic images obtained from each patient diagnosed with intracranial hypertension were available in the software of the Hospital Universitario del Valle. As statistical analysis we performed a two tailed t-student test (alpha 0.05) in SPSS Statistics V25.

Results and Discussion: The global average (Left and right eye) of ONSD for patients with neurological disorders suggests a RCG for blood-derived proteins. When RCGs exist, comparisons among subjects and/or studies are only valid if standardized CSF sampling procedures are followed.
Cerebral blood flow velocity decrease and its relationship to hemodynamic parameters in reduced cardiac output induced by lower body negative pressure

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Background and Goal of Study: The integrated regulation of cerebral blood flow (CBF) and its determinants in health and disease are still largely unclear. While the concept of cerebral autoregulation has been present for a long time, other parameters such as cardiac output have been shown to affect CBF. It was the objective of this study to investigate the effect of lower body negative pressure (LBNP) on global hemodynamic parameters and parameters of cerebral perfusion represented by transcranial doppler sonography (TCD) and near infrared spectroscopy (NIRS).

Materials and Methods: After a standardized medical examination and informed consent, 5 healthy male subjects between age 20-30 were included. Subjects were placed in supine position on a horiztonal tilt table. Basic monitoring consisted of continuous ECG and oxygen saturation. Continuous blood pressure, cardiac output and stroke volume were measured using a finger cuff device. Cerebral monitoring findings were TCD using a robotic probe and frontal NIRS. After a baseline measurement of 10 minutes, LBPN was applied at -15 mmHg for 5 minutes, then decreased to -30 mmHg for 5 minutes. Pressure was further decreased in steps of 10 mmHg every 5 minutes until subjects reached presyncope. LBPN was stopped and the table was placed in head down tilt position until complete recovery. Data were analyzed offline. Values were compared to the baseline and to every previous pressure level using the Kruskal-Wallis test with post hoc Bonferroni corrections of multiple comparisons. Data are presented as median (interquartile range). Variables were further analyzed using a linear mixed model. P values of ≤ 0.05 were considered significant.

Results and Discussion: Subjects reached presyncope at LBPN levels between -40 and -70 mmHg. All hemodynamic and cerebral variables were significantly altered by LBPN below -50 mmHg. In the mixed model analysis, stroke volume and mean cerebral artery flow velocity (MCAV) showed a strictly linear decrease with LBPN pressure level decrease in all subjects while this was not the case with mean arterial pressure, cardiac output and cerebral saturation. This suggests that stroke volume may play a central role in cerebral perfusion in situations with reduced cardiac preload. Our results also question the significance of intact cerebral autoregulation.

Conclusion: Stroke volume is an important factor for cerebral perfusion in LBPN.

Case Report: epidural blood patch as a treatment of intracranial hypotension syndrome

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Background: Spontaneous intracranial hypotension syndrome it's caused by cerebrospinal fluid (CSF) leakage characterised by postural headache associated with orthostatic hypotension without any trigger.

Case Report: 53-year-old man, no drug allergies. No neurological symptoms before. Clinical history: arterial hypertension and thyroidectomised in 2014. Clinical findings were tinnitus, orthostatic headache (imTCD). After a decubitus, ataxia of 10 minutes, LBPN was applied at -15 mmHg for 5 minutes, then decreased to -30 mmHg for 5 minutes. Pressure was further decreased in steps of 10 mmHg every 5 minutes until subjects reached presyncope. LBPN was stopped and the table was placed in head down tilt position until complete recovery. Data were analyzed offline. Values were compared to the baseline and to every previous pressure level using the Kruskal-Wallis test with post hoc Bonferroni corrections of multiple comparisons. Data are presented as median (interquartile range). Variables were further analyzed using a linear mixed model. P values of ≤ 0.05 were considered significant.

Results and Discussion: Subjects reached presyncope at LBPN levels between -40 and -70 mmHg. All hemodynamic and cerebral variables were significantly altered by LBPN below -50 mmHg. In the mixed model analysis, stroke volume and mean cerebral artery flow velocity (MCAV) showed a strictly linear decrease with LBPN pressure level decrease in all subjects while this was not the case with mean arterial pressure, cardiac output and cerebral saturation. This suggests that stroke volume may play a central role in cerebral perfusion in situations with reduced cardiac preload. Our results also question the significance of intact cerebral autoregulation.

Conclusion: Stroke volume is an important factor for cerebral perfusion in LBPN.

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Use of near-infrared spectroscopy (NIRS) during endovascular thrombectomy (EVT) in acute ischemic stroke

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Background and Goal of Study: NIRS is a non-invasive method of measuring regional tissue oxygen saturation (rSO2). The goal of this ongoing study was to determine if the NIRS monitor (O3® Regional Oximetry, Masimo Corporation) is able to detect changes in rSO2 associated with reperfusion during EVT in patients with an acute ischemic stroke.

Materials and Methods: After informed consent, 17 patients with a medial cerebral artery (M1) and/or unilateral internal carotid artery (ICA) occlusion diagnosed with
CT angiography were enrolled in the study. NIRS sensors were applied to the scalp directly over the ischemic area and over the contralateral temporal region. The rSO2 values from the ischemic and non-ischemic hemisphere before and after EVT were compared. Data are summarized as median [IQR] and were analyzed with the Wilcoxon signed-rank test.

Results and Discussion: Data from 7 of 17 patients were excluded from further analysis because of either previously unknown bilateral ICA occlusion, an M2 or more distal occlusion, or revascularization by intravenous thrombolysis alone. Patient demographics, procedural characteristics and results are displayed in Table 1. The rSO2 of the affected vs. non-affected hemisphere was 67% [65-73] vs. 67% [65-69] before, and 69% [67-74] vs. 67% [64-72] after EVT (Figure). This is the first study which measures oxygenation with NIRS directly over the ischemic area of interest. The possible reasons why we found no change in rSO2 before and after EVT include: (a) contamination of the signal from extracranial tissue, (b) intracranial collaterals maintaining oxygenation, (c) impaired O2 consumption in the ischemic brain.

Conclusion: Despite application of the NIRS sensor over the ischemic region, no change in rSO2 was detected during successful reperfusion in patients with acute stroke due to a M1 and/or unilateral ICA occlusion.

We present a case of CAS in 76 yrs old female with transient ischemic attack due to a M1 and/or unilateral ICA occlusion. A case report: stroke due to a M1 and/or unilateral ICA occlusion.

Case Report: Stroke due to a M1 and/or unilateral ICA occlusion. A case report: stroke due to a M1 and/or unilateral ICA occlusion.

<table>
<thead>
<tr>
<th>Patient demographics</th>
<th>Procedure characteristics</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (median[IQR])</td>
<td>79 [65-81]</td>
<td></td>
</tr>
<tr>
<td>Male, n/total, n</td>
<td>7/10</td>
<td></td>
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<tr>
<td>Present symptoms</td>
<td>IA +, ICA + M1 +, M2 +</td>
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<tr>
<td>General anesthesia</td>
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<td>Intravenous thrombolysis, no, total</td>
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<tr>
<td>aT-ICO (type B2/2)</td>
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<tr>
<td>Time last seen well to reperfusion, median [IQR]</td>
<td>60 [50-70]</td>
<td>90 [60-100]</td>
</tr>
<tr>
<td>rSO2 affected hemisphere</td>
<td>67 [65-70]</td>
<td>60 [57-70]</td>
</tr>
<tr>
<td>rSO2 non-affected hemisphere</td>
<td>67 [64-70]</td>
<td>60 [57-70]</td>
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<tr>
<td>M1 (perfusion)</td>
<td>0/0; 0/0</td>
<td></td>
</tr>
<tr>
<td>M2 (perfusion)</td>
<td>0/0; 0/0</td>
<td></td>
</tr>
<tr>
<td>M1 (perfusion)</td>
<td>0/0; 0/0</td>
<td></td>
</tr>
<tr>
<td>M2 (perfusion)</td>
<td>0/0; 0/0</td>
<td></td>
</tr>
<tr>
<td>Minute ventilation (%)</td>
<td>6.0 [5.8-6.2]</td>
<td>6.0 [5.8-6.2]</td>
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<tr>
<td>Heart rate (bpm)</td>
<td>78 [77-83]</td>
<td>78 [75-82]</td>
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<tr>
<td>Pre-op O2 CO (ml/g)</td>
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<td>3.6 [3.2-3.9]</td>
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<tr>
<td>Non-affected hemisphere</td>
<td>0.00 [0.00-0.00]</td>
<td>0.00 [0.00-0.00]</td>
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</tbody>
</table>

4953

Anesthesiologist's nightmare in the angio suite during Carotid Artery Stenting

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Background: Endovascular neurointerventions is one of the most expanding clinical fields in the present time. The complexity of conditions treated is increasing, creating challenges for neuroanesthesiologists. Carotid artery stenting (CAS) is regarded as a relatively safe, less invasive treatment of internal carotid artery (ICA) stenosis. Still CAS in calcified arteries carries a higher perioperative risk. Endovascular interventions are the most common complications, while rupture is rare, but generally fatal.

Case Report: We present a case of CAS in 76 yrs old female with transient ischemic attack. Cerebral angiography revealed a concentric calcification with 90% lumen reduction of ICA. CAS started under local anesthesia. After patient had repeated neurologic deficit due to bad tolerance of balloon occlusion test, it was converted to general endotracheal anesthesia. During the intervention of right ICA iatrogenic rupture occurred. After stent implantation patient remained intubated, anagosedated and on minimal vasoactive support. Urgent CT angiography revealed a normal flow through the right ICA without any great blood vessels occlusion; on cerebral CT no ischemic or hemorrhagic events. Patient was extubated without neurological deficit.

Discussion: Outcome after neurointerventional procedure is dependent on rapid diagnosis and early treatment of intraprocedural complications - the time factor! Severe artery stenosis can be indicative for decreased plaque stretch capability, with increased risk of dissection, rupture and residual stenosis. Some study shows that plaque's ability to undergo stretch is independent of the level of stenosis and strongly depends on the calcification's content. Anesthesiologist as a team member has a role in facilitating neuroradiological procedures, so an understanding of specific neuroradiological procedures, with potential complications, is crucial.


Learning points: In future we need parameters that should be more indicative for patient's interventional risk with the aim of safer classic endarterectomy. In the shadow of the procedure, an anesthesiologist's role is much more than covering titration, accurate BP and respiratory function monitoring - a good plan in dealing with possible complications and close cooperation with neuroradiologist is essential for favourable outcome.

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Vascular air embolism in Neurosurgery – A case Report

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Background: Vascular air embolism (VAE) is a feared complication of some invasive procedures, with relevance in neurosurgery. The true incidence of VAE is not known since many cases of VAE are subclinical. This is most often associated with sitting position craniotomies where the brain is in a higher position than the head. Vascular air embolism may have cardiovascular, pulmonary, and neurologic sequelae that might be lethal. The detection of an ongoing episode is mainly a clinical diagnosis, taking into consideration the circumstances under which clinical alterations occur.

Case report: We report a case of a 71 yo male, ASA 3, proposed to suboccipital craniotomy. Twenty minutes after the beginning of the surgery we found an abrupt decrease of eTcO2 and SpO2 (80%). We immediately informed the surgeon, lowered the headboard and institute high-flow 100% oxygen. Fluid therapy has been optimized, preserving hemodynamic stability. A arterial blood gas sample was collected and revealed hypoxemia (paO2 54,3mmHg) and hypercapnia (paCO2 54,3mmHg). There was a fast recover returning to the baseline clinical and laboratorial status. There was no hemodynamic repercussions or further complications until the end of the procedure. At this time a preordial Doppler was made and show small and insignificant air bubbles in the right atrium. We chose to wake up the patient that was uneventfully extubated and transferred to the intensive care unit.

Discussion: Early diagnosis and treatment before catastrophic cardiovascular collapse are of utmost importance. The principal goals of management include prevention of further air entry; a reduction in the volume of air entrapped and hemodynamic support. In this case the clinical suspicion was early recognized and the immediate actions were taken. Transesophageal echocardiography (TEE) is currently the most sensitive monitoring device for detection of air presence and the preordial Doppler (PE) is the most sensitive of the non-invasive monitors. We had no TEE available so PE was our possibility. Decision to transfer to intensive care unit was made for greater surveillance.

Learning points: The optimal management of VAE is prevention. Vascular air embolism is a potentially life-threatening event and clinicians must be aware of this silent but dangerous entity for an early suspicion.

Propofol post-conditioning after temporary clipping reverses oxidative stress in aneurysm surgery

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Background and Goal of Study: Aneurysm clipping has a potential risk of cerebral ischemia-reperfusion (IR) injury due to transient clipping of the parent artery to obtain transmural pressure control and avoid bleeding during surgery. Neuron damage induced by oxidative stress is an important pathophysiological mechanism of cerebral IR injury [1]. Propofol has the capacity to limit lipid peroxidation and improve cellular antioxidative stress systems [2]. Our research group has demonstrated that propofol post-conditioning provides long-term protection against focal cerebral IR injury in rats [3]. This study aims to investigate how propofol post-conditioning may influence cerebral IR injury in patients and provide evidence for patients in terms of proper selection and combination of anesthetics.

Materials and Methods: 60 patients undergoing intracranial aneurysm clipping were randomized into a propofol post-conditioning group or a sevoflurane group. Sevoflurane (0.5%-2%) was used for maintenance anesthesia in both groups. In propofol group, the inhaled concentration of sevoflurane was reduced after temporary clip removal to keep the bispectral index value between 40-60, and propofol (1.2 g/ml) was subsequently started. Blood samples were drawn at 6 time points.

Results and Discussion: Between the conclusion of the operation to 7 days after surgery, propofol post-conditioning decreased the serum concentration of OH and 8-iso-prostanet and micronuclei and nucleoplasmic bridges, furthermore, increased y-licopherol, SOD, MMSE and MoCA scores. Additional cognitive scales and future studies should be taken into consideration to more fully assess cognition and explore patients’ prognoses.

Conclusion: Propofol post-conditioning may protect brain from oxidative stress injury up to 7 days, and the combination of sub-dose propofol and low concentration sevoflurane may have an advantage over sevoflurane alone after aneurysm clipping surgery.

References:

Acknowledgements: This study was supported by grants from the National Natural Science Foundation of China, Beijing, China (81071059, 81100984, 81571054).

Assessment of psychoemotional disorders and autonomic nervous system dysregulation in the early postoperative period in patients with kinking of internal carotid arteries

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Background and Goal of Study: To compare the severity of psychoemotional disorders and autonomic nervous system dysregulation in the early postoperative period in patients with kinking of the internal carotid arteries (ICA) backdroof fibrinolytic disfibrinolysis (FMD) and arterial hypertension (AHT).

Materials and Methods: The prospective randomized study included 56 patients who underwent surgical reconstruction of ICA's kinking. Patients with kinking of ICA were divided into 2 groups: the first (1st) group included 27 people with FMD, and the second (2nd) group 29 respondents with AHT. The criteria for excluding patients from the study were: cognitive disorders, mental and acute neurological diseases. Hospital Anxiety and Depression Scale (HADS) was used to evaluate anxiety and depression, considering them if the score was ≥10. The assessment of autonomic dysregulation was carried out using the Russian "Questionnaire to identify autonomic nervous system changes" named after A.M. Vein (VQ), considering the autonomic nervous system dysregulation if the score was >15. The evaluation was performed before ICA's kinking surgery, on days 1 and 7.[1,2]

Results and Discussion: Prior to the operation, the levels of psychoemotional disorders did not significantly differ and HADS anxiety subscale scores were 15.1±2.1 in the 1st group and 12.3±3.2(p>0.05) in the 2nd, and in the HADS depression subscale scores were 8.5±3.4 and 7.2±3.5(p>0.05), respectively. On the 1st day after surgery, patients with FMD showed higher levels of anxiety (17.1±4.2 and 12.3±2.0(p>0.05), while the levels of depression did not significantly differ - 9.1±3.1 and 7.9±3.5(p>0.05) in the 1st and 2nd group, respectively. On 7th day, the studied level on the HADS anxiety scale was 14.5±2.1 and 10.3±3.2(p<0.05), and the depression level was 8.7±2.5 and 6.9±2.7(p<0.05) in the 1st and 2nd groups, respectively. According to VQ, higher scores were found in the group of patients with FMD. At the 1st day after operation scores were 56.3±14.2 and 34.2±11.6 (p<0.05) respectively. On the 7th day studied levels corresponded to 41.7±12.9 and 21.5±8.2 (p<0.05) respectively.

Conclusion: In the early postoperative period, patients with FMD operated on kinking of ICA are characterized by higher levels of psychoemotional disorders and autonomic nervous system dysregulation.

References:

Neurophysiology team input to cardiovascular instability approach. Case report of petroclival meningioma

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Background: During posterior fossa neurosurgery, cardiovascular instability and heart arrest may occur. Manipulation of medullary reticular formation and posterior part of the IV ventricle can result in arterial hypertension. Bradycardia may arise when operating in the vicinity of the pons and roots of V, IX and X. We report a case of successful multidisciplinary interaction between surgical, anesthesia and neurophysiology teams to halt lesion of brain stem.

Case Report: 42yo, ASA II, history of hypotension, with left hypoacusia and dysphagia. Proposed for excision of a big petroclival meningioma, 44x45mm with significant midline shift and brain stem molding. Submitted to total intravenous anesthesia with TCI of Propofol/Rempifentanil. Monitored with ASA standards, invasive blood pressure, evoked potentials and electromyography (EMG) of selected cranial nerves (CN). During tumor removal, near CN IX, X and XII, it was observed 5 short periods of bradycardia with hypertension. At the same time inputs were being received through EMG of the tongue (CN XII). The combination of the two signs aimed towards a neurocardiogenic reflex being triggered. That particular area was therefore avoided and no further complications were observed. Preoperative dysphagia resolved.

Conclusion: Mass effect distorts normal brain anatomy, rendering it difficult to recognize structures even under microscope. 2 Monitoring the integrity of the brainstem during posterior fossa surgery is highly recommended. Recent case reports of severe cardiovascular events in posterior fossa surgery denotes the importance of constant hemodynamic monitoring, integrated carefully and simultaneously, guiding a planned approach to a potential irreversible neurologic lesion.

References:

Learning points: Multidisciplinary team coordination in the OR are crucial for the well-being of the patient.
surgery was performed. During the procedure, unexpected tendency for bleeding was noted and two FFPs were administered along with 1g Ca gluconate. The bleeding continued from every layer of the surgical site, so 1g of tranexamic acid was given and improvement was noted. The patient remained sedated due to risk of further bleeding till the next day. Family members revealed he had few episodes of nose bleeding as a child. There was suspicion for von Willebrand disease so additional tests were done. Ristocetin test showed hypocoagulatin of the platelets. After 48th additional 500mg of tranexamic acid were administered for drain removal. Two weeks later Light Transmission Aggregometry test with ADP, Collagen and Ristocetin all showed hypocoaggregation.

Discussion: Every chronic hematoma in young patients, especially in “several bleeding times”, should steer our thinking towards some hematological disorder as a predisposing risk factor. According to European VWD type 1 study, bleeding history is a better guide for diagnosis than laboratory findings2, because standard coagulation tests have two “blind” spots WVF and FXIII. Standardized bleeding questionnaire is a better predictor for perioperative bleeding risk because bleeding symptoms are more relevant than WVF levels and they shouldn’t be checked routinely in asymptomatic patients2.

References:

Learning points: Standardized Bleeding Questionnaire should be part of every preoperative evaluation of surgical patients.

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The role of extracellular signal-regulated kinase (ERK) 5 in spinal cord on pathological pain in mice

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Background and Goal of Study: Mitogen-activated protein kinase (MAPK) cascade is a superfamily transducing a broad range of intracellular signals. Extracellular signal-regulated kinase 1 and 2 (Erk1/2) belong to a subfamily of the large MAPK family, and recent findings indicate the different functions of these isoforms in mouse pain models. We previously revealed that, by using isoform specific mutant mice, Erk2 plays a predominant and/or specific role in pain plasticity, the contribution of Erk1 is limited. Erk5, also known as big mitogen-activated protein kinase 1, is a member of another subfamily of large MAPK family. Although accumulating evidence suggests the important roles of Erk5 to pain hypersensitivity, there is no report to study the specific contribution of Erk5 to pain plasticity by using Erk5 mutant mice. Hence, we investigate the function of Erk5 to pain plasticity by using conditional, region-specific, genetic deletion of Erk5.

Materials and Methods: To generate mice deficient for Erk5 specifically in the central nervous system, the floxed Erk5 mouse line was crossed with a Nestin promoter-driven cre mouse line. All mice used in this study were 8-12 weeks male littermates. The partial sciatic nerve ligation (PSNL) model was used as the neuropathic pain model, and alldynia was evaluated by the Von Frey test. Inflammatory pain was assessed by the Formalin test.

Results and Discussion: Although Erk5 mutant mice showed a normal baseline paw withdrawal threshold to mechanical stimuli, these mice had a reduced nociceptive response following a formalin injection to the hind paw. In a PSNL model, these mice showed normal mechanical alldynia and thermal hyperalgesia compared to control mice.

Conclusion: Erk5 in the spinal cord played an important role in inflammatory pain, but did not play an important role in alldynia and hyperalgesia.

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Low skeletal muscle mass induces postoperative cognitive dysfunction in middle-aged rats

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) which is contributed to the neuroinflammation by activated microglia cell increases with age. Although it has been indicated multiple risk factors, the relation between POCD and frailty or sarcopenia is unclear. However, they affect dementia therefore we speculate on the relation to POCD and muscle atrophy. In this experiment, we have investigated whether muscle atrophy would induce the POCD in middle-aged rats.

Materials and Methods: All rats were allocated to two groups; tail suspension group (TS) which suspended their tails 2 weeks before surgery and control group. All rats in both two groups underwent hepatectomy and mesenteric manipulation under 3% sevoflurane with 30% oxygen on the day of surgery. Cognitive assessments were conducted by the Morris water maze test (MWM), fear conditioning test, and novel recognition test 7 days after surgery. Immunohistorical staining of iba-1 assessed the activation of microglia. Data were expressed as mean ± SEM. Behavioral test was compared with two-way analysis of variance, followed by the Wilcoxon rank sum test for two group comparison. P < 0.05 was considered statistically significant.

Results and Discussion: The swimming latency and length to the plat form in the TS group were significantly higher than the control group while the swimming velocity didn’t have significant difference. There were no significant difference of the freezing time and exploratory preference. Iba-1 in the TS group were increased compared with the control group.

Conclusion: Preoperative muscle mass reduction induces the spatial learning impairment and the neuroinflammation in middle-aged rats. These results indicate that muscle mass is important for the prevention of POCD.

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Dosing of Methadone for complex spine patients: Can we achieve personalized dosing using the patient as his own control

Alqarr N.1

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Background and Goal of Study: Patients undergoing spine surgery experience significant amount of pain that can interfere with daily activities. Articles in the literature describe the use of methadone as a single dose from 0.2 mg/kg up to 0.5 mg/kg. We want to determine if methadone given in small aliquots until respiratory depression allows the patient to act as his own control determining the dose he will require. After IRB approval, patients undergoing complex spine surgery are randomized to two groups: Group 1: In the OR, with full monitors, the patient receives 0.2 mg/kg of methadone IV based on ideal body weight titrated to apnea. Each subject receives a 10 mg loading dose then aliquots of 5 mg, given at 5 to 10 minute time intervals. After reaching the apex threshold as determined by respiratory rate less than 4 breaths/min, induction of general anesthesia and intubation proceeds. Each subject receives a 10 mg loading dose then aliquots of 5 mg, given at 5 to 10 minute time intervals. After reaching the apex threshold as determined by respiratory rate less than 4 breaths/min, induction of general anesthesia and intubation proceeds.

Results and Discussion: We collected intraoperative data: total dose of all anesthetics, length of surgery, number of levels, estimated blood loss, time to extubation, total and type of fluids and vasopressors administered, vital signs and total opioid use. The following post-operative data collected: patient daily pain score for the first 72 hours, total opioid usage, length of stay, time to get out of bed. We will calculate the opioid requirement for each 24-hour period and the whole 72 hours. The study was stopped after 20 subjects due to changes in intraoperative management of complex spine patients and implementation of ERAS protocols that conflicts with the strict adherence to study protocol. The protocol is being revised and requires a new institution review board approval. Statistical analysis: We are currently analyzing the data and will be ready for the poster. We do not have any respiratory depression events.

Conclusion: We describe a novel approach of dosing the long acting narcotic methadone using the patient as his own control to determine the most appropriate, personalized dose. The method appears to be safe and easily reproducible.
Transcatheter tricuspid valve replacement: a two-patient case report

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Background: Tricuspid regurgitation (TR) is a common valvulopathy most frequently produced by annular dilatation and therefore leaflet tethering with a poor prognosis for severe cases [1]. Many patients are destined to a lifespan of futile pharmacological therapy [2]. Surgical treatment of the tricuspid valve (TV) is infrequently performed but the rise of less invasive, percutaneous therapies intends to end this reality. Transcatheter tricuspid valve replacement (TTVR) remains as a rarity in the therapeutic spectrum of TR.

Case Report: Case 1: Female, 59 years old with a tricuspid prosthesis with an absence of coaptation and tenting of the prosthesis that produced severe TR. A general anesthesia was performed with invasive monitorization. A NaviGate curve and its prolonged cross-clamp times associated. Due to insufficient published negative clinical outcomes, these might be a consequence of a sharp learning curve and its prolonged cross-clamp times associated. Due to insufficient published evidence, larger prospective randomized trials should be performed to compare the efficiency of port-access techniques to classic sternotomy procedures in terms of increased risk.

Case 2: Female, 74 years old, with TR regardless of a previous double annuloplasty. A general anesthesia was performed with invasive monitorization. A NaviGate prosthesis was implanted with no incidents. Anticoagulation with enoxaparin was initiated that same day. Transthoracic echocardiography (TTE) after the procedure showed a correct function of the prosthesis with a minimal paravalvular leak. Case 2: Female, 74 years old, with TR regardless of a previous double annuloplasty. A general anesthesia was performed with invasive monitorization. A NaviGate prosthesis was implanted with no incidents. Anticoagulation was initiated on the first day with a continuous heparin infusion. The post-procedural TTE showed no TR or leaks.

Discussion: Severe TR remains a rarely treated valvulopathy in spite of its repercussion in patient survival [2]. We are still at a very early stage of endovascular treatment of TR and very few of these procedures have been done worldwide. The importance of these cases relies in the need for a correct anaesthetic approach to these patients. They represent the two only cases that have been performed in Spain.

Results and Discussion: No mortality was registered (0%) after surgery and before discharge. Two cases of bleeding (8.3%) were reported, but only one (4.1%) underwent reoperation. Difficult pain control was experienced in six patients (25%), despite the use of diverse analgesia strategies. 25% of the sample suffered from pulmonary complications and renal failure in the immediate post operatory. Only one case (4.1%) of surgical wound infection was noted. Mean cross-clamp and perfusion time were 111 min and 167 min respectively, taking longer in comparison to end this reality. Transcatheter tricuspid valve replacement (TTVR) remains as a rarity in the therapeutic spectrum of TR.

Severe tricuspid regurgitation treated by percutaneous approach: a case series using transcatheter mitral clip device

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Background: Tricuspid valve (TV) dysfunction that causes significant tricuspid regurgitation (TR) is a common heart valve disease with few effective treatment options. Recent evidence seems to indicate that patients undergoing a transcatheter clip procedure due to mitral regurgitation have worse outcomes if concomitant TR is present. In (1), herein, we describe procedural performance, anesthetic considerations and clinical outcomes of this therapy in 7 patients.

Case report: 7 patients underwent the procedure. Grade of TR was severe in all cases, most of them had preserved left ventricular ejection fraction and two of them had severe pulmonary arterial hypertension. All were performed through transfemoral access. A clip was placed at the anteroseptal commissure in all patients, adding a second one in 3 of them. The procedure was performed under general anesthesia. Left radial artery and peripheral and venous catheters were cannulated and unfractionated heparin was administered after sheath insertion.

Conclusion: We describe the case of a 85 years old Japanese female who was operated Aortic valve replacement and a left ventricular septum biopsy. Preoperative, echocardiographic examination showed cardiomyopathy and LVOT obstruction. After surgery, the patient's initial vital signs were unremarkable, and the lungs were clear and continued treating her with β-blockers. However, postoperative day 4, The patient caused episode of dyspnea had lasted a few minutes, and it was preceded by dizziness and palpitations. Doppler echocardiographic examination showed a mildly increased velocity across the LVOT and mitral valve systolic anterior movement. A left ventricular septum biopsy revealed the presence of significant interstitial amyloid deposits. After the diagnosis was established, we discharged her in stable condition for outpatient follow-up.

Discussion: Amyloidosis is a rare condition characterized by extracellular deposition of protein fibers, the so-called amyloids. The target organs for amyloid deposits are especially the kidney, heart, nerves, gastrointestinal tract and liver. The diagnosis of systemic AL amyloidosis with myocardial involvement is based on echocardiography. Wall thickening is incorrectly referred to as hypertrophy which may potentially lead to the wrong diagnosis of hypertensive heart disease or hypertrophic cardiomyopathy.

References:

Learning points: Cardiac Amyloidosis is associated with a severe AS in rare cases. We must suspect cardiac amyloidosis post operative systolic anterior movement and preoperative left ventricular outflow tract obstruction.


Learning points: Cardiac Amyloidosis is associated with a severe AS in rare cases. We must suspect cardiac amyloidosis post operative systolic anterior movement and preoperative left ventricular outflow tract obstruction.

Severe frailty syndrome – risk factor for delirium after transcatheter aortic valve implantation (TAVI)

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Background and Goal of Study: Postoperative delirium (POD) is one of the most common complication after cardiac surgery. Transcatheter aortic valve implantation (TAVI) is recommended for patients at high surgical risk, especially for the elderly. This population is particularly at high risk of POD due to advanced age and possible co-occurrence of frailty syndrome. The aim of the study was to evaluate the influence of frailty syndrome and comorbidity on POD occurrence after TAVI.

Materials and Methods: We retrospectively analysed the medical history of 66 patients who underwent TAVI procedure between 01.2018 and 10.2019 at Wroclaw University Hospital. Delirium was diagnosed according to DSM V criteria. Frailty syndrome was identified using 36-item frailty index. (1) Medical comorbidity was measured using Charlson comorbidity index (CCI). Results and Discussion: All TAVI procedures was transfemoral under general anaesthesia. Of 62 patients enrolled to the analysis, 33.8% (n=21) developed POD. There was no significant difference between age (mean 79.3 vs 79.2, p=0,8) and gender. Higher preoperative comorbidity was not associated with POD (median CCI was 6 vs 5, p=0,25). Mild frailty was diagnosed in 17.7% patients (n=11) and moderate frailty in 54.8% (n=34). Severe frailty was diagnosed in 27.4% (n=17) and it was associated with development of POD (p<0,007, (figure 1))

Conclusion: Preoperative diagnosis of frailty syndrome may help to identify patients at particularly high risk of POD and apply prevention treatment.

References:

Transcatheter mitral valve repair: a percutaneous approach to severe mitral regurgitation

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Background and Goal of Study: Mitral regurgitation (MR) is a common heart valve pathology with high morbi-mortality rates unless accurate treatment is given. Over the past few years, percutaneous techniques have become an important alternative to surgery in severe MR. Multiple treatment options are available for sytomatic moderate-severe or severe MR: medical treatment, open surgery and transcatheter mitral valve repair (Mitraclip®). Mitraclip® is foremost applicable to high surgical risk patients. It is a device that enables the approach of mitral valves with one or more clips, reducing MR area. The main objective of this study is to evaluate effectiveness and security of this technique in our hospital, attending to MR area reduction and complications rate.

Materials and Methods: We collected every Mitraclip® placed in mitral position in our hospital since April 2018 to September 2019. Mean age, gender, mean ejection of left ventricle (MELV) were recorded. We measured MR area before and after the clip placement, classifying it in four degrees: mild, moderate, moderate-
severe and severe. Duration of the technique (minutes), length of stay (days) and different complications (valve damage, mitral stenosis, infection or endocarditis, clip embolization, stroke) were also recorded.

Results and Discussion: Mean age was 67.6 ± 9.1 years, 90% (27) were men. Before Mitraclip placement, all patients presented severe MR with mean ejection fraction of left ventricle 32 ± 12%; after the technique, 56.6% (17 patients) presented mild MR, 36.6% (11) presented moderate MR, and 3.3% (1) severe MR. 6.6% (2 patients) suffered mitral damage; 3.3% (1) required cardiac surgery with mitral valve replacement; 3.3% of patients suffered mitral stenosis after Mitraclip placement. No cases of clip embolization, endocarditis or stroke were recorded. Average duration was 157 ± 66 minutes and length of stay, 6 ± 6.1 days. As we can see in this study, almost every patient reduced MR degree, with small rate of complications. As these patients are high risk patients (porcelain or highly calcified aorta, patent foramen ovale, severe pulmonary hypertension and severe liver disease), it seems a very good alternative to surgery.

Conclusions: It seems that Mitraclip represents an effective and secure therapeutic option for patients with severe mitral regurgitation and high surgical risk.

Chylothorax and chylopericardium after aortic valve replacement

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Background: Both chylothorax and chylopericardium are rare but severe complications of cardiac surgical procedures. They may be caused by an injury in the thoracic duct or its tributaries and result in a substantial increase in morbidity and mortality.

Case Report: We report a case of a 58-year-old male patient diagnosed with severe aortic stenosis who underwent scheduled metallic valve replacement. During his immediate recovery in our perioperative intensive care unit we observed. Pleural effusion had a milky-opaque appearance so differential diagnosis was made between chylothorax, empiema and Dresser syndrome. Pleural fluid analysis was assessed for cell count, glucose, LDH, total protein, triglyceride and cholesterol, cytology and microbiologic culture. A concentration of triglycerides of 264mg/dl and cholesterol/triglyceride ratio of <1 caught our attention. Initial treatment consisted in medium chain triglycerides diet with total parenteral nutrition and the maintenance of chest drains. Due to favorable evolution the patient was discharged to cardiac surgery ward, where he newly developed dyspnea and hypotension within a period of 10 days. A TTE was performed with the diagnosis of pericardial effusion. The patient underwent reesternotomy to evacuate the chylopericardium and search for its origin to control it. Thereafter, he had a favorable evolution until his full recovery.

Discussion: Chylothorax and chylopericardium are infrequent complications but severe enough to always have them in mind making our differential diagnosis. Their presence is suggested by a milky opaque effusion with laboratory findings including a triglyceride level >500mg/dL, cholesterol/triglyceride ratio of <1, negative cultures and cytology, lymphocyte predominance and fat globules. Initial treatment depends on the presence of symptoms. In the absence of clinical symptoms, dietary modifications sometimes associated with off-label use of somatostatin would be enough. Refractory effusions will require surgical therapy to prevent cardiac tamponade, dyspnea or malnutrition.

Learning points: Chylopericardium and chylothorax are rare complications of cardiothoracic surgery, associated with significant morbidity and mortality; prompt diagnosis and treatment are of critical importance. The diagnosis is confirmed following pericardial and thorax fluid analysis. Surgical treatment should not be delayed in symptomatic patients.

6105

State of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction with cardioprotection by electrical fibrillation and intermittent aortic clamping

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Background and Goal of Study: The aim of the work is to analyze the state of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction with cardioprotection by electrical fibrillation and intermittent aortic clamping.

Materials and Methods: We examined 45 patients with mitral valve insufficiency admitted to the Heart Institute Ministry of Health of Ukraine for surgical correction of the defect. All patients underwent an operation of mitral valve replacement, and the local protocol of the protection of myocardium was performed by applying electrical cardiac fibrillation and intermittent clamping of the aorta. Patients were fixed at the end of cardiopulmonary bypass, before being transferred to (intensive care unit) ICU, after leaving ICU the end systolic, end diastolic and stroke index (EDI, ESI, SI) of the left ventricle, left ventricular ejection fraction (EF), cardiac index (CI), systolic pressure in the pulmonary artery (PPAs) and global longitudinal myocardial strain (GLS).

Results and Discussion: The EDI was not statistically significantly altered during the study. At the stages of the study, the EDI gradually decreased and, before being transferred from an ICU, became significantly lower than the baseline (p<0.03), although such dynamics did not affect the SI. The EF at the end of cardiopulmonary bypass was unreliable (p>0.3) increased to 53.6 ± 4.1% and then remained almost at the same level: 53.2 ± 5.4% before being transferred to the ICU and 54.2 ± 6.2% before transfer from ICU. The GLS module at the end of cardiopulmonary bypass significantly (p<0.003) decreased to 7.9 ± 0.8%, then gradually returned to the previous level. PPAs after correction of the defect and at the end of cardiopulmonary bypass significantly and significantly decreased to 36.8 ± 2.6 mm Hg (p<0.0001), further, before transferring to the ICU, it became still significantly (p<0.004) lower. All CI changes during the study were unreliable.

Conclusion: These indicators indicate that the cardioprotection method used did not have a negative effect on myocardial contractility and central and intracardiac hemodynamic parameters.

6142

State of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction using crystalloid cardioplegia in the perioperative period

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Background and Goal of Study: The purpose of our work was to study the state of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction using crystalloid cardioplegia in the perioperative period.

Materials and Methods: We examined 40 patients with mitral valve insufficiency admitted for surgical correction of the defect. Patients underwent therapy and surgery (mitral valve replacement). Patients were fixed at the end of cardiopulmonary bypass, before being transferred to (intensive care unit) ICU, after leaving ICU the end systolic, end diastolic and stroke index of the left ventricle, left ventricular ejection fraction, cardiac index, systolic pressure in the pulmonary artery and global longitudinal myocardial strain.

Results and Discussion: The left ventricular ejection fraction at the exit from the cardiopulmonary bypass decreased to 50.7 ± 5.2% (p = 0.09 compared with the initial level). Then it increased insignificantly: to 51.7 ± 5.0% before transferring to intensive care unit and to 52.4 ± 5.8% (p < 0.7 compared to baseline) after transferring from intensive care unit. The global longitudinal myocardial strain module after correction of the defect and withdrawal from cardiopulmonary bypass significantly decreased from -12.4±8.8% to -11.3±7.9% (p < 0.001) and then did not significantly change statistically until the end of the study being transferred from intensive care unit - 11.7±1.1% (p <0.005 compared with baseline). Systolic pressure in the pulmonary artery after correction of the defect and after leaving the cardiopulmonary bypass decreased significantly and reliably to 35.6 ± 3.0 mm Hg. Art. (p <0.0001) and then not significantly changed (35.3 ± 2.8 mm Hg. before transferring to intensive care unit and 35.1 ± 2.7 mm Hg. before transferring from intensive care unit). Despite this, the integral indicator of the circulatory system -
Cardiac index - was below 2.51 / min / m² in only 5 (12.5 ± 5.2%) patients, while not being below 2.2 I / min / m², which was due to a compensatory increase in heart rate (maximum - up to 96 min 1) and the appointment of sympathomimetic therapy. Conclusion: Surgical correction was accompanied by the greatest changes in global longitudinal myocardial strain, systolic pressure in the pulmonary artery and left ventricular ejection fraction at the exit stage of cardiopulmonary bypass.

6265
Systolic anterior motion after mitral valve reconstructive surgery in non obstructive hypertrophic cardiomyopathy
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Background: Systolic anterior motion (SAM) of the mitral valve refers to the paradoxical movement of the anterior leaflet or chordae toward the interventricular septum during systole and it can be a life-threatening condition. The SAM is typically observed in patients with hypertrophic cardiomyopathy (HCM) or in patients following mitral valve reconstructive surgery.

Case Report: We present a case of a 42 years old woman with a history of bipolar disorder a moderate psychomotor disability. Other disease were hernia hyatus and low density anaemia. The patient was scheduled for mitral valve reconstructive surgery. The relevant findings of intraoperative transesophageal echocardiography (TEE) reveal mitral valve with prolapse of the posterior leaflet with defects of coaptation that cause eccentric mitral insufficiency of wide regurgitation jet toward the atrial ceiling. There was no evidence of hypertrophic cardiomyopathy or left ventricular hypertrophy. Mitral valve repair surgery was implantation of tendon neochordae an annuloplasty. When extracorporeal circulation was discontinued severe SAM was evident by TEE (fig 1). Volemia was optimized and beta blocker was given. Furthermore, the haemodynamics situation was normalized but anatomic alteration of left ventricular outflow tract persisted. Rerepair of mitral valve was decided and resection and sliding plasty of posterior leaflet was carried out. The technique performed solved the SAM (fig 2). The postoperative evolution was favourable. One month later the patient is asymptomatic with no SAM or mitral regurgitation on transthoracic echocardiography.

Discussion: SAM rates after mitral repair vary from 4% to 8% in the literature (1). When SAM is developed early medical management (volume loading, beta blocker therapy) usually resolve this situation and surgical intervention is not required. In our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that

4746
Intravenous versus inhalational maintenance of anaesthesia on tissue oxygenation in cardiac surgery
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Background and Goal of Study: The aim of this study was to evaluate the effect of total intravenous anaesthesia (TIVA) and inhalational anaesthesia techniques on tissue oxygenation. For this purpose, the effects of midazolam-based TIVA or sevoflurane-based inhalation anaesthesia maintenance on intraoperative central and peripheral tissue oxygenation parameters were compared in patients undergoing coronary bypass surgery (CABG).

Materials and Methods: Ethics Committee and written informed consent were obtained. A total of 104 adults were randomized (n=52 per group). Induction with 10 μg/kg-1 fentanyl,0.15mg/kg-1 midazolam,0.8 mg/kg-1 of rocuronium were performed. During the anaesthesia maintenance of groupTIVA,3μgkg-1fentanyl,0.01-0.05mgkg-1midazolam,0.2mgkg-1rocuronium were applied throughout the operation to keep BIS40-60, in every 30-45min.In SEVOgroup,2-3%sevoflurane,3μgkg-1fentanyl,0.2 mgkg-1rocuronium were applied with BIS guidance. During CPB, sevo vaporizer designed for the pump was used. Cerebral and left forearm NIRS values, central jugular and left forearm venous oxygen saturations were recorded. Measurement periods were: T1;5min after anaesthesia induction, T2; after the cannulation, T3; at the 10th min of cardiopulmonary bypass (CPB),T4;10min after cross removal,T5;10 min afterCPB,T6;sternum closing.

Results and Discussion: Demographic data were similar in both groups. Forearm NIRS values were higher in SEVO group (2nd,3rd,6th measurement periods p=0.029,0.028,0.032). Forearm venous oxygen saturations were not found significantly different between the groups, although it was observed higher in the sevo group. Central venous oxygen saturation in SEVO group, were significantly higher in the 2nd,3rd,4th periods, compared to TIVA (p=0.019, 0.006, 0.045). In both groups, the right-left cerebral NIRS values did not differ from the other. In the sevo group, extubation time was significantly shorter (9.58±3.97,9.54±4.66). ICU and hospital stay were not different between the groups.

Conclusion: Concomitant with advances in anesthetic methods, there have been efforts to elucidate the nonanesthetic effects of anesthesia drugs, focusing on the adequacy of organ perfusion. The effects of midazolam-based TIVA and sevoflurane-based inhalation anaesthesia maintenance on intraoperative central and peripheral tissue oxygenation parameters were compared in patients undergoing CABG, and it was found that sevoflurane-based anaesthesia provides more ideal tissue oxygenation than TIVA.

4396
Remimazolam (CNS 7056) compared to Propofol/Sevoflurane for anaesthetic induction - a post-hoc analysis of haemodynamic differences in a Phase II pilot trial in patients during elective cardiac surgery
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Background and Goal of Study: Remimazolam (CNS 7056), a benzodiazepine, is rapidly metabolized by tissue esterases (CNS A1A) to CNS 7054 with a context-sensitive halftime of about 7 minutes (1). In a randomized, single-blind, Phase II pilot trial (NCT 01937767) Remimazolam was compared with Propofol/Sevoflurane (PiS) during induction and maintenance of general anaesthesia. We compared haemodynamics from anaesthetic induction (IND) until 30 min after intubation (INT). Materials and Methods: 90 pat. scheduled for elective cardiac surgery were randomized into three treatment groups. All pat. received 0.2 mg of Fentanyl and either 2-2.5 mg/kg Propofol (PiS) or Remimazolam 6 mg/kg (P6) or 12 mg/kg (PiS). Results and Discussion: All pat. were anaesthetised successfully. 9 pat. were excluded from further data analysis, as they had received other vasoactive drugs. Biometric data, also baseline values of NCI, HR and MAP were not different. During analysed time intervals (start of IND to 20 min and 30 min after INT) RF dose, amount of fluid and NCI were not different. MAP also was not different, but we found a highly significant difference in the total dose of NCI given per KG BW (tbl 1).

Cumulative dose of NE (µg/kg)

<table>
<thead>
<tr>
<th>Group</th>
<th>Start of IND (µg/kg)</th>
<th>20 min after IND (µg/kg)</th>
<th>30 min after IND (µg/kg)</th>
<th>60 min after IND (µg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PiS</td>
<td>3.9±3.1</td>
<td>0.8±0.2</td>
<td>0.3±0.1</td>
<td>0.1±0.1</td>
</tr>
<tr>
<td>CNS 7054</td>
<td>2.9±3.1</td>
<td>0.8±0.2</td>
<td>0.3±0.1</td>
<td>0.1±0.1</td>
</tr>
<tr>
<td>CNS 7056</td>
<td>2.9±3.1</td>
<td>0.8±0.2</td>
<td>0.3±0.1</td>
<td>0.1±0.1</td>
</tr>
</tbody>
</table>

Conclusion: A significantly lower NE dose was administered when Remimazolam compared to Propofol/Sevoflurane was used for IND and maintenance in patients undergoing cardiac surgery until 30 min after INT (p<0.0006).

References:

4396
Cardiac, Thoracic and Vascular Anaesthesiology
Cardiac, Thoracic and Vascular Anaesthesiology
Conclusion: The results indicate that NIRS might be prone to extracranial contamination. SRS is probably more reliable than MBL after administration of PE.

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Preoperative predictors of immediate hypersensitivity reactions in cardiac surgery

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Background and Goal of Study: Anesthesia care in cardiac surgery is often associated with elevated risk of immediate hypersensitivity reactions (IHR) due to application of various drugs, such as heparin, protamine, etc. Despite many publications concerning evaluation of IHR risk there's still no consensus about causes of increase in IHR. The goal of a study is to identify predictors of IHR reactions in cardiac surgery.

Materials and Methods: The study included 740 cardiac surgery patients. We evaluated 37 factors, which were considered as potential predictors. Logistic regression was used with calculation of odds ratio (OR), 95% confidence interval (95% CI) and significance level (p) for each factor to determine the prediction model of the development of immediate hypersensitivity reactions. These factors were considered as predictors of immediate hypersensitivity reactions at p-value < 0.05. Sensitivity, specificity and significance level were determined for quantitative variables using ROC analysis.

Results and Discussion: Risk factors of immediate hypersensitivity reactions and Spectroscopic Resolved Spectroscopy (SRS) method to measure the total hemoglobin content (nTHI, expressed in arbitrary units). Although both parameters generally provide concordant values, SRS has a higher cerebral specificity and tends to not be affected by extracranial blood flow. We hypothesized that extracranial contamination of NIRS values is plausible when PE induces more pronounced changes in MBL than in SRS.

5404

Comparison of the effects of dexmedetomidine and remifentanil used in cardiac surgery on dynamic thiol-disulphide homeostasis

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Background and Goal of Study: Thiols are organic compounds containing the sulphhydryl group and have antioxidant effect on dynamic thiol-disulphide homeostasis (DTH). Paraoxonase-1 (PON-1) has an antioxidant effect on DTH, similar to thiol. Remifentanil and dexmedetomidine used to increase the depth of anesthesia and provide hemodynamic stability during cardiac surgery have been shown to have antioxidant effects (1). The aim of this study was to investigate the effects of remifentanil and dexmedetomidine on TDH and PON-1 as adjacent...
agents in patients undergoing coronary artery bypass graft surgery (CABG) with cardiopulmonary bypass (CPB).

Materials and Methods: A total of 100 patients undergoing CABG under elective conditions were included in the study. Induction was performed with propofol, fentanyl, and rocuronium. Sevoflurane-remifentanil (Group R) or sevoflurane-dexmedetomidine (Group D) was used for the maintenance of anaesthesia. Central venous blood samples were taken immediately after internal jugular vein catheterization (T1), immediately after cross-clamp insertion (T2), when warming of the patient started (T3), 10 minutes after completion of protamine infusion (T4) and on post-op 1st day (T5) Total thiol, native thiol, disulphide, and PON-1 levels were studied.

Results and Discussion: Demographic data of both groups were similar. Total thiol, disulphide, PON-1, native thioltotal thiol, total thioldisulphide levels and native thioldisulphide levels were similar in all time periods measured between the two groups. Native thiol levels were found significantly higher in T3 and T5 in Group D than in Group R (p = 0.017, p = 0.027, respectively). Sevoflurane-dexmedetomidine combination is more effective than sevoflurane-remifentanil combination in preventing damage during extracorporeal circulation. In a study by Turkın et al., it was shown that the cardioprotective effect of dexmedetomidine was greater than that of remifentanil (1). The underlying cause of this effect is the protection against ischaemia-reperfusion injury. Luyten et al. showed that antioxidant capacity during CPB increased contrary to expectations, but argued that the increase was lower than the increase in oxidative effect (2).

Conclusion: We think that in CABG with CPB, dexmedetomidine should be the first choice as an adjuvant.

References:

Long-term effect of esmolol on the coronary arteries’ structure

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Background and Goal of Study: The morbidity and mortality associated with hypertensive patients are related to coronary remodeling. At present, several drugs have been demonstrated to be useful in the regression of ventricular remodeling after chronic treatment. Our group previously demonstrated that short-term treatment (48 h) with esmolol produces early regression on coronary artery remodeling, although the long-term effect has not been studied yet (1). The aim of our study was to show the effects of short-term treatment with esmolol (48 h) on coronary arteries’ structure in an experimental model of arterial hypertension and compensated left hypertrophy. Likewise, we wanted to know if this effect might remain in the long term.

Materials and Methods: Fourteen-month-old male spontaneously hypertensive rats (SHR) were randomized into 6 groups: three therapy groups with esmolol (300 µg/kg/min during 48h), one of them analyzed 48h after treatment, another one 7 days after treatment and the last one after 1 month (SHRE-48h, SHRE-7d and SHRE-1m), and three placebo groups for each therapy group (SHR-48h, SHR-7d and SHR-1m). 48 hours, 7 days and 1 month after treatment, we studied the coronary artery remodeling (geometry and composition of the left anterior descending coronary artery) using a confocal microscopy method (using the nuclear dye DAPI). Results and Discussion: The external diameter, the wall width and the cross-sectional area from coronary artery were significantly lower in the esmolol group after 48h of treatment, and these findings remained after one week and one month. Likewise, we found a decrease in the thickness, the number of muscle cells and cell density of the middle layer after 48h of treatment; these findings remained after one week and one month except the cell density that showed no changes over time.

Conclusion: Short-term treatment with esmolol significantly attenuated coronary artery remodeling. These changes remain in the long term. The next goal will be to explain why this happens.

References:
2. Acknowledgments: This work was supported by a grant from FIS 16/02069 and Fondo DEDEF, Spain.

Impact of low-opioid anesthesia on inflammatory response and clinical endpoints in cardiac surgery: a prospective study

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Background and Goal of Study: During coronary artery bypass grafting, patients are subjected to additional risk, which is caused by both the conduction of surgical treatment and pathophysiological changes in homeostasis, provoked by the action of anesthetics and cardiopulmonary bypass.

Materials and Methods: The research involved 60 patients, who had been subjected to coronary artery bypass grafting with cardiopulmonary bypass. All patients were divided into two groups: the first group (30 patients) – low-opioid scheme of anaesthesia and the second group (30 patients) – standard scheme of anesthetic management. Determination of IL-6 level in the blood was conducted before and after completion of CPB by ELISA test.

Results and Discussion: Having compared values of IL-6 between investigated groups after completion of cardiopulmonary bypass, it was established that the levels of IL-6 were relatively higher by 27.51% (p = 0.001) in patients of the first group compared with the results of patients in the second group. In patients of the first group had significantly less time of mechanical ventilation compared to the second group (2 h (2;3) vs 4 h (3;5), p = 0.021). Low cardiac output syndrome was significantly less frequently reported in patients of the first group (10.0% vs 33.3%, p = 0.028). In addition, patients in the first group had significantly less time spent in ICU (2 days (1; 3) vs 3 days (3; 4), p = 0.044).

Conclusion: The use of multimodal low-opioid anesthesia was associated with significantly lower IL-6 at the end of surgery, less mechanical ventilation duration, less frequent low cardiac output syndrome and a need for catecholamines, shorter ICU stays.

Successful Opioid Free Anesthesia in patients undergoing cardiac surgery, with and without cardiopulmonary bypass

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Background: Contemporary perioperative medicine is progressing with increasing questioning of current clinical practice. One of these is routine perioperative opioid use. An opioid-based anesthesia has been the cornerstone of intra- and postoperative management for a long time. Opioid-free anesthesia (OFA) is a technique in which non-opioid multimodal analgesics are used to provide adequate pain control in the perioperative period. The authors present 3 cases of successful implementation of an OFA regimen in cardiac surgery.

Case report: First case: a 43-year-old female patient was scheduled beating heart coronary surgery. Second case: 49-year-old male patient was listed CABGx2 with cardiopulmonary bypass (CPB). Third case: 49-year-old female patient was scheduled mitral valve replacement(MVR) with CPB. Patients had average adult weight and had no history of any disease, only MVR patient had atrial fibrillation. OFA protocol 0.25g/kg iv dexmedetomidine was given for 10min in the preoperative period. A 50ml solution containing 50µg dexmedetomidine, 50mg ketamine, 500mg lidocaine was prepared. Just before induction,1ml/10kg/10min infusion was performed from this solution. Then anesthesia was induced with propofol-rocuronium. For maintenance, this solution was continued throughout the operation by reducing the dose to 1ml/10kg/h and sevoflurane was administered with BiLevel-guidance.50mg ketamine was added just before surgery.1.5g magnesium was given before CPB.1g paracetamol was given during sternal closing. Local anesthesia was performed with bupivacain in the chest drain regions of our patients. At the end of the operation, solution dose was reduced to 0.5ml/10kg/h and continued in postoperative period. Paracetamol was administered every 8h for first 24h. When the VAS score was over 4, contramal 1mg/kg was administered. Only, the 2nd patient needs 2 times contramal. The patients were extubated within 2-3h. NSAID was not administered due to not convenient for cardiac surgery. Patients were successfully discharged from ICU and hospital.

Discussion: Cardiac surgery patients experience pain in many places, including sternotomy, drainage tubes, vascular access sites, saphenous graft harvest sites. If there is no efficient pain control, sympathetic activation occurs in this vulnerable patient population and may cause unstable hemodynamics, increased O2 demand.

Learning points: Our cases show that OFA technique can adequately control pain, provide effective hemodynamic stability in cardiac surgery.
Open abdominal aortic aneurysm repair surgery conducted using an opioid free anaesthesia (OFA) protocol

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Background: The implementation of an OFA protocol in a patient undergoing an open abdominal aortic aneurysm repair surgery. The patient had already been undergone an EVAR operation in the past when a 8 cm aortic aneurysm was diagnosed. Due to a type 1 endoleak an open abdominal approach was considered mandatory. The patient was also treated for coronary disease-10 years ago he had experienced a STEMI and was submitted to CABG surgery. The preoperative echocardiogram was normal with a preserved LV function (LVEF=55%).

Case Report: We present the case of a 69 year old male with a medical history of ischaemic heart disease. He was admitted for an open abdominal aortic aneurysm surgery repair (elective). He has no history of smoking. BMI=20 and spirometry values were good (FVC=98%/FV1=99%). He was on aspirin, amiodipine, valsartan, atorvastatin and metoprolol. He was considered ASA III due to the ischaemic heart disease. An OFA protocol was used. Regional anaesthetic techniques were excluded except the infiltration of the surgical wound with ropivacaine. The application of the protocol consisted of 2 stages: the preoperative and the intraoperative. In the preoperative stage, pregabalin was administered in 2 doses of 150 mg each, the night before and the day of the operation. In the intraoperative stage, both induction and maintenance of anaesthesia were conducted according the OFA protocol by Müller et al. Heart rate and arterial blood pressure were measured using esmolol, glycerine triinate and phenylephrine infusions titrated according to patient response. The hemodynamic monitoring was conducted using a FloTrac system and the depth of anaesthesia was measured using Bis. The operation lasted 4 hours, with no major complications. The patient was extubated and transferred to ICU. The postoperative pain was mild (VAS = 6) and managed using a PCA with morphine.

Discussion: We adopted a protocol based in Müller’s technique with the exception of dexmetomidine. The main points could be compressed in sympatholysis and multimodal analgesia.


Learning points: OFA provides cardiovascular stability and adequate intraoperative stress management with minimal needs in postoperative opioids. Further evidence however is needed.

Anesthetic management of a patient with peripartum cardiomyopathy in cesarean delivery

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Background: Peripartum cardiomyopathy (PPCM) is a rare life-threatening cardiomyopathy of unknown cause that occurs in the peripartum period in previously healthy women. The incidence varies widely depending on geographical region and ethnic background.

Case Report: We present a 23-year-old gravida four, parity two pregnant woman who presented to the health center with palpitation and dyspnea at the 27th week of pregnancy. Ejection fraction fraction was normal and peripartum cardiomyopathy was diagnosed and she was hospitalized. Metoprolol was given once a day. In follow up echocardiography at 31st week, ejection fraction decreased to 15-20%. LV diastolic diameter was 5.5 cm, TAPSE was 1.5 cm, Systolic pulmonary arterial pressure was 28. She had increased symptoms and heart and obstetric disease. Peripartum cardiomyopathy was diagnosed. Due to a type 1 endoleak an open abdominal approach was considered mandatory. The patient was also treated for coronary disease-10 years ago he had experienced a STEMI and was submitted to CABG surgery.

Discussion: General anesthesia rather than regional anesthesia could be used in delivery of the baby of a patient with PPCM and we wanted to emphasize that anesthesia management can be performed with invasive monitoring and induction of anesthesia according to the patient and cardiac condition without the need for Ecmo or left ventricular assist device could be achieved.

Table shows the amount of CS-cfDNA copies/ml in each group before and after surgery.
Remote ischemic preconditioning reduces the amounts of angiogenic proteins in human plasma and increases the numbers of Tie2 positive circulating monocytes

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Background and Goal of Study: Remote ischemic preconditioning (RIPC) is achieved by the application of brief episodes of non-lethal ischemia and reperfusion on a limb. RIPC protects various organs from ischemic damage, but its role in angiogenesis remains unclear. The numbers of non-inflammation related resident monocytes in ischemic tissue after stroke are increased by RIPC [1] and recent work of our group suggests that cell types derived from monocytes such as PMCO and MREG also possess angiogenic potential [2]. The aim of the study was to evaluate whether RIPC regulates the amounts of angiogenic proteins in human plasma and if the numbers of positive proangiogenic angietin receptor (Tie2) expressing monocytes is regulated by RIPC.

Materials and Methods: Ten healthy volunteers were subjected to RIPC using a blood pressure cuff inflated to >200mmHg for 3x5min on the upper arm. Peripheral blood mononuclear cells (PBMCs) were isolated from the blood of the volunteers by density gradient centrifugation. RIPC was induced daily for a total of 7 consecutive days by inflating a blood pressure cuff (3x5min, >200mmHg), which was placed on the upper arm. Blood samples were collected on the 1st, 2nd and 3rd postop days. Follow-up was carried out until 30 days postoperatively.

Results and Discussion: RIPC1 decreased the numbers of Tie2 positive monocytes in plasma. While 3/25 (12%) of the investigated factors were increased, 6/25 (12%) remained unaffected. The effect of RIPC7 was even more pronounced (70% decrease, 4% increase and 20% unaffected; Fig A). The top five RIPC regulated angiogenic plasma proteins (RIPC1/noRIPC; RIPC7/noRIPC) were: Artemin (0.36; 0.26), PD-ECGF (0.49; 0.42), Angiopoietin 2 (0.50; 0.39) and Angiopoietin 1 (0.52; 0.41) (Fig. B). FACS analyses of circulating monocytes revealed a significant increase in the numbers of Tie2 positive monocytes after RIPC7 (40.63±6.93% vs noRIPC 23.70±6.05%; P<0.05).

Conclusion: Our data shows that while RIPC decreases the relative amounts of most of the angiogenic plasma proteins, it increases the proangiogenic Tie2 receptor on human monocytes. Further studies have to evaluate whether RIPC has the potential to influence angiogenesis via monocyte Tie2.

References:

Figure 2: Cardiovascular complications at 30 days follow-up.

Conclusion: MINS is a common perioperative complication in patients over 45 years undergoing elective high cardiac risk non cardiac surgery or intermediate cardiac risk non cardiac surgery with cardiovascular risk factors. Patients with MINS have higher risk of MACCE 30 days postoperatively.
Conclusion: We could show that the in-vivo application of RIPC affects the inflammatory cytokine secretion of human monocytes in-vitro. This proposes RIPC as a possible treatment of inflammatory diseases.

References:

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Reverse myocardial remodeling following multichannel blocker by inhibiting nuclear factor of activated T-cells and improving plasmatic oxidative status

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Background and Goal of Study: Left ventricular hypertrophy (LVH) is a problem in the clinical setting. Dronedarone is an antiarrhythmic agent that was recently approved for the treatment of atrial fibrillation. However, its effect on regression of LVH have not been reported. We tested the hypothesis that administration of dronedarone induces regression of LVH by inhibiting nuclear factor of activated T-cells (NFATc4) and attenuating plasmatic oxidative stress.

Materials and Methods: Ten-month-old male SHRs were randomly assigned to an intervention group (SHR-D), where animals received dronedarone treatment for a period of 14 days, or to a control group (SHR) where rats were given vehicle. A third group with normotensive control rats (WKY) was also added. At the end of the treatment we studied the cardiac structure and function using transthoracic echocardiogram, cardiac metabolism using the PET/CT study and size of myocyte by histological analysis. After treatment, a new biomarker of plasmatic oxidative stress was studied, and then left ventricular tissue was processed for Western blot analysis.

Results and Discussion: SHR-D rats showed statistically significant lower values in comparison to SHR group for left ventricular mass, glucose myocardial uptake and size of myocytes. There were no significant differences in the E/A ratio or ejection fraction. Dronedarone showed decreased levels of p-NFATc4, p-ERK1/2 and p-AKT compared to SHR and decreased protein thiolation index. All these values obtained in SHR-D rats were similar to the values measured in the normotensive WKY control group.

Conclusion: In the present study we show that short-term administration of dronedarone reversed LVH in SHR by downregulation NFATc4/ERK/AKT pathway and decreased of thioc-specific oxidative stress. If the results of this study are confirmed in humans, this effect should be very interesting in clinical practice in patients with atrial fibrillation and LVH induced by chronic hypertonersision.

Acknowledgments: Study financed by the Health Research Fund FIS PI16/02069 and Fondos FEDER.

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Downregulation of ketone body catabolism exacerbate cardiac ischemia-reperfusion injury under obesity

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Background and Goal of Study: Epidemiological studies indicate that obesity is a high risk factor for cardiovascular disease. Ketone body β-hydroxybutyrate (β-OHB) is produced in the liver and serves as an alternative energy source for the extrahepatic tissues during nutrient deprivation. Recent studies show that the heart increases reliance on β-OHB as an alternative energy source during hypothermia and heart failure. However, whether this cardiac fuel switch happened in obese mice and the impact on acute stress are unclear. Therefore, this study was designed to investigate the cardiac β-OHB metabolic profile and explore the role of β-OHB in myocardial ischemia-reperfusion (I-R) injury under obesity.

Materials and Methods: Three-month-old male mice of SV129 background were fed with either chow diet or high-fat diet (HFD, D12492, Research Diets) containing (kcal) 20% protein, 20% carbohydrate and 60% fat for 12 weeks. The in vivo I/R insult was induced by 30-min left anterior descending coronary artery (LAD) ligation and 24-h reperfusion. For carbon-13 (13C) nuclear magnetic resonance (NMR) spectroscopy, isolated mouse hearts were perfused with 13C-labeled mixed-substrate KH buffer ([2,4-13C2] β-OHB, [U-13C] mixed long-chain fatty acids, lactate, glucose and insulin).

Results and Discussion: With a more rapid increase of body weight, the mice under HFD developed glucose intolerance within 3 months (Figures 1A-1C). Also, the HFD-fed mice were sensitive to in vivo cardiac I-R injury, as evidenced by reduced ejection fraction and a larger infarct size (Figures 1D and 1E). By performing carbon-13 (13C) isocapnic analysis of tissue extracts by nuclear magnetic resonance (NMR), we found a significant reduction of β-OHB oxidation in the heart from the HFD-fed mice (Figures 1F). This decreased β-OHB utilization was companied with a downregulation of protein abundance of β-hydroxybutyrate dehydrogenase 1 (BDH1), the enzyme that catalyzes the first step of β-OHB catabolism in mitochondria. Besides, the expression of other ketogenic enzymes succiny-CoA-3-ketocid CoA transferase (SCOT) and acetyl-CoA acetyltransferase 1 (ACAT1) remained unchanged.

Conclusion: Together, these data indicate an exacerbated cardiac I-R damage under obesity, which is associated with a BDH1-mediated suppression of β-OHB utilization.

5757
The effect of retrograde autologous priming method on intraoperative global tissue oxygenation in open cardiac surgery

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Background and goal of the study: Nowadays, the management of the cardiopulmonary bypass (CPB) has been focusing on countering the high incidence of blood transfusion, and the problem of acute haemodilution, induced by the addition of the priming volume. Studies have demonstrated the efficacy of retrograde autologous priming (RAP) in the reduction of blood transfusion requirement. The main purpose of this prospective observational study, was to investigate the impact of RAP on the intraoperative global tissue oxygenation. The second aim was to evaluate intraoperative blood transfusion requirement.

Materials and Methods: Elective 108 patients scheduled for cardiac surgery were randomly divided into liberal & RAP groups. The RAP group was treated with CPB using RAP, while the liberal group was treated with conventional CPB. The intraoperative time course of oxygen delivery (DO2), consumption (VO2) were evaluated. As surrogate markers of oxygen balance, the central venous oxygen saturation (ScvO2), venoarterial PCO2 difference (Pvaco2),lactate were investigated. Parameters were recorded at 3 timepoints (after anesthesia induction, at the lowest temperature during CPB, sternum closing).

Results and discussion: RAP was used in 58patients and compared with 50liberals. Demographic-perioperative data were similar in both groups. Intraoperative global tissue oxygenation parameters DO2,VO2,ScvO2,Pvaco2,lactate were not different between the groups. However, erythrocyte (ES) transfusion and diuretic medication requirements were significantly higher in the liberal group compared the RAP group (p=0.043,0.046,respectively).Although more ES transfusions were performed in liberal group, hemoglobin values were significantly lower during the measurement periods (p<0.001).There was no difference between the groups in terms of postoperative complications and mortality.

Conclusions: RAP is an effective adjunct to decrease the EStransfusion, however, no effect on intraoperative oxygenation parameters was observed. Since DO2,VO2,ER parameters are numerical calculations, increase in hemoglobin value by RAP or EStransfusion may result in similar results.ScvO2,Pvaco2,lactate were not affected by the administration of RAP or transfusion in the acute intraoperative period, but possibly the adverse effects of transfusion or positive effects of RAP could be observed if they were followed up postoperatively or longer. To our knowledge, there is no study in the literature that investigated tissue oxygenation during RAP.
5852

Conditioning with netrin-1 in Acute myocardial infarction model of rat improves diastolic left ventricular dysfunction

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Background and Goal of Study: To evaluate the improvement of systolic and diastolic left ventricular (LV) dysfunction by preconditioning and postconditioning with netrin-1 after acute myocardial infarction (MI) in rat model, we examined the changes of echocardiographic parameters and compared with them before and after MI.

Materials and Methods: Male, 8-to 9-week-old, Spraque-Dawley rats with a mean body weight of 277.40 ± 9.48 g were anesthetized with intraperitoneal injection of pentobarbital at a dose of 65 mg / kg, followed by intubation and positive pressure ventilation for 15 minutes as a stabilizing period. After 30 minutes of ischemia in the acute MI model, netrin-1 (5 mcg/kg) was slowly injected into MI group but vehicle (normal saline) into another MI group via tail vein. Netrin-1 preconditioning was administered intravenously 3 minutes before the induction of ischemia and 3 minutes after the induction of ischemia. Netrin-1 postconditioning was administered intravenously 5 minutes before the end of ischemic induction for 3 minutes and pentobarbital 35 mg / kg after 2 hours of reperfusion. And the echocardiographic evaluation was performed. Using Vevo2100, Echocardiographic studies were performed before surgery and after 120 minutes of reperfusion. Echocardiographic parameters matched systolic function with fractional shortening (FS) and ejection fraction (EF), but diastolic function with E’ and E/E’ ratio.

Results and Discussion: Fractional shortening values were significantly increased in the pre-isch, pre-netrin, post-isch and post-netrin groups compared to the vehicle group. The EF (ejection fraction). And in the post-netrin group, the left ventricular systolic function was improved. E’ (initial diastolic velocity) values were significantly higher in the post-iso, post-isch, and post-netrin groups than in the vehicle group. E’/E’, Post-isch, post-isch, and post-netrin, respectively.

Conclusion: Preconditioning and postconditioning with netrin-1 makes meaningful improvement of systolic dysfunction with significant increase with FS and EF after acute MI. Also it helps E’ recovery for LV diastolic function and E/E’ ratio for left atrial pressure.

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Acute hypobaric hypoxia attenuates myocardial ischemia reperfusion injury through HIF-1α

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Background and Goal of Study: Ischemic heart diseases (IHDs) are one of the major causes of morbidity and mortality for patients all over the world. Many approaches have been conducted to reduce ischemic reperfusion injury (IRI). The discovery of preconditioning has arguably been the most important development in the field of ischemic biology. Many studies showed that chronic intermittent hypobaric hypoxia (CIHH) preconditioning exert a cardioprotective effect. However, the effect of acute hypobaric hypoxia (AHH) preconditioning is still unclear. The aim of this study is to investigate the effect of AHH preconditioning by exposing rats to simulated high altitude.

Materials and Methods: Wistar rat (n=24) were randomly divided into three groups: Control group (normobaric normoxia, n=8), Hypobaric Hypoxia group (HH group, n=8), and Normobaric Hypoxia group (NH group, n=8). Rats in HH group were exposed for 6 hours to simulated high altitude at 60.8 kPa in a hypobaric chamber, in NH group rats exposed for 6 hours to hypoxic circumstance (fraction of inspiratory oxygen 12.6%, 101.3 kPa), and rats in Control group remained at 101.3 kPa for 6 hours. After left thoracotomy was performed, the left anterior descending (LAD) coronary artery was ligated and subjected to 30 minutes ischemia followed by 60 minutes reperfusion. Infarct size was assessed by 2% Evans Blue dyeing and TTC (1% 2,3,5-triphenyltetrazolium chloride) staining. The presence and expression levels of hypoxia Inducible Factor 1-α (HIF-1α) were assessed by Western blotting.

Results and Discussion: Hypobaric hypoxia preconditioning and Normobaric Hypoxia preconditioning significantly reduced %IS/AIR. The expression levels of HIF-1α in HH group and NH group were significantly higher than in Control group.

Conclusion: The exposure to simulated high altitude for 6 hours might attenuate myocardial ischemia reperfusion injury. HIF-1α is an important role for cardioprotective effect.

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Comparison between an oxidative stress score and individual biomarkers for diagnose patients with left ventricular hypertrophy

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Background and Goal of Study: Left ventricular hypertrophy (LVH) is a common manifestation of cardiovascular disease, which has been related to stroke, serious arrhythmias, and sudden cardiac death. Oxidative stress plays a key role in patients with LVH. A recently developed global index or score of oxidative stress status takes into account a combination of plasma biomarkers of oxidative damage and antioxidant capacity has been validated in several pathologies however not in LVH. The objective of this study was to compare the performance of oxidative stress score with those of its individual components in patients with LVH.

Materials and Methods: Seventy consecutive patients were recruited in the cardiac surgery section of our institution and each was assigned to one of the two study groups: control group (without LVH) and LVH group (with LVH), based on an echocardiography study. Biomarkers plasmatic related to antioxidant defense and oxidative stress were assessed. The global index of oxidative stress related to LVH was calculated using the statistical methodology previously described (1). The ability of the score and individual biomarkers to discriminate LVH patients from control was tested by the area under the ROC curve analysis. All procedures were approved by the Ethics Committee of Hospital Gregorio Marañón, Madrid, Spain.

Results and Discussion: The ROC analysis of each biomarker shows the lack of the score and individual biomarkers to discriminate LVH patients from control group was tested by the area under the ROC curve analysis. All procedures were approved by the Ethics Committee of Hospital Gregorio Marañón, Madrid, Spain.

Conclusion: The performance of oxidative stress score with those of its individual components in patients with LVH.

Acknowledgements: Study financed by the Health Research Fund FIS P116/02069 and Fondos FEDER.
Oxygen uptake (VO2) by CPET before lung resection – our experience in one year

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Background and Goal of Study: Lung resection, main therapy of lung cancer, has, as a consequence, changed lung function and exercise capacity depending on size of resection and time passed after resection (1). Forced expiratory volume in one second (FEV1) and carbon monoxide lung diffusion capacity (DLCO) are mainstay of patient selection before lung resection (1). Cardiopulmonary exercise test (CPET) is a high-tech test and golden standard of preoperative assessment for thoracic surgery patients at risk (1). The main result of CPET is oxygen uptake (VO2) usually expressed in mL/kg/min (1). No single test of lung function has absolute prognostic value in lung resection (1). Hypothesis: Patients with predicted postoperative VO2 (pVO2) values of 10-15 mL/kg/min calculated after preoperative VO2 measured by CPET, can safely undergo major lung resection.

Materials and Methods: We retrospectively collected values of VO2 measured by CPET testing and we calculated (formula as in Brunelli et al.) predicted postoperative values of VO2 (pVO2) for patients undergone lung resection in one year and one month on our Clinic for thoracic surgery Jordanovac, Zagreb, Croatia (1). Results are correlated to hospital complications.

Results and Discussion: There were 17 lung resection patients needed CPET during preoperative assessment between Sept. 1th 2018, and Oct. 14th 2019. Indications for CPET were low preoperative/predicted postoperative FEV1 and/or DLCO values and/or anamnesis of poor exercise tolerance and/or planned pneumectomy or lobectomy or prior lung resection. Preoperative VO2 values were between 5.81 and 33.7 (median 17.4) mL/kg/min and pVO2 4.59-20.5 (median 12.82) mL/kg/min. There was sublobar resection in 2, lobectomy in 11, bilobectomy in 1 and pneumectomy in 3 patients. One patient died after left pneumectomy from cerebrovascular insult. He had preoperative VO2 23.5 mL/kg/min and pVO2 12.37 mL/kg/min.

Conclusion: Our data shows that it may be possible for patients with low preoperative VO2 and pVO2 to safely undergo resection to the extent of lobectomy, but we suggest thorough clinical evaluation of comorbidities.

References:

High-dose Nitroglycerin Administered during Rewarming Preserves Erythrocyte Deformability in Cardiac Surgery with Cardiopulmonary Bypass

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Background and Goal of Study: It remains unclear whether exogenous nitric oxide affects the molecular determinants of cellular deformability and improves red blood cell deformability in cardiac surgery with cardiopulmonary bypass. We aimed to determine whether high-dose nitroglycerin, a nitric oxide donor, preserves erythrocyte deformability during cardiopulmonary bypass and examine the signaling pathways of nitric oxide in erythrocytes.

Materials and Methods: In a randomized and controlled fashion, forty-two patients undergoing cardiac surgery with hypothermic cardiopulmonary bypass were allocated to high-dose (N=21) and low-dose groups (N=21). During rewarming period, patients were given intravenous nitroglycerin with an infusion rate 5 and 1 µg-kg-1-min-1 in high-dose and low-dose groups, respectively. Tyrosine phosphorylation level of non-muscle myosin IIA in erythrocyte membrane was used as an index of erythrocyte deformability and analyzed using immunoblotting.

Results and Discussion: Tyrosine phosphorylation of non-muscle myosin IIA was significantly enhanced after bypass in high-dose group (3.729 ± 1.700 folds, p = 0.011) but not low-dose group (1.545 ± 0.595 folds, p = 0.076). Phosphorylation of aquaporin 1, vasodilator-stimulated phosphorylase, and focal adhesion kinase in erythrocyte membrane was also upregulated in high-dose group after bypass. Besides, plasma nitric oxide level was highly correlated with fold change of non-muscle myosin IIA phosphorylation (Pearson’s correlation coefficient 0.8708).

Conclusions: High-dose nitroglycerin administered during cardiopulmonary bypass improves erythrocyte deformability through activating phosphorylation of aquaporin 1, vasodilator-stimulated phosphorylase and focal adhesion kinase in erythrocytes.

Assessment of the effect of inhalation anesthetics to the efficiency of gas exchange in thoracic surgery

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Background and Goal of Study: Maintenance of effective gas exchange in thoracic surgery using one-lung ventilation during general anesthesia with halogen anesthetics is one of the priorities.

Materials and Methods: 60 patients were included to the study. All patients were undergone to general anesthesia with CMV and endobronchial intubation; as a hypnotic component were used desflurane (DF, n=23), sevoflurane (SF, n=14), isoflurane (IF, n=23, retrospective group). According to the study stages, the indicators of systemic, pulmonary, intracardiac hemodynamics (Swan-Ganz), gas exchange and metabolism from the radial artery and mixed venous blood were analyzed. Stages of the study: stage 1- after anesthesia induction, both lungs ventilation (CMV); stage 2 - one-lung ventilation (OLV) not less 30 minutes; 3 and 4 stages – 60 and 80-120 minutes of OLV respectively; stage 5: 20-30 minutes after returning to both lungs ventilation (CMV).

Results and Discussion: The severity of changes in systemic, pulmonary hemodynamics and gas exchange hadn’t significant differences. The identity of pre- and postcapillary resistances (Ra, Rv) in the DF and SF groups indicates that the difference in the gas exchange level isn’t determined by the state of pulmonary gas exchange blood flow. Differences in systemic vascular resistance (SVR) in DF from SF on the 1rd and 4th stages significantly better than the right ventricle pumping ratio (RVPR) in the group of DF at all stages of the study and the physiological dead space (VD) shows the inclusion in the organization-level gas exchange blood flow reserve additional regions such as the bronchial blood flow system closely associated with pulmonary blood flow and non-capillary perfusion vessels.

Conclusion: the main difference of conditions to maintain effective gas exchange in the lungs with the DF is the inclusion in the gas exchange in addition to the pulmonary blood flow vessels systemic blood flow vessels (bronchial blood flow and extracapillary perfusion) which are diluted under the DF in comparison with SF allowing DF to show cardioprotective properties in comparison with IF and SF more effectively.
The changes of pulmonary circulation in pregnant rats with PAH during the post-partum period

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Background and Goal of study: Maternal mortality of pregnant women with PAH remains high nowadays, especially during the post-partum period. We plan to observe the changes on pulmonary circulation in pregnant rats with PAH during the post-partum period in order to contribute to further study on the exact cause of death.

Materials and Methods: 120 female rats were randomly assigned into 2 groups: In pregnant MCT group, we performed MCT(40 mg/kg) subcutaneously over necks of the rats at 7 weeks old. Pregnant group was the control group and we only used saline in the same dose. The rats of both groups mated at 8 weeks old. Hemodynamic data and pulmonary tissues of the successful mated rats were collected at 12 weeks old(T1), 1 day after termination of pregnancy(T2), 3 days after termination of pregnancy(T3), 7 days after termination of pregnancy(T4). At last we had 15 samples at each time point from both two groups.

Results and Discussion: Compared with pregnant group, preg-MCT group had greater PAP (p<0.01), PVR (p<0.05), relative medial thickness (p<0.05), occluded arterial density (p<0.001), as well as lower non-thickened arteries density (p<0.001) at each time point. Compared with data at T1, PAP and PVR at T2, T3 and T4 had no significant changes in pregnant group (p > 0.05), but increased gradually in pregnant MCT group (p > 0.05). Compared with data at T1, relative medial thickness and non-thickened arteries density of both groups at T2, T3 and T4 had no significant changes (p > 0.05), but occluded arterial density of the pregnant MCT group at T2, T3 and T4 increased significantly (p<0.05). We noted prominent proliferative and occlusive changes in pulmonary arteries, which lead to increased PVR during pregnancy. There was no significant proliferative changes after pregnancy, but PVR increase slightly. It is noteworthy occluded arterial density increased significantly after pregnancy. Proliferation in pulmonary arteries were very difficult to change in a short time, but the occluding of the pulmonary arteries could be affected by many other factors. We considered there might be some factors that could dilate pulmonary unthickened arteries, and might weakened or disappeared after pregnancy, which cause occluded arterial density and PVR increase.

Conclusions: PVR increased gradually in pregnant rats with PAH during the post-partum period. Further etiological research may contribute to improve survival outcome of pregnancy with PAH.

Reference:
Severe Refractory Respiratory Acidosis During Extrapleural Pneumonectomy

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Background: We exposed a case of acute respiratory acidosis despite lung recruitment maneuvers during an extrapleural pneumonectomy.

Case Report: A 68-year-old male, COPD with Adenocarcinoma T4N2M0 was operated with extrapleural pneumonectomy. At the end of the procedure, the patient started with atrial fibrillation (Afib) and respiratory failure. Fluidotherapy was not effective and norepinephrine was initiated. Extrapleural pneumonectomy with right section of chest wall and pericardium was performed.

In the ICU, weaning was unsuccessful and he started with atrial fibrillation (Afib) with rapid ventricular response, multigorgan dysfunction and death.

Discussion: During the surgery, we followed a strategy of permissive hypercapnia, protective ventilation with tidal volume 6 ml/kg and PEEP 8 cmH2O (1) to limit the PaCO2 to 30 cmH2O and the DP<13 cmH2O (1.2). In recent studies, DP has shown benefits in mortality in patients undergoing thoracic surgery (3).

The appearance of Afib due to mediastinal shift, severe respiratory acidosis and multigorgan dysfunction led to death. The main factors that influenced refractory acidosis were intrapulmonary shunt, V/Q alteration and the degree of surgical inflammation (1).

Learning points:

References:
1. Applegate RL, Dorotta IL, Wells B, Juma D, Applegate PM. The relationship of driving pressure (DP) during one lung ventilation along the ventro-dorsal axes (centre of ventilation) did not differ between the two modes (P≤0.001), total PEEP (P≤0.001), and mechanical power (P<0.001) were lower compared with VCV. The minute volume (P≤0.001), respiratory rate (P≤0.001), total PEEP (P≤0.001), and mechanical power (P≤0.001) were lower compared with VCV. The minute volume (P≤0.001), respiratory rate (P≤0.001), total PEEP (P≤0.001), and mechanical power (P<0.001) were lower compared with VCV.

Conclusion: In normo- and hypovolemic pigs, OCV reduced the mechanical power compared with VCV, without effects on oxygenation. In hypovolemic pigs, the efficiency of ventilation was higher in VCV compared to VCV.
A randomised controlled trial comparing high-flow nasal oxygen with standard oxygen therapy for conscious sedation during transfemoral transcatheter aortic valve implantation

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Background and Goal of Study: Transfemoral transcatheter aortic valve implantation (TAVI) is increasingly popular as a minimally invasive alternative to surgical aortic valve replacement in patients with symptomatic severe aortic stenosis. Conscious sedation and regional anaesthesia is preferred to general anaesthesia. Hypoxia commonly occurs and is confounded by patient comorbidities, supine procedural positioning and possible deep sedation. The aim of our study was to determine whether high-flow nasal oxygen (HFNO) improves gas exchange as measured by arterial PaO2. Secondary outcomes included intraoperative cerebral desaturation and neurological events during valve deployment, perioperative oxygen therapy duration, hospital length of stay, patient device satisfaction scores and complications.

Materials and Methods: We carried out a randomised controlled trial from 1 June 2019 to 1 April 2021. Ethical approval and written informed consent were obtained. 66 patients will be randomised to either HFNO (50-70L/min, FiO2 0.3, Optiflow®; Fisher and Paykel, Auckland) or standard oxygen therapy (SOT, nasal cannula, 2-8 L/min, FiO2 0.3). Conscious sedation with remifentanil infusion titrated to a Ramsay sedation scale of 2-3 and regional anaesthesia were provided. Arterial blood gases were performed at induction and at 30-minute intervals. The study is powered for a 30% increase in PaO2, from a baseline of mean (SD) 10.1 (5.2) kPa; with an alpha of 0.05 and with 90% power. Interim analysis of 25 patients was performed using descriptive statistics, Welch correction, Chi-squared tests and linear regression from Prism 8 (GraphPad Software Inc., California, USA).

Results and Discussion: Demographic and clinical variables were comparable between the groups. Table 1 shows the comparison of primary and secondary outcomes between the HFNO and SOT groups. There was no significant difference between the remaining outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>HFNO (n=33)</th>
<th>SOT (n=33)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of oxygen therapy</td>
<td>114 (95-136)</td>
<td>122 (104-144)</td>
<td>0.40</td>
</tr>
<tr>
<td>Duration of sedation</td>
<td>114 (95-136)</td>
<td>122 (104-144)</td>
<td>0.40</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td>114 (95-136)</td>
<td>122 (104-144)</td>
<td>0.40</td>
</tr>
<tr>
<td>Duration of recovery</td>
<td>114 (95-136)</td>
<td>122 (104-144)</td>
<td>0.40</td>
</tr>
<tr>
<td>Duration of hospital stay</td>
<td>114 (95-136)</td>
<td>122 (104-144)</td>
<td>0.40</td>
</tr>
<tr>
<td>Patient device satisfaction score</td>
<td>7.3 (5.7-8.2)</td>
<td>8.1 (6.7-9.0)</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Conclusion: HFNO significantly improved oxygenation, reduced perioperative duration of oxygen therapy, was associated with less neurological events and higher patient device satisfaction scores in this cohort.

Dynamic description of hemodynamic variables during lung resection surgery

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Background: During lung resection surgery, patient is in lateral position, open chest and one-lung ventilation with tidal volume (VT)8ml/kg. Under these conditions, dynamic pulse parameters are not validated. Our objective is to make a description of the evolution of hemodynamic variables at different times studied during lung surgery.

Materials and Methods: Observational and unicentric study approved by Scientific Committee of Clinic Hospital of Valencia. We included 25 patients scheduled for lung resection surgery. Monitoring with transpulmonary monitor PiCCO (Pulsion Medical Systems) to obtain cardiac output (CO) and hemodynamic parameters. Data collection times: T1: 10 min after anesthetic induction, bipulmonary ventilation (VT 8ml/kg), supine position and closed chest.T2: supine position with one-lung ventilation (VT 8ml/kg) and closed chest.T3: lateral position, bipulmonary ventilation (VT 8ml/kg), closed chest.T4: lateral position, one-lung ventilation (VT 6ml/kg), closed chest. T5: lateral position, one-lung ventilation (VT 6ml/kg) after 15 min with open chest. Hemodynamic variables of figure 1 were collected. We analyze the correlation and mixed linear regression between hemodynamic variables at different times.

Results: Pulse pressure variation (PPV) correlation coefficients showed statistically significant differences between times T1-T2 (p<0.05; p-value=0.008), T1-T3 (p<0.001; p-value<0.001) and T3-T4 (p<0.001; p-value<0.001). In the interval T3-T4 a negative difference of 3.39% (variation percentage -27%) was estimated with statistically significant difference. (p=0.01, 95%CI [-6.23,-0.55]). Pearson’s correlation of stroke volume variation (SVV) was statistically significant between times T1-T3 (p<0.001) and T3-T4 (p=0.07). In mixed linear regression model, non-significant differences were found. However, a negative difference of 2.50% (variation percentage -20%) was estimated between T3-T4 (95%CI [-5.16, 0.15]; p-value<0.001) and T3-T4 (95%CI [-5.16, 0.15]; p-value=0.07). In other hemodynamic variables, statistical significance were not observed.

Conclusion: One-lung ventilation with VT 6ml/kg in lateral position causes a 25% decrease in dynamic pulse parameters PPV and SVV.

Swan-Ganz fracture in an open heart surgery

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Background: The Swan-Ganz (SG) catheter has been replaced by less invasive monitors. Young doctors have less experience of placing and handling complications. We report a case of SG fracture in the cardiac surgery with delayed notice.

Case Report: The 51-year-old man had rheumatic heart disease and MV prolapse for 5 years under control. He had fever and exertional dyspnea after dental treatment. IE with severe MR was diagnosed by TEE. After antibiotics treatment, he was discharged 5 days after surgery.

Discussion: Complications of SG catheter include life threatening PA rupture, dysrhythmia, thrombosis and technique complications.1 Our case had accidental cuffed catheter during cannulations.

Learning points: Early evaluation of blood from wrong lumen though it could be clot after protamine reversal. Low PA pressure could be another hint for incorrect position of SG catheter.

Complications of SG catheter include life threatening PA rupture, dysrhythmia, thrombosis and technique complications.1 Our case had accidental cuffed catheter during cannulations.

Learning points: Early evaluation of blood from wrong lumen though it could be clot after protamine reversal. Low PA pressure could be another hint for incorrect position of SG catheter.
Impact of aortic insufficiency due to percutaneous left ventricular assist device on hemodynamics: A retrospective study

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Background and Goal of Study: Impella® is an antegrade left ventricular assist device with a pump catheter used in the left ventricle. Impella is placed across the aortic valve leading to a potential risk of aortic insufficiency (AI). Consequently, total flow of Impella may not be enough to the end-organ. Few studies have evaluated AI volume by Impella. Therefore, we evaluated the AI volume in this study.

Materials and Methods: Using medical charts, we collected consecutive patients undergoing Impella 5.0 insertion surgery during April 2016 to September 2016. Patients whose aortic valve did not open during systolic phase by echocardiography or pulse pressure < 10 mmHg were reviewed to calculate AI volume accurately. AI volume was defined as difference between the expected flow displayed on the Impella controller (Expected Impella flow) and continuous cardiac output measured by the pulmonary artery catheter (thermodilution technique).

Results and Discussion: Impella 5.0 was inserted in 19 patients, in which nine patients were diagnosed as no spontaneous cardiac output. The median expected Impella 5.0 flow was 4.6 L/min [first quartile, third quartile: 4.4, 4.9 L/min] and the median continuous cardiac output was 3.3 [first quartile, third quartile: 3.1, 3.6 L/min]. The median difference was 1.4 L/min [first quartile, third quartile: 0.5, 1.8 L/min] which was 30.4% of median expected Impella 5.0 flow rate. Moreover, focused on six patients assisted with maximum support level P9 by Impella, the median difference and the portion were 1.5 L/min [first quartile, third quartile: 1.3, 1.7 L/min] and 30.9%. The six of nine patients added venoarterial extra-corporal membrane oxygenation (VA-ECMO) for maintaining adequate total blood flow. No patients had AI before Impella 5.0 insertion, but three patients developed mild AI after Impella 5.0 placement.

Conclusion: New-onset AI decreased effective Impella 5.0 flow by 1.4 L/min (30.4%) in patients without spontaneous cardiac output. Some cases need to consider combining with other circulatory assist device such as VA-ECMO.

5059
Assessment of left ventricular contractility (LV) based on pressure-volume loops obtained by invasive arterial blood pressure measurement instead of LV end-systolic pressure (ESP)

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Background and Goal of Study: Pressure-volume (PV) loops provide the most reliable experimental method for quantifying ventricular contractility through the calculation of preload recruitable stroke work (PRSW) and the slope (Emax) of the end-systolic pressure-volume relationship (ESPVR). A limitation of bringing PV-loops into clinical practice is the need for invasive LVP measurement. The aim of this study was to compare PRSW and Emax obtained by using LVP vs the use of invasive arterial blood pressure measurements.

Materials and Methods: After approval by the local ethics committee, data from a pig animal study were selected for the current analysis. LV volumes were assessed using 3D transesophageal echocardiography, while fluid-filled catheter pressure measurements were obtained in the LV, the ascending aorta and the femoral artery. PRSW data were generated by clamping of the inferior caval vein. LVEESP was defined by the registered software as the left upper point of the PV-loop. Using Bland-Altman analysis the values of PRSW and Emax with pressure measurement in the ascending aorta and in the femoral artery were compared to the values with pressure measurement in the LV cavity. Experimental data were recorded at baseline and under 2 µg.kg.min-1 dobutamine.

Results and Discussion: Ten high-quality data sets were used for the present analysis. Pearson correlation between LVP-derived and arterial pressure-derived data was 0.78 (y = 0.83x + 0.18) for Emax (p < 0.05) and 0.86 (y = 0.62x + 0.27) for PRSW (p < 0.05). Using femoral arterial pressure data correlations were respectively 0.78 (y = 0.77x + 0.21) (p < 0.05) for Emax and 0.75 (y = 0.94x + 9.84) (p = 0.05) for PRSW. Comparing LVP vs central aortic-derivated data, Bland-Altman analysis indicated a bias of 0 limits of agreement (LOA): -1 to 1) for Emax and of -8 [LOA: -22 to 5] for PRSW. Using the femoral artery pressure data, bias was 0 [LOA: -0.8 to 0.8] for Emax and -10 [LOA: -28 to 8] for PRSW.

Conclusion: The results of this preliminary study suggest that calculation of Emax and PRSW using arterial pressure and femoral artery-derivated pressure data yielded similar information as when using LVP data. Further studies are planned to further characterize the relationship in various experimental conditions.
Unusual suture and migration of a pulmonary artery catheter to the left mammary vein

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Background: Invasive Pulmonary Artery Catheter (PAC) monitoring is frequently used during cardiac surgery; during the procedure, was identified that the catheter was pierced by the wire of the sternal cerclage, the withdrawal was uneventful. The patient underwent to a second-look surgery, during the procedure, was identified that the catheter was pierced by the wire of the sternal cerclage, the withdrawal was uneventful. The patient had a satisfactory progress and finally discharged in adequate conditions.

Discussion: The migration of a catheter to a lower tributary vein of the brachiocephalic vein is more frequent on the left side for two reasons: first there are more venous branches on the left side, second, the drainage site of these branches is exactly in front of the left internal jugular vein drainage site, where the PAC emerges if it is advanced from the left side.

References:
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Background and Goal of Study: We previously presented an algorithm to quantify Ventilation induced Pulse Pressure Variation (VPPV) in patients with atrial fibrillation [1, 2]. While the model showed predictable behaviour in response to volume changes, its precision and accuracy are yet to be determined. This study was designed to assess measurement error of the new algorithm for quantification of VPPV in atrial fibrillation.

Materials and Methods: After ethical approval and written informed consent we retrospectively built a database of perioperative haemodynamic records of patients with atrial fibrillation under general anaesthesia with full mechanical ventilation. From each subject, a stable data segment of 60s was randomly selected to calculate VPPV (VPPValgorithm). Replicates were then generated (VPPVrepl) from the original parameter (VPPValgorithm), by omitting 1 value of the original dataset for each reanalysis (Jackknife technique). The aggregate of the replicates was used to assess bias and variance of calculated VPPValgorithm. Both measures of uncertainty were checked for proportionality.

Results and Discussion: Twenty-one patients were selected. The values of VPPValgorithm ranged from 0% to 43%. The bias, assessed as the difference between the mean of VPPVrepl and the VPPValgorithm was 0% (sd 0.4%). The coefficient of variation (CV), calculated as standard deviation of VPPVrepl divided by the mean of VPPValgorithm, ranged from 0.026 to 5.63. There was a significant inverse relation between CV and the VPPValgorithm (see figure). A non-linear least squares regression analysis revealed that CV rapidly regressed towards 0.09 (+/- 0.06).

Conclusion: Our preliminary findings show that, using a jackknife resampling technique, the new algorithm provides reliable measurements with minimal bias and an acceptable CV.

References:
Cardiac tamponade after central venous catheterization: a report of two clinical cases
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3 University Clinic of Thoracic and Vascular surgery - Skopje - Skopje (Republic of North Macedonia)

Background: Pectus excavatum is a congenital chest wall deformity and is quite challenging for anesthetizing management due to progressive compression and restriction of the heart and lungs. Good preoperative assessment is essential before surgery.

Case Report: A 58 years old male patient was scheduled for elective left sided thoracotomy with suspicion for tumor. His medical history revealed he was on beta-blocker therapy with Bisoprolol, Losartan, ASA and Atorvastatin. He had sinus rhythm with heart rate 90 beats/minute and BP 120/70mmHg. His pulmonary function tests showed restrictive pattern with FVC 68% predicted, FEV1 64% and FEV1/FVC 98% indicating restrictive lung disease. Patient had severe pectus excavatum with compression on the right side of the heart. At the day of the surgery he had HR 74 beats/minute, BP 126/70mmHg and SaO2 96% and a right sided double lumen endotracheal tube was placed and verified bronchoscopically. He was placed in right decubitus position and surgery was started. Thirty minutes after the requested collapse, a hemodynamic instability occurred with drop in the systolic blood pressure up to 60mmHg and gradually increasing heart rate up to 120 beats/ min. Additional fluid bolus was administered along with phenylephrine boluses. Surgeons considered that the heart looked quite empty besides this intervention like it was failing to fill with blood. Than we noticed that the operating table was tilted additional 15° to right for better surgical view, probably as a reason for the instability. After tilting it back there was improvement in the blood pressure but the tachycardia remained. After the reexpansion he stabilized and was extubated in the OR.

Discussion: Pectus excavatum can be demanding condition for perioperative anesthetic management. Even though patients can be quite asymptomatic before surgery, placing them in specific operating positions can provoke dynamic positional obstruction of the right heart due to compression of the large blood vessels. This can lead to impaired venous blood return or to impaired right ventricular outflow presenting as abrupt hemodynamic instability.

References:

Learning points: This conditions should be assumed and noticed quickly and prompt reaction is required.

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Cardiac tamponade after central venous catheterization: a report of two clinical cases

Microvascular effects of hypoxia, hyperoxia, hypocapnia and hypercapnia measured by vascular occlusion test in healthy volunteers: a post-hoc analysis
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Background: Changes in oxygen and carbon dioxide concentrations in blood or tissues are common during general anaesthesia. Tissue oxygen saturation (SIO2) can be measured by near-infrared spectroscopy during ischaemic provocation of the microcirculation by a vascular occlusion test (VOT). During occlusion one can estimate muscle oxygen consumption (downslope angle), after occlusion microvascular reactivity (recovery angle) followed by hyperperfusion (post-ischaemic hyperaemia phase). We aimed to assess whether hypoxia and hypercapnia will affect any of these variables.

Materials & Methods: Twenty healthy volunteers were included after local IRB approval in this observational study. A four-minute VOT was performed on the lower arm with SIO2 measured ipsilaterally on the thenar muscle. VOTs were performed at room air (baseline), during hyperoxia (FiO2 1.0), mild hypoxia (FiO2 0.14), and after a second baseline VOT; during hypocapnia (etCO2 2.5-3.0 vol%) and hypercapnia (etCO2 7.0-7.5 vol%) at room air. Downslope angle was measured in decline of SIO2 in %/min, recovery angle as incline in %/sec, and the area under the curve of the post-ischaemic hyperaemia phase (AUC-H) as absolute values. We
analysed the data using repeated measures ANOVA.

Results: The values of the sequential VOT procedures are shown in Table 1. Hypoxia and hyperoxia did not influence the downslope and recovery angles. In contrast, the AUC-H during hypoxia was lower when compared to baseline and hyperoxia (Table 1, p=0.005), meaning less hyperperfusion after ischaemia occurred. Neither hypopcapnia nor hypercapnia influenced any of the VOT characteristics.

Conclusion: In healthy volunteers at rest, exposure to either hypoxia, hyperoxia, hypopcapnia and hypercapnia did not influence microvascular O2 consumption or reactivity. Apart from hypoxia, none of the instances influenced post-ischaemic hyperaemia.

<table>
<thead>
<tr>
<th>VOT</th>
<th>Baseline BD (%)</th>
<th>Downslope Angle (degree in %/min)</th>
<th>Recovery Angle (degree in %/sec)</th>
<th>AUC-H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoxia</td>
<td>12.0 (10.6-14.3)</td>
<td>1.82 (1.39-2.29)</td>
<td>1520 (1002-1997)</td>
<td></td>
</tr>
<tr>
<td>Hyperoxia</td>
<td>11.4 (10.2-13.6)</td>
<td>1.77 (1.44-2.35)</td>
<td>1702 (891-2459)</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>12.9 (12.6-13.8)</td>
<td>1.53 (1.23-1.83)</td>
<td>963 (489-1070)</td>
<td></td>
</tr>
<tr>
<td>Baseline 2</td>
<td>12.5 (11.6-15.0)</td>
<td>2.19 (1.63-2.84)</td>
<td>1162 (875-1347)</td>
<td></td>
</tr>
<tr>
<td>Hypoxia</td>
<td>14.4 (11.3-17.7)</td>
<td>2.21 (1.69-3.01)</td>
<td>798 (632-1042)</td>
<td></td>
</tr>
<tr>
<td>Hyperoxia</td>
<td>11.7 (10.1-12.3)</td>
<td>2.55 (1.18-3.24)</td>
<td>885 (603-1064)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Overview of the VOT characteristics in each VOT performed. Median (IQR). VOT: Vascular occlusion test. AUC-H: AUC of the post-ischaemic hyperaemia phase. * p<0.005.

4573

The effect of low dose Dexmedetomidine on the incidence of Acute Kidney Injury (AKI) in cardiac surgery: Secondary subanalysis of a randomized clinical trial

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Background and Goal of Study: Cardiac surgery-associated AKI can occur in up to 30% of the patients. A meta-analysis showed that Dexmedetomidine (DEX) decreased cardiac surgery-associated AKI. We investigated the effect of a low dose DEX on the incidence of AKI in cardiac surgery.

Materials and Methods: This is a secondary subanalysis of a randomized double-blinded trial of DEX vs Placebo (PL) in patients ≥ 60 y undergoing surgery with cardiopulmonary bypass (CPB) (NCT03388541). At the closure of chest, patients either received a continuous infusion of PL or DEX at a concentration of 0.4μg/kg/h. The study drug was administered at 5ml/h during 10h in all patients. AKI was defined according to the RIFLE classification. The criteria that led to the worst possible classification during the study period were included in the analysis. pAKI is defined as a statistically significant difference.

Results and Discussion: We included 102 patients in this study and 38 patients who received haptoglobin administration were excluded. Finally, 64 patients were included in the analysis. pAKI occurred in 21 patients (32.8%). Perioperative fHb concentration in AKI group was significantly higher than that in non-AKI group (p=0.0001) (Figure A). Max-fHb in AKI group was 0.13±0.03g/dL, which was significantly higher than 0.087±0.04g/dL in non-AKI group (p<0.001). Perioperative Hb concentration in AKI group was significantly lower than that in non-AKI group (p=0.03) (Figure B). These results may suggest the potential association of hemolysis with the risk of pAKI.

Conclusion: Increased fHb and decreased Hp were significantly associated with the risk of pAKI in patients with CVS requiring CPB.

4355

Management of General Anesthesia in a Patient with COL4A1 Mutation During Cardiac Surgery: a case report

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Background: COL4A1 mutation was recently identified as a monogenic cause of the basement vascular membranes, which results in small vessel disease including hemorrhagic stroke, arteriovenous malformation, and aneurysms. There is no report on general anesthesia for cardiac surgery in a patient with COL4A1 mutation. In this report, we describe the case of a child with COL4A1 mutation who required general anesthesia for cardiac surgery.

Case Report: A 2-year-old male with a history of porencephaly, epilepsy controlled on antiepileptic drugs, left ventricular outflow tract obstruction (LVOTO) and moderate mitral regurgitation secondary to hypertrophic obstructive cardiomyopathy required cardiac surgery for worsening LVOTO. He was diagnosed with COL4A1 mutation with a genetic test at 3 months. At 2 years of age, he had a pneumonia that had
caused acute worsening of his LVOT that did not improve upon resolution of his pneumonia. LVOT velocity was 4.0-6.5 m/s and the mean LVOT pressure gradient was 80–130 mmHg. He required resection of left ventricular abnormal myocardium and mitral valve repair. Of note, the patient had history of rhabdomyolysis with respiratory infections. General anesthesia was therefore induced by fentanyl, midazolam, rocuronium, and was maintained with continuous dosing of remifentanil, midazolam, and a bolus of rocuronium. Resection of left ventricular abnormal myocardium and edge-to-edge repair for the mitral valve was performed. LVOT velocity declined to 2.0 m/s. His perioperative course was uneventful.

Discussion: This is the first report of general anesthesia for cardiac surgery in a patient with COL4A1 mutation. The relationships between COL4A1 mutation and congenital heart disease or rhabdomyolysis have not been previously reported. Patients with COL4A1 mutation present with a variety of clinical features because of abnormalities in the structural integrity of the basement vascular membranes. They should be individually evaluated and carefully managed in the perioperative period according to their specific risk profile.

References:

Learning points: Patients with COL4A1 mutation have an increased risk of intracranial hernorrhages so it is vital to maintain a normal perioperative blood pressure.

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Prediction model with panel data to calculate the risk score of acute kidney injury after cardiac surgery with cardiopulmonary bypass

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Background and Goal of Study: Cardiac surgery with cardiopulmonary bypass affects renal function in short and long time period. Incidence rate of acute kidney injury (AKI) following cardiac surgery is 5–30%. It is said that 1-2% of the AKI patients need renal replacement therapy after cardiac surgery. However, to predict AKI after cardiac surgery is difficult due to postoperative hemodilution. Currently, panel data such as continuous vital signs are essential factors for personalized healthcare. The aim of this study was to determine the predict factors of AKI and to construct the model with panel data to calculate the risk score of AKI with using panel data such as continuous vital signs.

Materials and Methods: We retrospectively collected data of patients who underwent cardiac surgery with cardiopulmonary bypass at Yokohama city university hospital from 2017 June to 2019 Sep. AKI was defined by the KDIGO criteria using the change of sCr from baseline. (1) increment of ≥0.3mg/dl (within 48 hours) (2); increment of ≥150% (within 7 days). Patients were divided into AKI and non-AKI group, and we collected the trend patterns of vital signs (systolic and diastolic blood pressure, heart rate and lactate level). In this report, we applied an functional logistic regression for constructing a model to predict AKI. All repeated measurements of vital signs were incorporated into the model as smoothed curves, and patients were classified into two groups by the calculated risk score (0.5 group and 0.5< group).

Results and Discussion: 92 patients were enrolled for this study. 21 patients were divided into AKI group and 71 patients were divided into non-AKI group. We constructed prediction models to calculate the risk score of AKI. The best area under the receiver operator characteristic curve (AUC) was achieved by the estimated model which used diastolic blood pressure, systolic pressure and heart rate (AUC=0.91, 95% bootstrap CI: 0.82-0.98). However, this model was not validated by test set. Therefore, it may have the risk of overfitting, and further study will be needed.

Conclusion: We constructed prediction model with panel data as continuous vital signs was useful for predicting AKI after cardiac surgery.

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Acute kidney injury in neonates after arterial switch operation using autologous umbilical cord blood

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Background and Goal of Study: The rate of acute kidney injury (AKI) in cardiac surgery is 9.6%-59%. Cardiac surgery with the cardio-pulmonary bypass (CPB) during the first hours of life and umbilical blood comprises significantly lower level of hemoglobin (Hb), consequently, lower oxygen delivery in comparison with the usage of donor’s blood. Taking this into account, study of AKI may relatively reflect the level of hyperoxemia during CPB. The goal of the study was to compare the rate of AKI in two groups of neonatal patients who received umbilical or donor’s blood.

Materials and Methods: The study was performed on neonates with Transposition of Great Arteries who underwent arterial switch operation. Study group – 21 patients who underwent cardiac surgery during the first hours of life and received umbilical blood during CPB; control group – 38 patients who were treated with the conventional approach. Primary results were analyzed by the rate and stage of AKI. Secondary results were analyzed by the level of serum lactate and its correlation with AKI.

Results and Discussion: Patients who received umbilical blood had higher level of fetal Hb and more significant hemodilution during CPB due to restricted volume of umbilical blood. Median of serum creatinine (SCr) level in study and control groups was 57.5 and 59.6 mmol/l, accordingly. Both groups experienced significant increase of SCr level at 24 hours and its decline at 48 hours after surgery. More significant hemodilution in study group led to decrease in Scr for 18% from baseline compared to 6% change in control group. Trend in lactate change was almost equal in both groups – 5% growth after the surgery, 21% and 29% decline in 24 hours, and 10% increase during the next 24 hours. Overall level of lactate in absolute units in study group was higher. In both groups the maximum of lactate level was observed at the time of the end of the surgery and the maximum of SCr – after 24 hours. There were no significant differences in the incidence of AKI in both groups – p-value = 0.81, (c-stat value in both groups – 0.95).

Conclusion: There were no statistically significant difference in the rate of AKI in neonates after cardiac surgery with CPB with UB or donor’s blood. More significant hemodilution had no results on the rate of AKI in neonates. Higher levels of the lactate level in study group had no effect on the AKI, it may be assumed that the lactate level is the result of higher level of fetal Hb, but this statement needs to be studied more.

6333

Use of Modern hydroxyethyl starch and Acute Kidney injury after cardiac surgery in high-risk patients: a prospective multicenter cohort

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Background and Goal of Study: Cardiac surgery-associated acute kidney injury (CSA-AKI) is associated with increased short- and long-term mortality. Data on the intraoperative and postoperative use of modern tetrastarch products in the cardiac surgical setting are limited. Given the uncertain generalizability of data from critically ill patients to the surgical population, we conducted a multicenter prospective cohort study to determine the association of intraoperative and postoperative modern tetrastarch (6% HES 1300/4) use, with postoperative renal function in high-risk patients undergoing cardiac surgery.

Materials and Methods: This study was a multicentre prospective cohort study at 15 cardiac surgery centres in Spain and in the UK. The study cohort included all consecutive high-risk patients for developing CSA-AKI (Cleveland Score =>4), aged 18 yr or older (n=262) who underwent cardiac surgery between 15th of January 2017 and 15th of September 2018. The cohort was divided into two groups, namely patients who received (n=98) or did not receive (n=164) 6% HES 1300/4 intraoperatively and postoperatively. To confirm these regression-based analyses, we further conducted a complete-case multivariable logistic regression analysis.

Results and Discussion: Of the overall cohort (n=262), 96 (36.7%) were exposed to 6% HES 1300/4 either intraoperatively or postoperatively. Postoperative AKI occurred in 145 patients (55.5%). Patients in the HES group had greater burden of comorbidity (e.g. higher weight, lower estimated Glomerular filtration rate (eGFR), higher chronic kidney disease (CKD) and slightly higher Cleveland score). In the multivariable logistic regression analysis, there is no significant difference between

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groups with regard to AKI (OR 0.98, 95% CI 0.50-1.92, p=0.96) and RRT (OR 0.70, 95% CI 0.27-1.80, p = 0.47). In the propensity score matching analysis (n=94 vs 94), there is no statistically significant difference between groups with regard to neither AKI (OR 0.91, 95% CI 0.77-1.08, p=0.32) nor to RRT (OR 0.95, 95% CI 0.94-1.15, p=0.41). The variables used for the matching were the ones with most clinical impact.

Conclusion: The intraoperative and postoperative use of modern hydroxyethyl starch 6% HES 130/0.4 was not associated with increased risks of AKI and dialysis after cardiac surgery in our multicentre cohort of high-risk patients for developing CSA-AKI with Cleveland Score >=4.

The patient presented obvious blue lips and clubbing fingers. Norepinephrine was continuously infused after induction to maintain systemic blood pressure. During pheochromocytoma manipulation, ABP drastically increased to 205/108 mmHg and SpO2 dropped to 70%. Nitroglycerin infusion was started and boluses of phentolamine, sodium nitroprusside and esmolol was given. ABP gradually decreased to normal whereas SpO2 was still around 75%. We administered an additional 100 µg bolus of nitroglycerin against to pulmonary vasoconstriction, and SpO2 gradually raised back to 87%. Patient was extubated in the OR and was discharged on postoperative day 13.

Discussion: Perioperative management of patient with untreated DORV and pheochromocytoma is rarely reported. Meticulous perioperative management is essential. Two widely used medications are nonselective α-antagonist phenoxybenzamine and selective α1-antagonist doxazosin. We infused crystal fluid for fluid expansion before induction and started norepinephrine infusion to maintain systemic blood pressure. Real-time intravascular volume status and myocardial contractility were monitored with TEE and ProAQT. Goal-directed fluid expansion strategy along with vasopressors and vasodilators infusion prevented the patient from extreme hemodynamic changes during surgery.

Learning points: Physiology and preparation of pheochromocytoma. Physiology of untreated cyanotic congenital cardiac disease (DORV).

Giant axillary pseudoaneurysm in a patient with Alport syndrome

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Background and Goal of Study: describe the anesthetic management of urgent surgery of giant left axillary pseudoaneurysm (PSA) in a patient with Alport syndrome. Materials and Methods: 45-years-old male patient with Alport syndrome who develops long-standing chronic renal failure (CRF), in need of blood dialysis. Renal transplantation is performed 3 times, the last one in 2009, working well. He has previously presented PSA of venous artery fistula (AVF) in upper left limb (MSI) correcte by ligation. Subsequently he develops aneurysm of the brachial artery in MSI performing resection plus axillary brachial graft with PTFE. Currently the patient develops a giant left axillary PSA partially thrombosed, confirmed by angioTAC. It is decided to intervene urgently due to the high risk of breakage. It crosses blood. General anesthesia. Induction by rapid sequence, with propofol, succinylcholine, fentanyl and, maintenance with TCI (target controlled infusion system) fentanyl, adjusting the doses according to BIS (bispectral index). The right radial artery, right jugular venous catheter, two peripheral pathways, and bladder catheter are channelled. Open surgery with PSA, resection and aubclavian artery bypass to previous axillary prosthesis. Incident-free procedure, with little bleeding, remaining hemodynamically stable.

Results and Discussion: Alport syndrome is an inherited disease that affects the basement membranes, due to the alteration of type IV collagen. Prevalence of 1:50000. Aneurysms of the thoracic and abdominal aorta have been reported, due to the alteration of type IV collagen. Prevalence of 1:50000. Aneurysms of the thoracic and abdominal aorta have been reported, damaging the basement membranes, due to the alteration of type IV collagen. Aneurysms are atheromatous and not inflammatory. They need blood dialysis and composite outcome, patient’s gender does not influence early post-operative morbidity and composite outcome, Jehovah’s witnesses’ patients were excluded. Anaesthetic, CPB and surgical techniques were standardized. Most studies have been realized in the US while data for European populations are scarce. This study aims to assess the influence of sex difference on postoperative morbi-mortality in children operated in a tertiary university hospital in Belgium.

Materials and Methods: This retrospective cohort study included all children undergoing cardiac surgery with cardio-pulmonary bypass (CPB) between January 2006 and December 2015. Jehovah’s witnesses’ patients were excluded. The database included 837 males (30.2 months ± 42.7 ; 11.3 kg ± 13) and 651 females (31.8 months ± 42.5 ; 10.9 kg ± 10.38).

Results and Discussion: The database included 837 males (30.2 months ± 42.7 ; 11.3 kg ± 13) and 651 females (31.8 months ± 42.5 ; 10.9 kg ± 10.38).

Impact of gender on postoperative morbi-mortality in cardiac surgery children

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Background and Goal of Study: Impact of gender on postoperative mortality in children undergoing congenital heart disease surgery remains debated (1,2). Most studies have been realized in the US while data for European populations are scarce. This study aims to assess the influence of sex difference on postoperative morbi-mortality in children operated in a tertiary university hospital in Belgium.

Materials and Methods: In these patients, repeating pseudoaneurysms could be related to Alport syndrome. TIVA-TCI anesthesia with invasive blood pressure control was safe and effective. The patient was extubated in the OR and was discharged on postoperative day 13.

6395

4471

Perioperative management for pheochromocytoma resection in a patient with untreated cyanotic congenital heart disease: a case report

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Background: Perioperative management for pheochromocytoma resection remains a challenge for anesthesiologists due to dramatic catecholamine fluctuation during surgery. Patients with untreated cyanotic congenital heart disease usually have complex cardiac and respiratory physiology, which might lead to severe problems. We presented a case of pheochromocytoma resection in an adult patient with untreated cyanotic congenital cardiac disease.

Case Report: A22-year-old female complained of abdominal pain for 10 months and headaches for 4 months. CT showed distal pancreatic and bilateral adrenal masses. Plasma norepinephrine, urinary epinephrine and dopamine was dramatically higher than normal. The patient was diagnosed with pheochromocytoma and prescribed phenoxybenzamine. The patient was born with cyanotic congenital heart disease with double outlet right ventricle, but untreated and presented progressive cyanosis and increased hypoxemia on exertion. Baseline SpO2 was 78% on room air.

Learning points: Physiology and preparation of pheochromocytoma. Physiology of untreated cyanotic congenital cardiac disease (DORV).

4591
Hypophosphatemia following staged surgical palliation of Hypoplastic Left Heart Syndrome

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Background and Goal of Study: Hypophosphatemia is commonly seen in critically ill children and has been shown to hamper clinical recovery. Patients after surgical palliation of HLHS are prone to develop this disturbance as they require large doses of medications known to decrease serum phosphorus levels. Moreover, deleterious effects of hypophosphatemia on the cardiopulmonary system can be especially harmful to those patients.

Materials and Methods: We conducted a retrospective review of the medical records of children consecutively admitted to our PICU between March 2014 to September 2019, whose disease, consisting of a membrane in the left atrium (1). Some challenges for anesthesiologists in patients with cor triatriatum should be managed. We report the anesthetic management of a 7-month old infant with cor triatriatum undergoing closure of the ostium primum atrial septal defect and inlet ventricular septal defect.

Management of physiopathology in congenital complex cardiopathy in adults to keep pulmonary/systemic blood flow ratio (Qp/Qs) balance as a main goal. A case report

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Background and Goal of Study: Maintaining Qp/Qs balance in complex cardiopathy is a challenge. Despite congenital cardiac defects classifications, even at their extremes, anatomic variations and physiopathological hemodynamic adaptations. Both P(v-a)CO2/C(a-v)O2 and ERO2 seem to be a more reliable markers of global anaerobic metabolism and useful tools in predicting LCOS even in pediatric cardiac surgery patients.

Low cardiac output syndrome (LCOS) is the most common complication after surgery for congenital heart disease (CHD). Classic markers to detect LCOS (blood lactate and ScVO2) have several pitfalls and may be not completely reliable indicators of global tissue hypoxia. Aim of the present study is to establish whether the ratio between the veno-arterial carbon dioxide and the arterial-venous oxygen differences (Pv-a)/C(a-v)O2) could predict developing of LCOS after surgery for CHD.

Role of the ratio between venous-arterial carbon dioxide difference and arterial-venous oxygen content difference in predicting low cardiac output syndrome after surgery for congenital heart disease

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5878

Anesthetic management of a infant with cor triatriatum sinister anomaly and atioventricular canal defects undergoing closure of the ostium primum atrial septal defect and inlet ventricular septal defect

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Background: Cor-triatriatum is seen about 0.1% of patients with congenital heart disease, consisting of a membrane in the left atrium (1). Some challenges for anesthesiologists in patients with cor triatriatum should be managed. We report the anesthetic management of a 7-month old infant with cor triatriatum undergoing closure of atioventricular (AV) canal defects.

Case report: The patient was 7-month-old with 3000 g body weight. She underwent an echocardiography and a complete AV canal defect, cor triatriatum were demonstrated. There was 20 mmHg systolic gradient distal to the pulmonary valve diagnosed as pulmonary hypertension. On the operation day, blood pressure was 88/50 mmHg and peripheral O2 saturation 88%. Peripheral venous access was obtained using 24-gauge cannula before induction and the child received 1.5 mg/kg

Reference:
ADHD symptomatology of children with congenital heart disease 7 years after cardiac surgery

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Background and Goal of Study: The aim of the present study was to investigate the differences in ADHD symptomatology between healthy controls and children who underwent cardiac surgery at different ages.

Materials and Methods: Altogether, 132 children (53 patients with congenital heart disease undergoing cardiac surgery under 3 years of age, 27 operated thereafter, and 52 healthy controls) were examined. ADHD symptoms were assessed on average 6.8 years after first surgery. Both patients and parents were asked to complete the Child Behaviour Checklist, while the ADHD Rating Scale-IV was completed by parents only.

Results and Discussion: Results of the general linear models indicated that surgery status was a significant predictor of most indicators of ADHD symptomatology even after controlling for sex and age at survey completion, with effect sizes in the medium range. Post hoc tests indicated that the ADHD symptoms of those treated surgically above 3 years of age were more severe not just than that of the control group but also those who were treated surgically at a younger age. The control group and those treated surgically below the age of three did not differ significantly across any of the five ADHD severity indicators.

Conclusion: Our findings indicate that the age at which cardiac surgery is predictive of later ADHD symptomatology – with younger children having better outcomes.

Anesthetic Strategy for very young children undergoing coronary artery bypass due to Kawasaki disease: Utopia or reality?

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Background: Kawasaki disease is one of the most common vasculitis in childhood. Of unknown etiology, it can cause a variety of cardiovascular complications, such as aneurysm and coronary artery stenosis, which may later lead to acute myocardial infarction, arrhythmias, heart failure and sudden death.

Case Report: 2 years old child, 11,470kg, Kawasaki Disease diagnosed in the previous year, in follow-up for residual pericardial effusion. IN a new control echocardiogram, an important left aneurysm measuring about 8mm in diameter was detected. Ventricular ejection fraction of 45%. The patient was then submitted to myocardial revascularization surgery under balanced general anesthesia using sevoflurane, fentanyl and rocuronium. Cefalothin for antibiotic prophylaxis and prevention of bleeding with transamin (bolus + maintenance). During surgery bolus of phenylephrine for blood pressure maintenance. Later on, dobutamine and milrinone at moderate doses, considering ventricular dysfunction were added. Long ICU stay, after surgery developed a severe cardiac dysfunction (EF 36%) and altered walking pattern.

Discussion: Treatment with aspirin-associated intravenous immunoglobulin is effective and should be started early within the first 10 days of illness to prevent cardiac sequelae. The persistence of fever after 24 hours of initiation of treatment should be assumed as refractory disease and it is associated with the development of coronary artery abnormalities. Myocardial revascularization surgery is often indicated in an attempt to relief the symptoms of angina, reduce the risk of acute myocardial failure and aneurysmal rupture. Anesthesia should always keep an hemodynamic stability, as well as maintain an average blood pressure level in order to avoid neurological complications due to hypoxia.

References:

Learning points: Induction in very young patients at risk of aneurysm rupture should be slow and always avoid hemodynamic changes. Hypo-ischemic lesions with consequent neurocognitive disorders due to brain immaturity is the risk factor to be considered during anesthesia.

Anesthetic Strategy for very young children undergoing coronary artery bypass due to Kawasaki disease: Utopia or reality?

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Background: Tracheal stenosis is a rare but a life-threatening condition. The most common indications for tracheal resection and reconstruction are symptomatic concentric stenosis either idiopathic or related to prolonged intubation. First-line tracheal resection is a safe option and obviates the need for repeated endoscopic dilations 1.

Case Report: A 46-year-old male, ASA III, with a severe tracheal stenosis due to prolonged intubation by rupture of esophageal varices, was scheduled for tracheal resection and reconstruction. He was a current smoker and medical history included cirrhosis of alcoholic etiology and diabetes mellitus. He presented with stridor and shortness of breath. The exams showed a concentric 5 mm stenosis distancing 3 cm from the vocal cords. Intubation through the stenosis was successful using a microaryngoscopy tube number 5 and a bronchofiberscope under sedation and maintaining the spontaneous breathing. Sevoflurane, fentanyl and rocuronium were used for maintenance of general anesthesia. The surgical approach with resection of the stenosis around the endotracheal tube allowed no further mobilization of the tube throughout the procedure. Exubation, with forced fexion of the neck, was after complete recovery of consciousness, adequate spontaneous breathing, preventive reflex and muscle strength.

Discussion: Despite the relatively low occurrence, anesthesia for tracheal resection is one of the most challenging aspects of our practice. The anesthesiologist must provide adequate ventilation and oxygenation to a patient with a pre-operative critical airway, an intraoperative transected airway and a precarious post-operative airway that may be edematous due to multiple manipulations and cervical fexion positioning. Our approach avoided a tracheotomy that is itself more invasive and carries an increased risk of restenosis.

References:

Learning points: This case reports the management of a tracheal stenosis and demonstrates the importance of a detailed clinical history, the approach in severe cases, the surgical technique and mostly the importance of programming solutions by a multidisciplinary team.
Effect of Thoracic Epidural Anesthesia on Cardiac Rhythm in Patients with Paroxysmal Atrial Fibrillation During the Perioperative Period in Thoracic Surgery

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Background: The occurrence of paroxysmal atrial fibrillation (PAF) in patients in thoracic surgery significantly worsens treatment outcomes. According to the literature review, thoracic epidural anesthesia (TEA) has a protective effect on the cardiac rhythm stabilization.

Goal of study: The research is aimed at assessing the effect of TEA on the incidence of PAF and the features of their course in patients with paroxysmal form of atrial fibrillation (PFAF) after thoracotomy.

Materials and Methods: The study included 2 groups of 20 patients who underwent a lobectomy. Patients of both groups were diagnosed with PFAF. Patients of the control group (CG) got general anesthesia with sevoflurane and fentanyl whereas in the studied group (SG) it was supplemented by TEA with ropivacaine (2 mg/ml) with fentanyl (2 mg/kg) for 3 days. The study assesses the incidence of PAF during the surgery and in the postoperative period, as well as the duration of paroxysms and the dose of amiodarone for their relief.

Results and Discussion: Initially, all patients had a sinus rhythm. During the intraoperative period the incidence of PAF in patients of the CG was significantly higher than in the SG (50% (10/20) vs 15% (3/20); p=0.043). Moreover, the duration of PAF in the CG turned out to be longer than in the SG (20.1±5.7 min and 16.3±4.5 min respectively; p<0.05), and the dose of amiodarone is higher (245±53 mg vs 210±38 mg; p<0.05). The short duration of intraoperative PAF can be explained by the reflex character, which is confirmed by their occurrence during traction of the heart, as well as during electrocautery. In the postoperative period, the incidence of PAF in the CG also exceeded that in the SG (65% (13/20) vs 25% (5/20); p=0.026). The duration of PAF (158±54.8 min) as well as the dose of amiodarone (515±135 mg) in patients of the CG, significantly exceeded the similar parameters in the SG (115.2±36.5 min and 405±118 mg respectively; in both cases p<0.05). In this situation positive effects of TEA can be associated with sympatholytic, improved gas exchange, correction of the pain syndrome, as well as the antirhythmic effect of the local anesthetic.

Conclusion: The addition of TEA to the anesthetic protocol and the postoperative analgesia in patients with PFAF in thoracic surgery improves the perioperative period in comparison with the control group, and the use of amiodarone in the postoperative period is reduced.

5440
Perioperative inflammation related to chronic arterial hypertension may be associated with a greater rate of cancer recurrence after lung resection surgery

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Background and Goal of Study: Chronic hypertension (HT) is one of the most common chronic medical conditions. Inflammation is a cause and consequence of chronic HT. Inflammatory response (IR) plays a major role in tumor progression. The goal of this study was to evaluate the relationship between chronic HT and inflammatory biomarkers (IB) during the perioperative period of lung resection surgery (LRS) and to evaluate its influence in cancer recurrence.

Materials and Methods: 174 patients who underwent LRS were classified as non-HT (n=95), HT grade I (n=38), patients preoperatively well controlled with 1 hypotensive drug, or HT grade II (n=41), patients who need 2 or more hypotensive drugs to control preoperative arterial blood pressure or patients who have had an hypertensive emergency during the previous 12 months. Blood was drawn at baseline (before one lung ventilation [OLV]), at 30 min after the start and at the end of the OLV and 6 and 24 hours after the end of the surgery. IB were measured using Western blot. Kruskal Wallis, Mann-Whitney U and χ2 tests were used to analyse and compare all data and Kaplan Meier estimator was used to analyse recurrence.

Results and Discussion: Table 1 and Graph 1 shows the results from this study. IR was higher at 6 hours postoperative in HT patients. Preoperative HT was associated with a bigger rate of oncological recurrence. HT is associated to a broader inflammatory state, which can worsen tumor progression. Thus, there could be a causal relationship between the highest perioperative inflammatory response in HT patients and the greatest tumor recurrence in these patients.

5155
Atypical ACTH-producing carcinoid tumor of thymic origin. Anesthetic management. Postoperative complications

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Case report: Patient, 48-year-old male, in charge of Thoracic Surgery of General Hospital of Valencia for surgery of atypical ACTH-producing carcinoid tumor of thymic origin. The patient has secondary Cushng syndrome, with alkalosis and hypokalemia, IDDM, hypertension and pulmonary aspergillosis, in treatment with voriconazole. In pulmonary CT the anterior mediastinal mass is visualized, in contact with large vessels. In preoperative analysis, thrombocytopenia secondary to chronic treatment with kelocetazone. Surgery is scheduled, along with Cardiac Surgery. Transfusion of 1 pool of platelets and administration of 200 mg hydrocortisone. Airway management was performed using 37 Fr Vivasight DL and a videolaryngoscope. Thymic tumor excision through sternotomy, without DL and a videolaryngoscope. Thymic tumor excision through sternotomy, without...
The Effects of Thoracoscopic Intercostal Nerve Blocks in Patients Receiving Non-intubated VATS and Endotracheal Intubated VATS

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Background and Goal of Study: Regional anesthesia may have anesthetic-sparing effects. However, the effects of regional anesthesia were rarely investigated. In this study, we analyzed the effects of intraoperative thoracoscopic intercostal nerve blocks (ICBs) from T3 to T8 on the effect-site concentration (Ce) of propofol and remifentanil infusions for non-intubated VATS (NIVATS) and intubated VATS (IVATS).

Materials and Methods: Sixty ASA I to II patients suitable for NIVATS were randomly divided into NIVATS and IVATS groups. Analgesia was induced and maintained with intravenous propofol and remifentanil with TCI. ICBs were performed after artificial pneumothorax. The data of BIS, Ce for remifentanil and propofol were recorded and retrospectively analyzed.

Results and Discussion: The effects on ICBs, the changes of Ce were demonstrated in figure 1. The results of two-way ANOVA were shown in table 1.

Conclusion: More anagetics but not hypnotics were needed on IVATS than on NIVATS. The effects of ICBs onset almost immediately after blocks by a significantly reduced BIS. The anesthetic-sparing effects are shown by significantly decreased Ce for both drugs 10 minutes after ICBs.

Postoperative quality of recovery after nonintubated thoracoscopic lung resection surgery: a randomized controlled trial

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Background and Goal of Study: Nonintubated anesthesia has been reported as a feasible alternative of intubated general anesthesia for patients undergoing thoracoscopic pulmonary resection. Retrospective studies showed that a nonintubated thoracoscopic approach provides faster recovery after surgery. However, the quality of recovery after nonintubated thoracoscopic surgery is rarely evaluated in a prospectively randomized study design.

Materials and Methods: We evaluated the postoperative quality of recovery and safety of nonintubated thoracoscopic approach for management of lung tumors. Patients were randomly assigned to undergo thoracic surgery using either nonintubated or intubated approaches. A modified Postoperative Quality of Recovery Scale (PQRS) was used to assess physiological, emotive, nociceptive, functional, and cognitive recovery at 50 minutes (T50) and 1 day (D1) after surgery. Each domain recovery as primary endpoints was defined as PQRS scores returning to baseline values or better. Postoperative hospital stay, chest drainage, and complications were also evaluated as secondary endpoints.

Results and Discussion: A total of 151 patients were assigned to receive nonintubated anesthesia and 149 to receive intubated anesthesia for thoracoscopic pulmonary resection. There were no differences between groups in overall recovery (odds ratios for nonintubated group in T50 and D1 were 0.67 (CI: 0.46 – 162.57) and 1.25 (CI: 0.54 – 2.89), respectively. Individual domains were only significantly favored nonintubated group in T50 nociceptive recovery (odds ratio: 2.21, CI: 1.28 – 3.81) but less favor nonintubated group in D1 cognitive recovery (odds ratio: 0.39, CI: 0.20 – 0.74). Clinically, there were no differences between groups in length of hospital stay, chest drainage, and postoperative complications.

Conclusion: Nonintubated anesthesia management for thoracoscopic surgery did not provide a better overall quality of recovery after surgery. Even so, it may be associated with faster immediate nociceptive recovery but with less favored early cognitive recovery. Tracheal intubation or not seems to be equally safe in elective patients undergoing thoracoscopic surgery.

An approach to a new minimal invasive surgical procedure for chest wall repair in patients with pectus excavatum: “PECTUS UP”

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Background and Goal of Study: Pectus excavatum (PE) is the most common chest wall malformation with an incidence of 1 out of 400 newborn and it is three times more frequent in males. The cardiorespiratory morbidity and the psychosocial impact it has are the main clinical issues we found in these patients. In recent years, new surgical procedures regarding pectus excavatum chest wall repair have emerged, one of which is the “PECTUS Up”. Due to its minimal invasiveness and the much shorter recovery period associated, this procedure is blazing new trails towards chest wall repair surgery.

Materials and Methods: From June 2017 to August 2019 a total of 18 (n=18) pectus excavatum repair surgeries by the “PECTUS Up” method were performed in our hospital. While hospitalized, or at the prospective surgeon visits, patients were asked about their satisfaction with the procedure. The main clinical outcomes were short and long term complications, mean hospitalization time, individual satisfaction with the procedure and the use of analgesia in the postoperative period.

Results and Discussion: No cases of intraoperative complications were found in this study (0%). Short term complications were mild pain (2 patients, 11%) ten days after the surgery and the appearance of a serous exudate at the surgical wound reported by three patients (17%), whereas long term complications involved problems in relation to subdermal metal plate. A protrusion of the plate was noted in five patients (27%). Nevertheless, two of these patient’s surgical wires were broken, desestabilizing the plate and leading to a recurrence of the pectus excavatum. The mean hospital stay time was 2.55 days. Analgesia used in these patients involved NSAIDs and opioids. The whole sample with no recurrence of the pectus excavatum (88%, sixteen patients) reported high levels of satisfaction with the procedure.

Conclusion: “PECTUS Up” is a minimal invasive surgical procedure used for chest wall reparation in pectus excavatum. It has shown a short convalescence period and satisfactory short and medium term results with low incidence of complications, although long term effectiveness is still needed to be validated.

Postoperative quality of recovery after nonintubated thoracoscopic lung resection surgery: a randomized controlled trial

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Routine practice of Erector Spinae Plane Block for Video Assisted Thoracoscopic Surgery: Experience in our centre

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Background and Goal of Study: The erector spinae plane (ESP) block was described in 2016 as a novel regional anesthetic technique for thoracic analgesia. [1] This block is easier to perform than Paravertebral Block and Thoracic Epidural, therefore, it represents an attractive alternative to the existing techniques. In this descriptive report we describe our experience with ESP Block as part of a multimodal anesthetic approach in several patients who underwent different video-assisted thoracoscopic (VATS) surgeries.

Materials and Methods: After general anaesthesia induction, the ESP block was performed in lateral decubitus between T5 and T7 level with ultrasound guidance. There were administered a volume of 30 mL of local anaesthetic. In some cases, those involving a pulmonary resection surgery, a catheter was placed in the same plane after the initial administration of local anaesthetic. Pain was evaluated with the Visual Analogue Scale (VAS) from 0 to 10 in the postoperative, as well as the need for rescue intravenous analgesia if VAS was greater than 3. In the cases where a catheter was placed, it was removed the third postoperative day.

Results and Discussion: We collected data of all the ESP Blocks implemented in patients who underwent VATS during years 2018-2019. In this series of cases we performed a total amount of 78 ESP Block; 60 were a single puncture, 5 were 2 level puncture and 13 were with a catheter placement. Pending of the final results, most of the patients reported a good level of analgesia with high satisfaction during their admission. Although some of them required rescue analgesia with opioids, all patients were able to complete their postoperative pulmonary rehabilitation with adequate pain management. Neither complications related to the blocks nor the use of opioids were seen.

Conclusions: ESP block seems to be a safe, easy and effective technique for thoracic surgery; consequently it has become a regular practice in our center and in some procedures it is now our first regional analgesia choice. Adding a catheter and...
a continuous infusion of local anaesthetic could be a good alternative for longer and more painful surgeries. Further studies are needed to compare the effectiveness towards thoracic epidural and paravertebral block.

References:

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Erector Spinae Plane Block as an Effective Analgesia Method After Thoracotomy in a 4 Year Old Boy

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Background: In pediatric patients, pain control after open thoracotomy is a challenging problem. Erector spinae plane block is a new and promising block for many analgesia treatments.

Case Report: A 4-year-old, 16kg boy, was admitted to the hospital with metastatic nodule adjacent to the pleural area in the right lung and surgical resection was planned. The patient was evaluated the day before the surgery and examination was normal. After obtaining consent from parents, he was taken into the operating room. The operation took 90 minutes in right lateral decubitus position and the tumour was removed through a posterolateral incision. The patient was administered 15mg/kg paracetamol for analgesia. ESPB was planned for postoperative analgesia. IV fentanyl PCA (10mcg bolus, 30min lockout) was programmed as a rescue analgesic.

At the end of the surgery while the patient is still in the lateral position, transvers procès of T5 vertebra visualized with a linear USG probe. A 22G block needle was inserted in-plane in a cranio-caudal direction to contact the tip of the T5 transvers process. After the correction of the needle tip location with 2ml %0.9 NaCl, 8ml %0.025 bupivacaine was injected that was seen to spread from T3 to T8. There were no additional problems during the operation period. Postoperative pain was utilized with Wong-Baker FACES Pain Rating Scale at 2, 6, 24 and 48 hours. The scores at rest were 4-2-2-2 respectively. The scores didn’t change with movement and coughing. He needed analgesic only at eighth hour after operation. He mobilized at postop 22 hour. The chest tube was removed at third day after the operation. He was discharged from the hospital 6 days after the operation.

Discussion: ESPB is a recently described interfacial plan block for the treatment of thoracic neuropathic pain, trauma, and acute pain after surgery. With easy recognition of sonoanatomy, ESPB is a simple and reliable block, provides multilevel segmental analgesia with a single injection, besides doesn’t have the adverse effects and complications of paravertebral block and thoracic epidural analgesia.

References:

6235

The effect of US guided serratus anterior plane block (SAPB) in addition to intrathecal morphine for early postoperative period after Video-Assisted Thoracoscopic Surgery (VATS): a randomised controlled study

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Background and Goal of Study: Intrathecal morphine(ITM) provides prolonged postoperative analgesia lasting approximately 24h, but the peak analgesic effect occurs up to six hours after administration.Therefore, an additional analgesia is needed for about 6h. The aim of this study was to evaluate the effect of serratus anterior plane block (SAPB) in addition to intrathecal morphine for early postoperative period after VATS on the amount of morphine consumption and the Visual Analogue Scale(VAS) scores.

Materials and Methods: By obtaining ethics committee approval, we conducted a prospective study in 64 patients, undergoing VATS. SAPB Group(n=32) received 0.4 ml/kg bupivacaine 0.25% at the level of fifth rib with US guidance in addition to intrathecal morphine 0.6 mg, ITM Group(n=32) received only intrathecal morphine 0.6 mg after an induction of anaesthesia. Primary outcomes were the amount of morphine consumption, VAS-S and VAS-D. Mann Whitney U test used for comparison.

Results and Discussion: A total of 64 patients included in the study. Mean morphine consumption was significantly lower in the SAPB group at all hours. Compared with the control group, VAS scores at rest and coughing were significantly lower at 0.6 and 12 hours after surgery (Figure 1-2). Pain scores were significantly higher in the SAPB group in patients where trochar was inserted at upper than lower intercostal space (3-4 vs 5-7) at 0. and 6. hours during postoperative period.
4424

Blowout syndrome of femoral artery after radical vulvectomy

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Background: Carcinoma of the vulva represents 4-5% of all genital tract carcinoma. The occurrence of metastatic changes in the inguinal lymph nodes, often associated with the present infection and radiation therapy may involve femoral blood vessels, lead to bleeding, severe hemorrhagic shock and death.

Case Report: A 60-year-old woman, received due to occasional bleeding from the inguinal region. Six months ago a radical operation was performed with bilateral dissection of the inguinal lymph nodes due to the vulvar carcinoma. During hospitalization, there is spontaneous, massive bleeding from the left femoral artery, the development of severe haemorrhagic shock, respiratory failure, and disturbances of consciousness with a predisposing heart failure. Immediately she was introduced into the operating room with resuscitation measures and compression of the inguinal region. Introduced in general anesthesia and surgery was performed on femoral artery. Postoperatively she was on mechanical ventilation and analgesosedation to hemodynamic stabilization and correction of biochemical disorders. She was discharged from the hospital 12 days after surgery.

Discussion: Respecting the reanimation recommendations made it possible to get time to perform surgical intervention and to prevent further loss of blood from the femoral artery. Although numerous surgical vascular techniques have been described in the literature, there is still an ongoing discussion about the best treatment strategy for such a condition. Our surgical team has done the femoral artery wall suture. Such a procedure is dictated by the difficult general condition of the patient, by the lack of a vascular surgeon in the area, and by the need for rapid intervention to prevent further loss of blood.

5194

Pre-operative cardiac evaluation of patients undergoing peripheral vascular surgery using coronary CT-derived fractional flow reserve (FFRCT) may reduce post-operative cardiac complications

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Background and Goal of Study: Patients undergoing peripheral vascular surgery (PVS) have high risk of cardiac complications with 3% hospital mortality and >5% 30-day MACE (death/MI). Current guidelines recommend no pre-op cardiac testing of patients with no CAD symptoms. A new non-invasive cardiac test, coronary CT-derived fractional flow reserve (FFRCT) reliably identifies patients with coronary ischemia. We sought to determine whether pre-op diagnosis of coronary ischemia using FFRCT can facilitate multidisciplinary care of PVS patients to reduce post-op death/MI.

Materials and Methods: Patients with no cardiac symptoms admitted for elective PVS had pre-op coronary CT angiography (CTA) and FFRCT in a prospective Study and were compared to matched Control patients undergoing surgery with standard pre-op cardiac evaluation. FFRCT results were available to treating physicians in Study with guidance by multidisciplinary Vascular Team. Coronary ischemia was defined as FFRCT ≤0.80 distal to stenosis in a major coronary artery with ≤0.75 stenosis in a major coronary artery. Primary endpoint was MACE (death/MI) at 30 days and 6 months.

Results and Discussion: Study patients (n=126) were similar to Controls (n=130) with regard to age (66±8 v. 66±8 years), gender (80% v. 82% male), cardiac risk factors, and surgery performed. Control CTA in Study revealed left main disease in 7% and 25% stenosis in 70%. FFRCT analysis revealed significant silent coronary ischemia in 86 patients (63%) with severe ischemia in 53%. Indicated vascular surgery was performed in Study with knowledge of silent ischemia using cardiac anesthesia and intensive care with no post-op deaths or MI. In Control there were 7 MIs and 5 post-op deaths. MACE at 30 days, in Study was 0% vs 5.4% in Control (p=0.060). On the basis of FFRCT findings, elective coronary revascularization was performed in 50 patients with severe coronary ischemia (45 stents; 5 CABG), 1-3 months after recovery from surgery. MACE at 6 months was reduced in Study (2/126, 1.6%) compared to Control (9/130, 6.9%, P=0.034).

Conclusion: Patients undergoing PVS have high prevalence (68%) of silent coronary ischemia. Pre-op diagnosis with FFRCT can identify high risk patients and facilitate multidisciplinary care to improve outcome. Favorable results with staged peripheral and coronary revascularization suggest the need for prospective, controlled trials to further define the role of FFRCT in assessment of PVD patients.

4837

Considerations in performing anesthesia for the patient with an aortoaoesophageal fistula secondary to the aortic lesion; a rare and fatal complication

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Background: Aortoaoesophageal fistula secondary to the aortic lesion (AEF) is a rare lethal complication1)2) . For us anesthesiologists, however, its severity is not widely known. Through this case, considerations for AEF are discussed.

Case Report: 45-year-old man presented melena four months after the total arch surgery was performed in Study with knowledge of silent ischemia using cardiac anesthesia and intensive care with no post-op deaths or MI. In Control there were 7 MIs and 5 post-op deaths. MACE at 30 days, in Study was 0% vs 5.4% in Control (p=0.060). On the basis of FFRCT findings, elective coronary revascularization was performed in 50 patients with severe coronary ischemia (45 stents; 5 CABG), 1-3 months after recovery from surgery. MACE at 6 months was reduced in Study (2/126, 1.6%) compared to Control (9/130, 6.9%, P=0.034).

Discussion: There is no consensus concerning the optimal treatment for AEF. Recently, however, a few studies reported that conservative treatments result in no improvement in survival1)2)3) . For us anesthesiologists, however, its severity is not widely known. Through this case, considerations for AEF are discussed.

References:


Learning points: AEF is a rare but fatal condition. We have to be prepared for sudden deterioration.

5401

Neutrophil-lymphocyte ratio and platelet-lymphocyte ratio as predictors for adverse events in endovascular aneurysm repair for abdominal aortic aneurysm

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Background and Goal of Study: This study investigated the association of chronic inflammatory markers with the clinical outcome after endovascular aneurysm repair (EVAR) for abdominal aortic aneurysm.

Materials and Methods: The study included 230 consecutive AAA patients, treated
electedly by EVAR from March 2016 to February 2019. The values of simple inflammatory markers, neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR), were measured pre- and postoperatively. Adverse events included any major adverse cardiovascular events (MACE), acute kidney injury and death from any cause.

Results and Discussion: Adverse events occurred in 12 patients (6%). Seven patients suffered from cardiovascular event and five patients from acute kidney injury. The values of NLR and PLR were significantly increased after the procedure (NLR from 3.34 to 8.64, p<0.001 and PLR from 11.37 to 17.21, p<0.001). None of the markers were predictive for the occurrence of a cardiovascular event. Receiver operating characteristic curve analysis showed that postoperative NLR and PLR were strong predictors of acute kidney injury after the EVAR procedure (area under the curve, NLR 0.843; P<0.009 and PLR 0.754; P<0.05). Areas under the curve for preoperative values of NLR and PLR were 0.595 (p=0.46) and 0.804 (p= 0.426). A threshold postoperative NLR value of 9.9 was highly associated with the occurrence of acute kidney injury, with a sensitivity of 80% and specificity of 83%. A threshold postoperative PLR value of 22.6 was highly associated with the occurrence of acute kidney injury, with a sensitivity of 80% and specificity of 83%.

Conclusion: Postoperative NLR and PLR are useful prognostic factors for the occurrence of acute kidney injury after EVAR for AAA.

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5565

Postoperative complications after Type b aortic dissection endovascular treatment

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Background and Goal of Study: Aortic dissection is a life-threatening condition associated with high morbidity and mortality. Type B aortic dissection, according to the Stanford classification, involves only the descending aorta. Endovascular treatment is one of the most innovative approaches of this disease. The aim of this study is to evaluate the postoperative complications after endovascular surgical treatment of type B aortic dissection.

Materials and Methods: In this descriptive, retrospective and uncentered observational study, we collected data from the electronic medical records of 25 patients undergoing endovascular surgery over a period of 5 years (January 2015 – September 2019). We analyzed different variables, such as sex, age, hospital admission, ASA-classification, mortality during hospital admission, general postoperative complications and specific postoperative complications. We performed the statistical analysis using SPSS Statistics. Data are presented in absolute values and percentages or mean ± SD.

Results and Discussion: After studying 25 patients in our hospital, we observed these overall results: 72% were men, average age was 66 (±11) years old, and ASA II and III was obtained in most patients (95%). The average hospital admission was 14 (±11) days. Thoracic endovascular aortic repair was performed in 23 patients (95%), 16 of which were emergent surgeries (64%). Mortality during hospital admission was 16%. We observed an incidence of general postoperative complications in 80% of the patients and specific postoperative complications in 72%. The most frequent complications were arterial hypertension (72%), delirium (32%), acute kidney injury (28%), refractory pain (24%), cardiorespiratory arrest (16%) and infection (16%).

Conclusion: Our results suggest that thoracic endovascular aortic repair in Stanford type b aortic dissections lead to an increased incidence of arterial hypertension, delirium, acute kidney injury and refractory pain in postoperative care units. Nevertheless, further investigation is needed to determine this association in larger prospective studies.

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5628

Open abdominal aortic aneurysm repair: how to determine the Maximum Surgical Blood Ordering Schedule?

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Background and Goal of Study: Despite advances in surgery, endovascular aneurysm repair is not always an option. Patients undergoing elective open abdominal aortic aneurysm (AAA) repair are at greater risk of requiring red blood cells (RBC) transfusion, with multiple studies showing association between RBC transfusion and increased mortality and morbidity2. Avoiding over crossmatching is important in order to best manage RBC stock and avoid unnecessary allocation of resources. However, there is a lack of guidelines advising the number of crossmatch units RBC needed. The C/T index is the ratio of blood cross-match blood units to the number of transfused blood units. Researchers have rated C/T index from 2.1 to 0.91 units as result of the optimal use of blood.4 We determine the Maximum Surgical Blood Ordering Schedule (MSBOS) for open AAA repair at our hospital.

Materials and Methods: A retrospective observational study took place in our hospital between January 2016 and April 2017, for all patients who underwent open AAA elective repair and analyzed, among others, the hemoglobin values, blood loss and RBC units transfused.

Results and Discussion: For a population of 35 patients, an average of 3.49 RBC units per person were pre-operatively cross-matched. In total only an average of 0.91 units were transfused per patient. Because only 37.1% of the patients were transfused, this subgroup received an average of 2.46 RBC units. The mean value of preoperative hemoglobin was 13.4 g/dl and blood loss was around 1575 ml per surgery with a delta hemoglobin mean value of 5g/dl. With the aim of avoiding unnecessary cross-matching and maintaining patient safety we opted for a C/T index of 3.1 to determine our MSBOS4.

Conclusion: For patients submitted to open AAA repair at our hospital, we established an MSBOS of 3.

References:
1. Stoneham, M; et al; Effects of a targeted blood management programme on allogeneic blood transfusion in abdominal aortic aneurysm surgery Transfusion Medicine Dec 17.

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5910

Spinal cord injury (sci) after a successful hybrid repair combining endovascular thoracic stent placement (tevar) with an open bypass from the descending aorta to the femoral artery

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Background: We present a patient with a failed attempt at emergency endovascular repair of a ruptured abdominal aortic aneurysm that required in the same surgery the explant of the prosthesis and closure of the aorta below the superior mesenteric artery, ligation of both renal arteries and a bypass axilibifemoral. Two years later, he goes to the operating room for a TEVAR and a bypass from the descending aorta to the femoral artery because of thrombosis of the axilibifemoral bypass.

Case Report: 69 year-old man with history of hypertension, and late-stage renal failure (RF) who is programmed for a TEVAR because of an aortic ulcer (aortic coverage of 10 cm) and revascularization of the legs with an opened aorto-femoral bypass. The stent is placed from the left humeral artery. On the day before surgery, the CSF drainage is placed unevenly, obtaining pressures around 20 mmHg. On the day of the intervention, surgery occurs without complications, requiring low doses of norpinephrine during legs reperfusion, no blood products were required. During the immediate postoperative period, urgent reintervention for mediastinal bleeding is required, observing a right ventricular lesion resolved with primary suture. After 48 hours, when sedation is withdrawal, motor paralysis is observed which does not improve despite CSF drainage and hemodynamic optimization, corroborating with imaging tests the ischemic cord injury in T4.

Discussion: Extent aortic repair, regardless of operative strategy, is associated with a significant morbidity and mortality risks. Risk factors1 for the development of SCI after TEVAR have been identified. Patient-related factors include advanced age, perioperative hypotension, kidney disease, COPD and HTA. RI has been postulated as a marker of widespread peripheral atherosclerotic disease, which suggests that such patients have a compromised collateral network of blood supply to the spinal cord. Surgical risk factors include the extent of the coverage and occlusion of the left subclavian artery (LSA).

References:
Is cerebrospinal fluid drainage indicated in endovascular repair of low-risk thoracic aneurysm?

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Background: Medullary ischaemia (SCI) is a serious complication of thoracic endovascular aortic surgery (TEVAR) that increases short and long-term mortality. The incidence depends on the location and protection measures, but the length of the excluded segment seems to be the only independent predictor factor. Clinical guidelines recommend placement of cerebrospinal fluid drainage (CSFD) only in high-risk patients. Our patient developed a delayed paralysis in the postoperative requiring CSFD insertion to improve SCI.

Case Report: An 86 year old man with an asymptomatic thoracic aorta aneurysm 20 cm long had its preoperative CSFD rejected due to the length of the segment to be occluded without any other risk factors. Two stent-graft were placed with an occluded segment of 22.8cm. The intervention had no incidences neither need of vasoactive drugs. He was extubated without neurological focial point and transferred to the ICU. Five hours later he showed reduced mobility in left leg without any hemodynamic changes. After coagulation check, CSFD for delayed paraplegia management was placed. The pressure was 25 mmHg and fluid was extracted to 15 mmHg with clinical improvement. It was then monitored with 8-10 mmHg pressure without need of drainage, with slight improvement but without complete resolution of the paresis. MRI confirmed ischemic dorsal myelopathy T6 to T9 and proved on CT that the pros thesis didn’t show complications. The drainage was withdrawn and discharged the third day without neurological changes. The paresis was not modified and continued with rehabilitation until being transferred to an specialized center.

Discussion: This is an SCI case in a low risk TEVAR, so no prophylactic CSFD was placed(1). Length of aortic coverage was the only independent predictor of SCI with 205 mm of aortic coverage as the threshold for increased risk, doubling the probability every 10%. However, Maier y cols. conclude that the use of CSFD is associated with a significant lower incidence of SCI after low-risk TEVAR than noruse. The importance of the spinal cord’s collateral blood supply network and its imbalance after TEVAR could be a contributing factor in this case.


Learning point: Highlight of CSFD utility in low risk TEVAR.

Preoperative Anaemia Prevalence in Elective Vascular Surgery: A Portuguese Unicentric Retrospective Study

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Background and Goal of Study: Preoperative anaemia prevalence on vascular surgery is reported to be more than 30%. Anaemia is an independent predictor of adverse outcomes (hospital length of stay, morbidity and mortality) and the strongest predictor of intra and postoperative RBC transfusions, another independent risk factor for poorer outcome. Our goal was to identify the prevalence of preoperative anaemia in elective vascular surgery on a tertiary hospital.

Materials and Methods: We conducted a retrospective descriptive analysis of adult patients submitted to elective vascular surgery between 1st January 2018 and 31st March 2018. Anaemia definition was based on WHO Hb thresholds (non-pregnant women < 12.0 g/dl, men < 13.0 g/dl). Data collected were: age, gender, weight, ASA-PS, comorbidities, type of surgery, preoperative blood tests (hemoglobin, fibrinogen, coagulation, creatinine) and preop renal replacement therapy. The statistical analysis of epidemiological and clinical data was performed with SPSS®.

Results and Discussion: The study included 128 patients with 69.5% male and 70.3% ASA-PS III. The prevalence of preoperative anaemia was 51.6%. The anaemia group was in average older (67.98 vs 66.19 years), female patients (69.69% vs 31.81%), with systemic disease (90.9% ASA III or IV vs 64.51%) and under renal replacement therapy (24% vs 3.22%). A higher incidence of preop anaemia was found in patients submitted to limb amputation (90.91%), followed by arteriovenous fistulae (80%). Cardiosternotomy and endovascular aortic repair had the lowest preop anaemia (21% and 24% respectively). Vascular preoperative anaemia is multifactorial but predominantly an iron-deficiency state. Vascular patients are frequently anaemic due to significant comorbidities including cardiac disease, diabetes, and malnutrition. RBC transfusion is common, exacerbated by antiplatelet agent use, prolonged operation times and intraoperative anticoagulation.

Conclusion: This vascular surgery population revealed a high prevalence of preoperative anaemia (51.6%) in concordance with literature. The correction and optimization of preoperative anaemia represents the "First Pillar of PBM - Optimize red cell mass". Nonemergency procedures should be postponed until appropriate anaemia treatment, especially if the anticipated blood loss is more than 500 to 1,000 mL. Preoperative anaemia in surgical care is an issue of patient safety demanding scientific societies recommendations.

Airway and anesthetic management of a patient undergoing tracheoplasty for tracheobronchomalacia

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Background: Airway management of tracheoplasty surgery represents one of the greater challenges for the anesthesiologist. The surgery requires access to the posterior aspect of the tracheobronchial tree via right thoracotomy (1). While various techniques for lung isolation in the setting on tracheoplasty were previously utilized (2) here we describe the use of reinforced single lumen tube for left endobronchial intubation as a safe alternative.

Case Report: A 55-year-old female presented for tracheobronchoplasty with polypropylene mesh for symptomatic tracheobronchomalacia. Thoracic epidural, large bore i.v. and left radial a-line were placed pre-operatively. After induction of anesthesia flexible bronchoscopy via LMA confirmed the diagnosis and patient was intubated with 8.0 reinforced endotracheal tube that was advanced into the left mainstem intubation.
bronchus and used as an endobronchial tube. TIVA with propofol and remifentanil provided adequate depth of anesthesia during subsequent multiple episodes of ETT repositioning and apnea during surgery. At the resolution of surgery; reconfirmation of the trachea was confirmed with flexible bronchoscopy and patient was extubated.

Discussion: Airway management for tracheoplasty requires easy repositioning of ETT in the setting of a single lung isolation. Traditionally described techniques require either modification of existing double lumen tubes by the surgeon (2) or specialized long reinforced ETTs (3) that may not be readily available. Here we describe a simple technique using reinforced endotracheal for left main stem intubation.

References:

Learning points: A safe anesthetic technique for tracheoplasty requires detailed understanding of the surgical procedure and close communication between the anesthesiologist and the thoracic surgeon. Here we present a simple alternative to the previously described airway management for tracheoplasty.

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4903

Autonomic stimulation is not different between single-lumen and double-lumen endotracheal intubation

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Background and Goal of Study: Tracheal intubation is associated with autonomic stimulation and adverse effects in susceptible patients. Traditionally double-lumen endobronchial intubation is considered mandatory during thoracoscopic surgery. Whether endotracheal intubation with a larger lumen of the endotracheal tube may exaggerate sympathetic stimulation is less investigated. The aim of this study was to determine if different intubation techniques may have an impact on the sympathovagal balance, which was evaluated using heart rate variability (HRV).

Materials and Methods: A total of 60 ASA class I-II patients 20-65 year of age were recruited. Thirty of them were scheduled for otorhinolaryngology surgery under general anesthesia with tracheal intubation of single lumen tube (group S), and the other 30 were scheduled for thoracoscopic surgery requiring double-lumen endotracheal intubation (group D). Heart rate variability was derived by continuous recording of electrocardiography. Power spectrum was generated by time-frequency analysis and the HRV parameters of different groups were compared between three periods: (1) pre-induction baseline (2) pre-intubation and (3) immediately post-intubation. Two-way ANOVA with repeated measures was used for statistical analysis.

Results and Discussion: There was a significant increase in the HRV spectral power in low-frequency (LF) power bands for both single-lumen and double-lumen endotracheal intubation groups after intubation. Moreover, there was no significant difference between the single-lumen and double-lumen endotracheal intubation groups.

Table 1. LF power bands during intubation in patients undergoing general anesthesia

<table>
<thead>
<tr>
<th>Group</th>
<th>Baseline (T1)</th>
<th>Pre-intubation (T2)</th>
<th>Post-intubation (T3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group S</td>
<td>12.1 ± 8.42</td>
<td>3.1 ± 2.61</td>
<td>6.18 ± 5.30</td>
</tr>
<tr>
<td>Group D</td>
<td>10.6 ± 9.51</td>
<td>2.5 ± 2.84</td>
<td>6.62 ± 2.06</td>
</tr>
</tbody>
</table>

Discussion: Tracheal intubation is associated with higher HRV spectral power in LF power bands, but there is no difference between single-lumen and double-lumen endotracheal intubation.

5506

Acute bleeding endobronchial tumour: a different airway approach

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Background: Surgical treatment of endobronchial tumours are always a challenge for the anaesthesiologist due to differences when ventilating the patient, especially when an emergency occurs and this tumour starts bleeding. We present a case report of a patient with an acute bleeding endobronchial tumour in which an emergency thoracotomy was performed.

Materials and Methods: A 47-years-old woman with no significant past medical history, was hospitalized in the intensive care unit (ICU) because of respiratory insufficiency after repeated episodes of pneumonia. During a fibrobronchoscopy, an endobronchial mass that occluded the right main bronchus was detected and started bleeding after the procedure handling. The patient was intubated with a single lumen tube at the ICU and was transferred to the operating room for an emergent thoracotomy; an attempt of right selective intubation was performed without success, due to the blood in the endobronchial lumen the ventilation was impossible. When placed in left lateral decubitus, a severe hypoaxemia led to cardiorespiratory arrest. After 1 min of cardiac arrest and unachievable ventilation, we agreed with the surgeon to perform an emergent thoracotomy and a bronchotomy to place the tube in the left main bronchus. A right pneumonectomy was carried out. The patient remained in the ICU for five days, and was discharged after 7 days.

Discussion: Airway management in important bleeding endobronchial tumours is a critical situation that can overlap the traditional algorithms. A selective intubation must be considered preferably, with the setback that it would probably be a difficult fibrobronchoscopy because of the occupation of the lumen and must be performed blindly [1]. In extreme situations, a thoracotomy and placement of a tube through a bronchotomy can be considered.

Conclusion: Few cases of endobronchial intubation through a bronchotomy are reported. We could consider this approach in big endobronchial tumours, tracheal tumours or in blunt thoracic trauma when a double lumen tube is not possible to place. The relevance of this case report lies in the rarity of the technique performed to control the airway and to give an option for dealing with this uncommon and not necessarily catastrophic situation.

References:

5573

Protocol: Utility of capnography and gas analysis in checking the correct placement and function of the double-lumen tube for one-lung ventilation

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Background and Goal of Study: During general anesthesia in thoracic surgery it is common to employ one lung ventilation (OLV) so immobility of the non-ventilated lung (NVL) facilitates surgical manipulation. On one hand this is achieved with a double-lumen endobronchial tube (DLT) which must be correctly positioned and sealing properly. For its placement, current gold standard is flexible bronchoscopoe. On the other hand, capnograph and gas analyzer measures the gas mixture inhaled and exhaled by the patient and it is mandatory in interventions under general anesthesia. However, new utilities of this device are currently being studied. Goal of study: Evaluate the analysis of the gases from the NVL as a predictor of malposition and correct placement and function of the double-lumen tube for one-lung ventilation.

Materials and Methods: 21 patients scheduled for thoracic surgery with OLV using DLT in the HGUA from September until December 2nd, 2019. The method used was: After initiation of OLV, a diagnostic algorithm was followed that included: auscultation, data collected from NVL through a capnography accessory line connected to the clamped lumen of DLT (expiratory oxygen fraction and morphology of CO2 curve) and pressures and volumes recorded by the anesthesia station, to evaluate the position and sealing of the DLT. Findings were immediately compared to bronchoscopoe views. At the end of this study, results of both techniques were collected in 2x2 tables to estimate sensitivity, specificity, positive and negative predictive values (PPV and NPV) of the new method compared to fibroscope.

Results and Discussion: This algorithm showed for all diagnosis a sensitivity and specificity of 50% and 86% respectively, with a 60% PPV and 81% NPV. Specifically, it detected distally displacement of DLT with 40% sensitivity and 100% specificity, showing 100% PPV. It also diagnosed proximally displacement with 100% sensitivity and specificity. Even more, the algorithm allowed to detect sealing
problems of the tube before surgeon or anesthesiology station notice it.

Conclusion: The gas analysis and morphology of CO2 curve of the clamped lumen is a good alternative to bronchoscopic being simpler, cheaper and less invasive method. Moreover, it allows to notice sealing problems not been detected by fibroscopy and providing complementary and valuable information. Besides, we believe than with a larger sample of patients its effectiveness would be even more evident.

5846
Mediastinal mass, superior vena cava syndrome and respiratory failure: a case report
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Background: Anaesthesia for patients with mediastinal masses imply on imminent risk of airway collapse after induction1. Superior vena cava syndrome is also a challenge because of it’s hemodynamic features1. In this case we discuss a patient with both of the pathologies that presents for an emergency tracheostomy.

Case Report: 58 year old male patient, former smoker, treating hypertension and new onset hypothyroidism with a past of squamous cell carcinoma of the tonsil treated with chemoradiotherapy in remission for 3 years. He was brought to the surgical ward by the head and neck surgery team with breathing effort and laryngeal stridor to undergo emergency tracheostomy. The procedure was performed under sedation with dexmedetomidine and local lidocaine and it was noticeable that the blood flow through the IVs was dependable on the respiratory pattern. After the tracheostomy the patient maintained the breathing pattern and the differential diagnoses were addressed. He received treatment for bronchospasm with no improvement and only after the chest radiography, echocardiology and blood tests we could understand that he had severe haemodynamic and respiratory impairment due to a mediastinal mass occupying ¾ of the diameter of the chest, severe right atrium dysfunction with superior vena cava syndrome, hypoaemia and sodium level of 100 mEq/L.

Discussion: These pathologies are often described as anaesthesiology challenges due to the ventilatory and haemodynamic components1. The point-of-care evaluation of these patients can be decisive and the after-effects life changing. In this case we decided to proceed with a form of sedation that would maintain the respiratory drive and offer positive pressure (PSV), the only way we could ensure airway patency.

References:

5907
Insertion depth of double-lumen endotracheal tube (DLT) changes in repeat lung surgery
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Background and Goal of Study: Insertion depth of double-lumen endotracheal tube (DLT) changes with various factors such as body position and post-lung resection, and pleurudosis. Our purpose were to evaluate to change of the insertion depth from 1st lung surgery to 2nd lung surgery.

Materials and Methods: We retrospectively reviewed 1744 patients who underwent thoracic operations requiring intubation of DLT at our institution, using electronic chart, collected from August in 2010 to September in 2019. We extracted data on poly-surgery patients and calculated change of insertion depth from 1st lung surgery to 2nd lung surgery. Mann-Whitney U test was performed to analyze the effect of lung resection volume on change of insertion depth.

Results and Discussion: We identified 133 poly-surgery patients. 75 patients’ data sets of 1st and 2nd lung surgery’s insertion depth were missing. The median age of the 58 patients at the time of 1st lung surgery was 68 years (16 - 85). Operation included 55 lung resection and the others (empyema curettage). At 2nd surgery, there were three cases of intubation failure as follows: DLTs were misplaced to the right main bronchi in two cases, one was unable to be placed to the left main bronchus. The change of insertion depth from 1st surgery to 2nd surgery were - 3 cm (Lobectomy at 1st surgery; 31 cases) and - 2 - 1 cm (Segmentectomy or partial resection at 1st surgery; 24 cases). The absolute value of change in Lobectomy group (0 – 3 cm) was significantly larger compared to Segmentectomy or partial resection group (0 – 2 cm) (p = 0.03). In one empyema curettage case, the insertion depth became minus 4 cm due to abscess cavity.

Conclusion: These findings suggested that DLT insertion depth at 2nd surgery changes greatly in proportion to lung resection volume at 1st surgery. We recommend that the depth of DLT insertion should be reliably confirmed using a bronchoscope rather than referring to the record at the 1st surgery.

References:
1. Khanbhai M. et al. Dissection of the pulmonary ligation during upper lobectomy: is it necessary?

6002
Impact of one-lung ventilation duration on the prognosis of patients undergoing lung resection surgery
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Background and Goal of Study: During thoracic surgery, periods of one-lung ventilation (OLV) are required in order to make easier the surgical technique. However, OLV could imply a negative impact on patients due to pathophysiology associated with it. The aim of our study was to assess the association between OLV duration and prognosis of patients undergoing lung resection surgery (LRS).

Materials and Methods: This is a sub-study of the randomized controlled trial NCT 02168751, performed in patients who underwent LRS and approved by the local Ethics Committee in Madrid, Spain in 2011. 174 patients scheduled for LRS were recruited and divided into 3 groups based on OLV time. Group 1 had OLV for less than 120 minutes, group 2 between 121 and 180 minutes, and group 3 more than 181 minutes. All patients were managed with the same anesthetic protocol and ventilatory settings. BAL was performed in both lungs before and after OLV period in order to determine inflammatory local biomarkers. They were measured using Western blot. We recorded postoperative complications, survival and IL6/IL10 ratio. Anova test was used to compare between three groups, and Kaplan Meyer curves were obtained to assess long term survival. Statistical significance was defined as p-value<0.05.

Results and Discussion: Our results are shown in Table 1 and Figure 1. Postoperative Pulmonary Complications (PPC), Acute Kidney Injury (AKI), hospital stay, IL6/IL10 ratio and mortality were higher in patients who had longer OLV (p<0.05). Limiting OLV time could decrease incidence of PPC observed in our study and long term mortality, although it should be balanced against a more difficult surgical technique.

Table 1: Postoperative complications related to OLV duration

<table>
<thead>
<tr>
<th>Group</th>
<th>0-120min</th>
<th>121-180min</th>
<th>&gt;181min</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPC</td>
<td>9 (15)</td>
<td>9 (16.7)</td>
<td>15 (31.7)</td>
<td>0.041</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>8 (13.3)</td>
<td>4 (6.2)</td>
<td>14 (27.3)</td>
<td>0.035</td>
</tr>
<tr>
<td>Respiratory infection</td>
<td>3 (5)</td>
<td>6 (11.1)</td>
<td>12 (23.7)</td>
<td>0.023</td>
</tr>
<tr>
<td>Atelecasis</td>
<td>2 (3.3)</td>
<td>1 (1.7)</td>
<td>4 (6.7)</td>
<td>0.403</td>
</tr>
<tr>
<td>SUI/AI</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (5)</td>
<td>0.045</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>3 (5)</td>
<td>3 (5.6)</td>
<td>7 (12.7)</td>
<td>0.33</td>
</tr>
<tr>
<td>AKI</td>
<td>2 (3.3)</td>
<td>1 (1.9)</td>
<td>9 (18.5)</td>
<td>0.009</td>
</tr>
<tr>
<td>Infection</td>
<td>10 (16.7)</td>
<td>12 (22.2)</td>
<td>17 (28.3)</td>
<td>0.209</td>
</tr>
<tr>
<td>Hospital Stay</td>
<td>17 (28.3)</td>
<td>31 (57.4)</td>
<td>37 (65.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>IL6/IL10 dependent lung - End</td>
<td>8 (12.1)</td>
<td>5 (8.7)</td>
<td>18 (29.7)</td>
<td>0.026</td>
</tr>
</tbody>
</table>

Cardiac, Thoracic and Vascular Anaesthesiology 225
Endobronchial blocker and tracheal bronchus: case of misdiagnosed congenital anatomic variant

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Background: In case of difficult airway management or predicted post operative mechanical ventilation, bronchial blocker (BB) are more often used compared to double lumen tube (DLT) to achieve selective one lung ventilation (OLV) during thoracic surgery. We describe a case of an incomplete OLV due to an aberrant tracheal bronchus (TB) arising from the right side of supracarinal trachea successfully managed with dependent lung apneic oxygen insufflation (AOI) interspersed to bilateral ventilation (BLV).

Case Report: A 77 yo, BMI 32, El Ganzouri 11, ASA 3 man was submitted to elective video assisted thoracoscopy surgery (VATS) due to upper lobe lung cancer. An awake fiberoptic (FB) intubation was performed and a right Arndt 7 french BB was inserted (Cook Medical, Bloomington, IN, USA), as we predicted a difficult airway management. Nevertheless, a complete collapse of right upper lobe, where cancer was located, could not be obtained. A right TB was suspected and confirmed by a carefully FB examination. Therefore, in order to not interrupt the procedure, BB was displaced on left bronchus; 5 minutes of 4 ml/kg of ideal body weight (IBW) BLV was alternated to 3 minutes of AOI on the dependent lung for a total time of 15 minutes. This procedure allowed to maintain an oxygen saturation of 93%, an end tidal carbon dioxide below 50 mmHg and surgery was completed as scheduled. At the end of surgical resection, BLV was re-established, BB was removed and the patient transferred in ICU for protected extubation. After 24 hours of monitoring, the patient was extubated without any complications.

Discussion: In the clinical scenario of incomplete lung collapse in patient submitted to OLV with BB, a TB should be considered. In these circumstances, is recommended the use of a DLT to achieve OLV completely. Nevertheless, DLT position could be challenging in case both predicted difficult airway management and post operative ventilation. In our case report, the displacement of BB in the left bronchus allowed AOI on the dependent lung and surgery was completed without any complications.

Learning Points: TB should be suspected in the scenario of incomplete OLV; displacement of BB on depend lung could allow AOI.

Hypothermia is an independent risk factor for prolonged ICU stay in coronary artery bypass patients

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Background and Goal of Study: Perioperative management could influence outcomes in coronary artery bypass (CABG) patient, but its importance is less well documented. Maintain normothermia was an important perioperative issue, and we would like to explore whether hypothermia on intensive care unit (ICU) admission was an independent risk factor for increased morbidity and mortality.

Materials and Methods: We collected medical and perioperative records for isolated elective CABG patients from Jan. 2018 to Jun. 2019. The outcome of interest was mortality, surgical site infection rate, ventilator dependent time, intensive care unit stay, and hospitalization duration. We did multivariate regression to adjust for age, sex and EuroSCORE II, and analyze the relationship of hypothermia during ICU admission and clinical outcomes.

Results and Discussion: A total of 206 patients were enrolled for analysis. 71 patients had off-pump CABG surgeries, and 135 patients had on-pump CABG surgeries. Hypothermia patients were taller (p=0.012), had lower LVEF (p=0.016), and more frequently had off-pump CABG (p=0.04). No 30-day mortality was noted in our analysis. Hypothermia was not associated with higher surgical site infection site or longer intubation time. After adjustment for sex, age, CPB duration, left ventricular ejection fraction, and EuroSCORE II, higher EuroScore II (p<0.001) and hypothermia on the admission to ICU (p<0.001) were independent risk factors for longer ICU stay.

Conclusion: In addition to EuroSCORE II, hypothermia on admission to ICU was an independent risk factor for prolonged ICU stay in elective coronary artery bypass patients.
Predictive value of STOP-BANG Score in patients undergoing Coronary Artery Bypass (CABG)

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Background: Obstructive Sleep Apnea (OSA) increases postoperative cardiac complications and mortality in the general population. The STOP-Bang questionnaire was specifically developed to be an easy-to-use screening tool to predict risk patient having OSA. The association between STOP-Bang score and mortality and morbidity undergoing cardiac surgery is not well established. The study aims to determine the association between STOP-Bang score and composite cardiac outcome and 30-day and 1-year mortality in patients undergoing Coronary Artery Bypass (CABG). Secondary outcomes were pulmonary, neurological, infection, renal complications, re-operation and readmissions and length of stays.

Methods: This was a prospective cohort study of patients undergoing cardiac surgery. STOP-Bang questionnaire was administered prior to surgery. Ethics approval was obtained from Institutional Review Board. Patients are excluded if they had valvular replacement surgery. Peri-operative data and post-operative outcomes including morbidity, mortality and length of stay was collected for a follow-up period of 1 year. COX proportional hazard was used for analysis of mortality, while multivariable linear or logistical regression models were used where appropriate for analysis.

Results and Discussion: Among 1349 patients recruited for the study, 919 patients met inclusion criteria and was categorized into Low (N=197), Intermediate (N=626) and High (N=626) risk groups based on STOP-Bang Score of 1-2, 3-4 and 5-8. The rates of composite cardiac complications were 53/197(26.9%) in low risk, 137/612(22.4%) in intermediate (N=612) risk group (p=0.737). STOP-Bang risk groups did not predict 30 day mortality (Ref group: Low risk. Intermediate risk p=0.576 and high risk p=0.448) and 1 year mortality (Ref group: Low risk. Intermediate risk p=0.988 and high risk p=0.345). In exploratory analysis, after adjusting for smoking status risk group is associated with increased acute kidney injury (AKI) (Adjusted HR 1.39, [95% CI 0.021-0.63, p=0.036]) but reduction in re-admissions to ICU (Adjusted HR 0.49, [95% CI -0.24 - -1.40, p=0.49]). Subgroup analysis shows female and thinner patients has more re-admissions to ICU (p<0.05). There was no significant differences in other secondary outcomes.

Conclusion: STOP-Bang Score is not useful in predicting cardiac outcomes and mortality in patients undergoing CABG surgery, but may predict post-operative AKI.

The effect of high thoracic epidural anesthesia on response to fluid therapy and myocardial function after off-pump coronary artery bypass grafting

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Background and Goal of Study: In off-pump coronary artery bypass grafting (OPCAB), high thoracic epidural anesthesia (HTEA) with local anesthetics and opioids can provide effective analgesia and reduce the number of perioperative complications. However, the hemodynamic effects of HTEA in coronary surgery are controversial and require further evaluation. The aim of our study was to estimate the effects of HTEA on response to fluid therapy and myocardial function after OPCAB.

Methods and Materials: Twenty-nine patients scheduled for elective OPCAB were enrolled into a single center prospective randomized study. All patients received sevoflurane anesthesia (1 MAC) and fentanyl 2-4 mcg/kg/h. The control group (n=15) had no epidural catheter and received postoperative IV infusion of fentanyl 20 mcg/ml at a rate of 2-4 mL/h. In the HTEA group (n=14), an epidural catheter was inserted at Th2-Th3 level with administration of 0.5% ropivacaine 1 mg/kg/h before surgery and continuous infusion of ropivacaine 0.2% and fentanyl 2 mcg/ml at a rate of 3-8 mL/h postoperatively. We measured cardiac index (CI) using Swan-Ganz catheter and assessed blood gases. To estimate response to fluid therapy after OPCAB, we used passive legs rising (PLR) test and fluid challenge test (FCT) (7 ml/kg of crystalloids at a rate of 2-4 mL/h. In the HTEA group (n=14), an epidural catheter was inserted at Th2-Th3 level with administration of 0.5% ropivacaine 1 mg/kg/h before surgery and continuous infusion of ropivacaine 0.2% and fentanyl 2 mcg/ml at a rate of 3-8 mL/h postoperatively. We measured cardiac index (CI) using Swan-Ganz catheter and assessed blood gases. To estimate response to fluid therapy after OPCAB, we used passive legs rising (PLR) test and fluid challenge test (FCT) (7 ml/kg of crystalloids during 15 min). Patients with CI increase after tests by >10% were estimated as responders. To assess diastolic myocardial function, we measured E/e' ratio before operation and 30 min after surgery and 1 h after induction of anesthesia. The differences between the groups in distribution of responders after PLR (p=0.83) and FCT (p=0.2) and in E/e' start, E/e'24h, lactate, SOV2, PV-c02 gap and PaO2/FIO2 at the end of surgery and at 24 hours postoperatively (p>0.05).

Conclusion: The perioperative HTEA during OPCAB does not influence response to fluid therapy, myocardial function and oxygen transport.

5019

The effect of low-opioid anesthesia on the level of endocrine-metabolic response and cardiospecific enzymes during coronary artery bypass grafting (CABG) under artificial blood circulation (ABC)

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Background and Goal of Study: The effectiveness of multimodal low-opioid anesthesia as an anesthetic assurance technique during CABG surgery under ABC. Materials and Methods: The study included 96 patients aged 61±9.1 year who underwent CABG under ABC. Patients were divided into 2 groups. The induction in both groups was performed with propofol (1.3±0.3 mg/kg), fentanyl (1.3±0.2 mcg/kg), myorelaxation - plicaxipone bromide (0.08 mcg/kg). The maintenance in Group I n=46: sevoflurane (1-1.5MAK), lidocaine (bolus 1 mg/kg followed by continuous infusion 1.5-2 mg/kg/h), dexethemidine 0.8 mg/kg/min., magnesium sulfate iv (20 mg/kg). The Group II (n=50) at this stage received: sevoflurane (1.5-2MAK), fentanyl (12.3±2.1 mg/kg for the entire operation).During the main stage we used artificial electric fibrillation. The level of endocrine-metabolic response was determined by measuring blood lactate and cortisol level dynamics in blood samples during surgery and in the postoperative period.

Results and Discussion: The average duration of anesthesia in the groups was 221.0±4.7 min. The total dose of fentanyl in Group I - 1.29±0.03 mcg/kg, in Group II - 4.66 mcg/kg. The average value of cortisol in Group I was 479.3±26.4 nmol/L, in Group II 536.5±11.5 nmol/L. The average value of cardiospecific enzymes in both groups corresponded to uncomplicated course for cardiac surgery, (in Group I: TnI = 1.86±0.74 mg/ml, CPK-MB = 7.26±1.2 U/L, in Group II: TnI = 1.9±0.35 mg/ml, CPK-MB = 7.46±1.4 U/L (p>0.5)). On day 2 p/o, a decrease in these indicators was observed in Group I by 25.2±1.7% (TnI), by 20.1±1.1% (CPK-MB) and in Group II by 26.9±1.4% (TnI), by 19.6±1.0% (CPK-MB) (p>0.5). The percentage of IL-6 p/o increase was 467.7% (25%-199.07%-970.7) mmol/L, the dynamics of mean values of cardiospecific enzymes in both groups during the postoperative period were statistically significantly influenced by the anesthesia technique (p<0.018), and the age, the duration of fibrillation, the number of aortic displacement, the duration of ABC in Group I with the growth of IL-6 were not correlated (p>0.05).

Conclusion: The multimodal low-opioid anesthesia technique did not have negative effects on the coronary blood flow, which can ensure adequate analgesia, indicated by the absence of endocrine-metabolic changes and has no pathological effect on the dynamics of cardiospecific enzymes.
5390

Intraoperative use of clonidine and dexmedetomidine for the prevention of postoperative delirium after coronary artery bypass grafting

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Background and Goal of Study: Delirium is a common complication after heart surgery. That is why, a large number of drugs, including clonidine and dexmedetomidine, have been proposed for the prevention of postoperative delirium. However, there is still no convincing evidence of their ability to reduce the mentioned complication significantly. The goal of our study was to evaluate the effectiveness of the intraoperative use of clonidine and dexmedetomidine for the prevention of postoperative delirium.

Materials and Methods: Within the study 200 patients who underwent surgical treatment for ischemic heart disease were randomized into three groups. The control group included 100 people, the clonidine group - 50 and the dexmedetomidine group - 50. Patients in all groups were comparable by gender, age, Charlson's comorbidity index, ASA and EuroScore II scores. All patients underwent general anesthesia (sevoflurane inhalation with intravenous infusion of fentanyl and propofol). Intraoperatively, dexmedetomidine or clonidine were used in a dose of 0.5 μg/kg/hour in clonidine and dexmedetomidine groups. The infusion started after anesthesia induction and lasted 2 hours after surgery. The existence of postoperative delirium was assessed by the Nursing delirium screening scale (NuDESC) during the patient’s stay in the intensive care unit. Mean arterial pressure (MAP), heart rate (HR), need of inotropic support, delirium and postoperative mechanical ventilation duration were analyzed.

Results and Discussion: The frequency of delirium was significantly higher in the control group. Postoperative delirium was detected in 19 patients from the control group. The NuDESC scores also differed significantly among groups and they were lower in clonidine and dexmedetomidine groups. No significant difference in MAP, HR, need of inotropic support and delirium duration between groups was revealed. In control and clonidine groups the duration of postoperative mechanical ventilation was higher in comparison to the dexmedetomidine group.

Conclusion: Intraoperative use of clonidine and dexmedetomidine in the studied doses reduces the incidence of postoperative delirium after coronary artery bypass surgery significantly. The use of clonidine increased the duration of postoperative ventilation.

6236

The impact of anesthesiologist and surgeon performance on outcomes after coronary artery bypass surgery

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Background and Goal of Study: Coronary artery bypass grafting (CABG) is one of the most common procedures in cardiac surgery and disparities exist in clinical practice, especially in anesthesiology. This is further exacerbated when off-pump surgery is performed. We aimed to characterize the contribution of operators to outcomes after CABG.

Materials and Methods: We designed a retrospective cohort study including patients that had undergone CABG at our hospital from 2004 to 2014. We collected sociodemographical data, as well as variables relating to patient and surgery characteristics, postoperative complications including stroke, acute myocardial infarction or ischemia demanding reintervention, acute renal sepsis, and atrial fibrillation episodes, 30-day mortality after surgery and all-cause mortality up to the end of 2016. We used mixed effects multilevel models to ascertain the influence of anesthesiologists and surgeons on these outcomes as random effects, as well as the effect of patient and surgical risk in the form of EUROSCORE II and off-pump surgery. We compared models with and without random effects using the likelihood ratio test.

Results and Discussion: We included 3,303 patients with a median follow-up time of 5.8 years. The prevalence of off-pump surgery was 44.7%. We found a significant contribution of anesthesiologists to the incidence of postoperative ischemia (p=0.01). This outcome was also influenced by surgeons and off-pump surgery. This was the only outcome not significantly impacted by EUROSCORE II (p<0.001). Surgeons also significantly influenced the incidence of post-operative atrial fibrillation (p<0.001).

Conclusion: We report on the contributions of surgeon and anesthesiologist to outcomes after CABG. Studies with greater statistical power may perform subgroup analyses to bring out other intriguing associations and effect modifications reported in the literature.

5972

Ultra-fast-track anesthetic technique promotes extubation in the operating room in patients undergoing off-pump coronary artery bypass graft surgery

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Background and Goal of Study: To determine if implementation of ultra-fast-track anesthetic technique (UFTAT) promotes extubation in the operating room (OR) in patients undergoing off-pump coronary artery bypass graft (CABG) surgery.

Materials and Methods: Two groups represented UFTAT (n = 42) and standard anesthetic technique (controls, n = 22) techniques. Anesthesia was conducted with propofol, fentanyl, rocuronium, isoflurane, dexmedetomidine and high thoracic epidural analgesia in the UFTAT group and propofol, fentanyl, rocuronium, isoflurane in the control group. Active temperature control was an integral part of UFTA technology. The fluid was preheated. Warming of the head and skin, moistened inhaled gases, a mattress with heating of circulating water and maintaining the operating room temperature of 24°C were used. The control group used heating of the head and skin, moistened inhaled gases, a mattress with heating of circulating water. The temperature in the operating room remained constant (20°C). The quality of sewn shunts in each patient was checked by means of intraoperative shuntography. In case of adequate myocardial revascularization and the absence of bleeding through safety drains, activation of patients was used. Patients who did not satisfy extubation criteria within 20 minutes from the end of skin suturing transferred to the intensive care unit (ICU).

Results and Discussion: All patients in the UFTAT group were extubated in the operating room within 20 minutes after a skin suturing. None of the patients required reintubation. Postoperative PaO2 were 88,8 +/- 7,2 and PaCO2,39,1 +/- 4,8. Rectal temperature decreased from 36,6 +/- 0,2 degrees to 36,2 +/- 0,3 degrees in the UFTAT group. ICU length of stay differed statistically significantly between the groups (p < 0.0001). Patients who were extubated in the operating room required lower nurse-to-patient acuity ratio (1:2) in the ICU. No difference was found in hospital length of stay. There were no perioperative deaths.

Conclusion: Implementation of UFTAT technique provided adequate hemodynamic control and facilitated extubation in the operating room in all patients. The impact of UFTAT on earlier patient discharge and actual cost savings requires further evaluation.
The relationship between transfusion and outcomes in patients undergoing isolate off-pump coronary artery bypass grafting

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Background and Goal of Study: The relationship between transfusion and clinical outcomes in patients undergoing off-pump coronary bypass grafting (OPCABG) was not clear. The aim of this study was to retrospectively study the relationship between perioperative transfusion and clinical outcomes in patients undergoing OPCABG after excluding time factor in a high-volume cardiac hospital.

Materials and Methods: Perioperative data of 2,178 patients who underwent isolated OPCABG from 2018 to 2019. All of patients were divided into transfusion group and control group. A 1:1 propensity score matching (PSM) was performed to control for potential biases. The post-operation complications (cerebral infarction, atrial fibrillation, myocardial infarction, heart failure, liver and kidney injury, wound infection, pulmonary infection, etc.) and the survival of patients in the two groups at 30 days after surgery were collected and analyzed. Kaplan-Meier survival curve was drawn and log-rank test was used for survival analysis.

Results and Discussion: The total transfusion rate of all patients was 29%, including 27.6% in red blood cell transfusion, 7.3% in plasma transfusion and 1.9% in platelet transfusion. 440 patients in each group were compared after PSM. Transfusion was only associated with postoperative pulmonary infection in patients undergoing OPCABG, but was not related to other complications, after adjusting for age, sex, smoking status, BMI, comorbidities, and surgical procedure. Increased pulmonary complications significantly prolonged the duration of postoperative mechanical ventilation, ICU stay, and in-hospital stay after surgery, and reduced short-term survival (p=0.05). Kaplan-Meier survival curve analysis showed that the 30-day cumulative survival rate of the transfusion group was lower than that of the control group (p=0.05). These factors may increase the consumption of opioids during hospitalization.

Conclusion: Perioperative transfusion in patients undergoing OPCABG increases the risk of postoperative pulmonary infection, reduces short-term postoperative survival, and may increases in-hospital costs.

Multi-model analgesia with wound infiltration after median sternotomy

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Background and Goal of Study: Opiate analgesics have been routinely used after cardiac surgery for postoperative pain control but have some unsavory side-effects which could delay patient recovery and prolong discharge after surgery. Infiltration of local analgesics at wound site could play as a part of opioid-minimizing multimodal pain regimen by blocking peripheral nerve. The aim of this study was to find out the efficacy of continuous local analgesics wound infiltration on decreasing post-cardiac surgery pain, opioid consumption, and effect on incidence of postoperative pain, cardiac, respiratory and surgical complications.

Materials and Methods: The relationship between transfusion and clinical outcomes in patients undergoing OPCABG after excluding time factor in a high-volume cardiac hospital.

Results and Discussion: In conclusion, these results point towards a larger administration of opioids in the ministernotomy group compared with full sternotomy in the first week after cardiac surgery.

Conclusion: Ministernotomy may not provide advantages in terms of analgesic administration in the immediate postoperative period. A multimodal analgesia strategy may be recommended in this category and its potential advantages could be the object of a next prospective study.

Ultrasoundography of the central veins through the supraclavicular view reveals pathology and provides solutions for optimal PICC line insertion

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Background: Novel supraclavicular ultrasonographic techniques allow for the visualisation of central veins including the right subclavian vein and both the right and left brachiocephalic veins. This facilitates an anatomical survey prior to catheter insertion and helps identify pathology. This case report presents a patient in whom the supraclavicular ultrasound view was used to choose an optimal PICC line insertion site.

Case report: A 38-year-old male with a history of acute lymphoblastic leukaemia was referred for PICC line insertion. Pre-procedural ultrasoundography with a microconvex probe placed in the right supraclavicular fossa revealed a large, mobile thrombus at the junction between the right subclavian vein and the internal jugular vein without concomitant limb swelling. Hence, a left-sided approach was chosen. During catheter insertion, the confluence of the brachiocephalic veins was

Ministernotomy versus full sternotomy: a retrospective study of opioid consumption in the first postoperative period after cardiac surgery

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Background and Goal of Study: Most cardiac operations are conducted via full median sternotomy. In the past decades, various minimally invasive techniques have been flourishing, with ministernotomy being promising in reducing long term postoperative complications and enhancing recovery. It has also been thought that a smaller surgical incision would imply less postoperative pain. The aim of this study was to evaluate the consumption of opioids after ministernotomy in comparison with full sternotomy.

Materials and Methods: This was a retrospective observational study, including all patients for aortic valve replacement (AVR) and coronary artery bypass grafting procedures (n=58) at Aalborg University Hospital during 2017. Data were collected by reviewing medical charts and compared using Student’s t-test, Mann-Whitney test, Chi-squared test, or Fisher’s exact test as appropriate. Regression analysis, adjusted for repeated measures and potential confounders, was used for comparison of equipotent opioid administration.

Results and Discussion: No differences were seen in baseline and demographics. In postoperative ICU, we observed less administrations of fentanyl in the full sternotomy group (27% vs. 44% of patients, p<0.05). In the thoracic ward, a larger consumption of opioids was seen in postoperative day 5, 6 and 7 (figure 1, p<0.05) in the ministernotomy group. The regression model revealed that the equipotent dose of opioids tended to be higher in the ministernotomy group (2.63 mg/day, 95%CI: -0.07 to 3.34, p=0.06). Moreover, the use of gabapentin was correlated with lower opioid administration (-1.19 mg/day, 95%CI: -3.12 to -5.8, p<0.01).

In conclusion, these results point towards a larger administration of opioids in the ministernotomy group compared with full sternotomy in the first week after cardiac surgery.
visualised in real-time using the same supraclavicular view. The catheter tip was seen as it entered the superior vena cava ensuring optimal tip positioning (see figure). Upon insertion appropriate anticoagulant therapy was administered.

Discussion: The case presents a patient with asymptomatic deep vein thrombosis which would not have been discovered without a pre-procedural ultrasound examination. It is not recommended to insert a catheter in close proximity to a pre-existing thrombus, as there is a risk of thrombus dislodgement and, in addition, the catheter may act as a substrate for further thrombus formation. In the present case, supraclavicular ultrasonography facilitated a change in strategy, and despite left-sided insertion correct catheter tip position was ensured in real-time.

Learning points: Supraclavicular ultrasonography allows for an anatomical survey of the right-sided central veins prior to PICC line insertion. When pathology is found, ultrasonography helps reveal feasible alternative strategies. The right-sided supraclavicular fossa view facilitates real-time confirmation of correct catheter tip positioning even in PICC lines placed on the left side.

Results and Discussion: 200 patients were included. Median age was 62 [47-71] years and median ASA-PS was 2 [2-3]. Initial median total number of B lines was 0 [0-2]. After fluid challenge of 250 ml, 67% patients were responders and 33% were nonresponders. Delta B-lines was significantly higher in non-responders patients compared to responders (4 [2-7] vs 1 [0-3]; p = 0.0001). Delta B-lines could predict fluid non-responders with an area under the ROC curve of 0.74 (IC95% 0.67-0.80 ; p< 0.0001). The best threshold was 2 B-lines with a sensitivity of 80% and a specificity of 57%. When considering all fluid challenge administered, Delta B lines was significantly correlated with ΔSV% after fluid challenge (rho= -0.25 ; p= 0.0001).

Conclusion: The appearance of 2 B-lines 2 on 4 lung ultrasound zones could be considered as a predictive marker of preload unresponsiveness after fluid challenge in abdominal surgery.

References:

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Lung ultrasound versus auscultation techniques in confirming endobronchial intubation in patients for thoracic surgeries
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Background and Goal of Study: The lung condition during one lung ventilation (OLV) may be similar with the pneumothorax, which the lung ultrasound can detect with high specificity and sensitivity. We hypothesized that lung ultrasound may be effective as much as bronchoscopy for confirmation of double lumen tube (DLT) position. Therefore, for this purpose, we investigated the sensitivity, specificity, positive prediction value, negative prediction value, and overall accuracy of auscultation and lung ultrasound techniques.

Materials and Methods: We enrolled 30 patients who were aged above 18 years requiring endobronchial intubation for OLV. We excluded patients without lung sliding by lung ultrasound before anesthetic induction, and refusing to attend this study. For blinding, 4 researchers were involved in the measurement of one person by lung ultrasound before anesthetic induction, and refusing to attend this study. For blinding, 4 researchers were involved in the measurement of one person.

Results and Discussion: The sensitivity (100%), specificity (100%), positive predictive value (63.3%), negative predictive value (0%), and accuracy (63.3%) of ultrasound was as same as that of auscultation in the supine position. The sensitivity (100%), specificity (57.1%), positive predictive value (85.2%), negative predictive value (100%), and accuracy (86.7%) of ultrasound was as same as that of auscultation in the lateral position. The total time for bronchoscopy was significantly longer than that for auscultation (P = 0.001 in supine position, P = 0.035 in supine position, P = 0.234 in lateral position).

Conclusion: Lung ultrasound as well as auscultation techniques are effective as much as bronchoscopy for confirmation of DLT position, even though the total time for estimation by auscultation was significantly shorter than that by lung ultrasound.

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Assessment of fluid unresponsiveness state guided by lung ultrasound in abdominal surgery: an observational and prospective study
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Background and Goal of Study: Fluid challenge could generate an infraclinical interstitial syndrome that could be detected by the passage from a profile (normal) to B profile (with "comet tail" B lines) in lung ultrasound 1. The main objective was to evaluate the appearance of new B lines as a predictive marker of preload unresponsiveness state.

Materials and Methods: We conducted a prospective and observational study. The agreement of the Institutional Review Board and signed consent of the patients have been obtained. Major patients undergoing abdominal surgery were included. Patients with chronic or acute pulmonary diseases were excluded. Fluid challenge was performed according to the french guidelines 2: titration with 250 ml of crystalloids. Stroke volume assessed by oesophageal Doppler was collected before and after fluid challenge of 250 ml of crystalloids (ΔSV). Responders were defined by a >10% increase of ΔSV after fluid challenge. B lines were count before and after the fluid challenge of 250 mL at 4 predefined zones (right and left supero-anterior and supero-lateral). Delta B-lines was defined as the number of new appeared B lines after fluid challenge. A receiver-operating characteristic curve (ROC) was established for ΔSV to predict fluid unresponsiveness after fluid challenge.

Results and Discussion: 200 patients were included. Median age was 62 [47-71] years and median ASA-PS was 2 [2-3]. Initial median total number of B lines was 0 [0-2]. After fluid challenge of 250 ml, 67% patients were responders and 33% were nonresponders. Delta B-lines was significantly higher in non-responders patients compared to responders (4 [2-7] vs 1 [0-3]; p = 0.0001). Delta B-lines could predict fluid non-responders with an area under the ROC curve of 0.74 (IC95% 0.67-0.80 ; p< 0.0001). The best threshold was 2 B-lines with a sensitivity of 80% and a specificity of 57%. When considering all fluid challenge administered, Delta B lines was significantly correlated with ΔSV% after fluid challenge (rho= -0.25 ; p= 0.0001).

Conclusion: The appearance of 2 B-lines 2 on 4 lung ultrasound zones could be considered as a predictive marker of preload unresponsiveness after fluid challenge in abdominal surgery.
The association between preoperative hepatic venous flow and the outcome after cardiac surgery

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Background and Goal of Study: The hepatic venous flow reflects to the pressure changes of the right ventricle. Therefore, it starts to appear as a part of the echocardiographic examinations. Moreover, the back and forth link between the cardiovascular state and the liver is well-known for several years. Our objective was to evaluate the association between preoperative hepatic venous flow and the outcome of patients underwent cardiac surgery.

Materials and Methods: Our prospective, observational study included 79 patients who underwent cardiac surgery between January 2018 and October 2019 at our Heart and Vascular Centre. Beside the routine echocardiographic examination we also measured the venous blood flow in the common hepatic vein before the influx into the Inferior Vena Cava with Doppler ultrasound. We recorded the standard four waves (V, D, S, A) maximal speed and velocity time integral (VTI). In our database we recorded the patients' demographic data, preoperative and postoperative hemodynamic and hepatobiliar markers and the EuroSCORE. We collected the length of stay (LOS), the intensive care unit stay, the vasopressor and inotrope need, and the occurrence of acute kidney injury (AKI). Our primary outcome was AKI, it were defined by the Kidney Disease Improving Global Outcomes (KDIGO) guidelines, which is one of the first signs of circulation problems. We used SPSS 22 program to analyse our data, with descriptive parameters and Cox-regression analyses.

Results and Discussion: Median age was 67.9 (IQR 25-75: 60.6-73.6), none of them had any liver or renal disease in their medical history. Most common surgical procedure was aortic valve surgery (27, 34.1%). During the first postoperative week 14 patients developed AKI (17.8%). Multivariate Cox-regression analysis revealed, that the ratio of the regredroge and anterograde waves: VTI had independent association with AKI (OR: 1.35; 95% CI: 1.03-1.75; p=0.027), the model was adjusted for the EuroSCORE.

Summary: The increment in the hepatic venous retrograde waves, which are related to hepatic stasis, can predict worse outcome among cardiac patients. Therefore, we might include this potentially useful tool in routine echocardiographic examinations.

Echocardiographic outcomes of intraoperative transprosthetic cuf leakage of biological aortic valve replacement in a single centre

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Background and Goal of Study: Intraoperative transprosthetic cuff leakage (TCL) which is a paravalvular (PVL) nor transvalvular leakage (TVL) after biological aortic valve replacement (AVR) has been recently reported. Although some studies have described the incidence of aortic TCL, there is a paucity of evidence regarding their time course of TCL. The aim of this study is to compare the short and long-term echocardiographic outcomes of TCL.

Materials and Methods: The study comprised adult patients undergoing biological AVR between January and November in 2019. TCL were determined whether trivial or greater TCL quantified using intraoperative transesophageal echocardiography (TEE) and postoperative TTE. TEE performed prior to weaning from the cardiopulmonary bypass, immediately after aortic declamping and follow-up with protamine administration. For each of the patients we recorded the pre-operative echocardiographic data as well as the post-AVR echocardiographic outcomes at day 7 and 1 month.

Results and Discussion: Twenty five patients using four types of aortic bioprosthetic valves (Inspir, Magna Ease [Edward Lifesciences, Irvine, CA USA], Trifecta [Abbott, St Paul, MN, USA], Crown PRT [LivaNova PLC, London, United Kingdom]) were enrolled in this retrospective study. Intraoperative TCL was present in 8 patients (32.0%); the majority (87.5%) were trivial. No TCL resolved after protamine administration. Follow-up TTE at each 7 days and 1 month was available for 25 patients (100%) and 23 patients (92%), respectively. At 7 days after AVR, most TCL remained unchanged (62.5%) or disappeared (12.5%). Only 1 patient (12.5%) had a progression of the TCL. One patient had trivial neo-TVL and the other patient had mild neo-PVL. Follow-up TTE at 1 month revealed all aortic TCL (including neo-leakage) remained unchanged except two patients who died during the follow-up period. Additionally, intraoperative mild TCL remained unchanged at 3 months in one case.

Conclusion: This single center evaluation of the intraoperative TCL of biological AVR demonstrated aortic TCL is not uncommon. These leaks are usually trivial and generally have a benign course. However, most of trivial-to-mild remained unchanged and the presence of residual TCL may influence neo-leakage.

Pericardial Effusions in Cancer Patients: Anesthetic Management and Survival Outcomes

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Background and Goal of Study: Malignancy is a common cause of pericardial effusion. Previous reports have studied survival and effusion recurrence rates after different surgical interventions for pericardial effusion in cancer populations but no study to date examines effect of intraoperative anesthetic management on long-term survival outcomes in cancer patients. Primary outcome is overall survival. Secondary outcomes are 30-day survival, 90-day survival and in-hospital survival.

Materials and Methods: After IRB waiver, retrospective review of 150 cancer patients between 2011-2015 in a single quaternary cancer center. All patients with malignancy and pericardial effusions requiring drainage were included. Data from electronic health record included preoperative and intraoperative data. Overall survival was measured from date of surgery to date of death in June 2019.

Results and Discussion: Median survival was 5.84 months, with an in-hospital
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mortality of 13.3%, 30-day mortality of 19.3%, and a 90-day mortality of 36.7%.
Univariable analysis showed metastatic disease (HR, 1.772; p=0.026), malignant pericardial effusion cells (HR, 1.499; p=0.032) were associated with decreased overall survival. After multivariable analysis, the only statistically significant factors affecting mortality are high initial heart rate (HR, 1.162; p=0.005) and intraoperative sinus tachycardia (HR, 1.862; p=0.012).

Conclusion: Mortality after pericardial wound on oncologic patients remains high. High starting heart rate and sinus tachycardia are associated with worse survival. Initial high heart rate and intraoperative sinus tachycardia were only significant factors affecting mortality. The malignancy type and preoperative presence of tamponade physiology are not associated with difference in mortality. Intraoperative factors such as choice of induction agents, paralytics, utilization and timing of arterial line, and time of day surgery took place are not associated with a statistically significant difference in mortality outcome after multivariable analysis.

References:

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New NIRS features. An alternative view on the technique
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Background: The depth of penetration into biological tissues limits the sensor radiation of the most common NIRS monitors using in clinical practice by 15–20 mm. We were interested in the possibility of intraoperative spectroscopy of the lungs, myocardium and gastrointestinal tract organs. The aim of our study was to evaluate the possibility of a modern spectrometer in determining non-cerebral tissue oxygenation in patients of various age groups during operations and congenital heart correction without cardiopulmonary bypass in neonoms.

Case Report: We selected patients whose visualization depths of the pleural hyperechoic line were no more than 15 mm for lungs study. In this group we performed an intraoperative study of the oxygen saturation dynamics of lung tissue.

To assess visceral blood flow under cardiopulmonary bypass, the sensor was fixed on the anterior abdominal wall in children under one year old. Transgastric spectroscopy was performed in patients over 18 years with anterior abdominal wall thickness greater than 15 mm. Two adult patients underwent myocardial spectroscopy before and after cardioplegia.

Discussion: The method for the lung tissue saturation assessment is a criterion for an adequate systemic-pulmonary Anastomosis function. In the case of corrective anastomosis function, asymmetry of lung rSO2 appears in 100% of cases. With PEEP increasing from 5 to 10 cmH2O all patients showed a decrease in rSO2 over the lungs of 9.5-14.7% (<0.05). The analysis of the oxygen dynamics of the lungs during cardiopulmonary bypass operations, accompanied by cardioplegia: lung rSO2 increased to 95% with aortic clamping time of more than 20 minutes, followed by a decrease within 72 hours to 70 ± 5% (<0.05). When performing transgastric spectroscopy of the abdominal organs, the influence of certain factors on the dynamics of rSO2 of the visceral tissues was examined, for example, the beginning of the infusion of vasoactive drugs (a 5.7% decrease in visceral rSO2), the transition to extracorporeal circulation (lack of dynamics of visceral rSO2). Myocardial rSO2 was evaluated before and after cardioplegia: rSO2 decreased by 8.4%.

Learning points: The physical NIRS basis allows dynamic monitoring of the blood flow state and oxygen metabolism not only in the brain, but also in other organs and tissues.

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BioGlue manifesting as a subaortic floating structure in ventricular septal rupture surgery
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Background: In surgical patch repair for ventricular septal rupture (VSR), it has never been described that BioGlue, an adjunct to seal the suture line of patch-repaired septum, was detected as a subaortic floating structure, which could potentially contribute to devastating embolism.

Case Report: Written informed consent was obtained from the patient. The 72-year-old male developed myocardial infarction and percutaneous intervention was administered, thereafter intra-aortic balloon pump (IABP) was placed. The following day, he exhibited VS and underwent a patch closure. The incision was undertaken from right ventricular wall, then BioGlue was applied to the suture line of patch-repaired septal endocardium toward left ventricle. Before the weaning from cardiopulmonary bypass, transesophageal echocardiography (TEE) demonstrated a subaortic floating structure, which was not found preoperatively. TEE also revealed an exacerbated mitral regurgitation, which urged the surgeons to perform valve repair. While the additional operation, the subaortic structure was removed and diagnosed as BioGlue clot due to its appearance. Although he was extubated on postoperative day (POD) 8 and weaned from IABP the following day, right ventricular failure developed on POD 19, and he died on POD 29.

Discussion: We experienced a case of subaortic floating BioGlue clot leaked from suture line between the patch and septal endocardium. The glue responsible for embolism has been previously reported that it is applied to the suture lines outside of the heart, such as aortic or coronary grafts. Cryolife Inc. warns that the glue should not be applied to the intracardiac cavity, which is more likely to cause embolism than its application outside of the heart. However, surgeons occasionally use the glue during VSR surgery to provide reinforcement to the suture line between infarcted friable septum and the patch. It is recommended that anaesthesiologists ask the surgeons about the use of BioGlue, and if so, careful TEE examination particularly around the patch to find the abnormal structure is needed, thereby avoiding the postoperative embolism.

Learning points: BioGlue applied to intracardiac suture line is more likely to cause embolism than its use outside of the heart. Anaesthesiologists are recommended to confirm the use of the glue and if so, careful TEE examination is needed to prevent potential embolism.

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Cerebral oximetry changes and postoperative delirium in adult cardiac surgery patients
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Background and Goal of Study: Postoperative delirium is associated with increased morbidity and mortality. We hypothesized that changes of regional cerebral oxygen saturation would influence the incidence of postoperative delirium after cardiac surgery. The aim of this study was to analyse the relationship between intraoperative cerebral oximetry changes and the postoperative delirium incidence after adult cardiac surgery in our setting.

Materials and Methods: This was a prospective observational study. After obtaining institutional Ethics Committee approval and written informed consent, all consecutive adult patients scheduled for elective cardiac surgery with cardiopulmonary bypass (CPB) were enrolled during 3 months (from February to April 2019). Recorded variables were: demographics, preoperative medication, intraoperative cognitive function using Mini-Mental-State-Examination (MMSE), baseline educational level, comorbidities, EuroScore, intraoperative data (type of surgery, CPB time, regional cerebral oximetry (rSO2) and desaturations >20% from baseline values (1 minute or longer) at different times, ICU and in-hospital length of stay) and postoperative data (intubation time, transfusion, presence of shock, need of vasoactive drugs, etc.). Postoperative delirium was assessed by using the confusion-assessment-method for the intensive care unit (CAM-ICU) during 10 postoperative days. Student’s t-test and Chi-square test were used for analysis.

Results and Discussion: A total of 90 consecutive patients were included (25% women; 100% ASA IV; mean age 67.7±11.3 years, mean body mass index 28.63±4.4 kg.m-2). 6.7% of them developed delirium postoperatively according to the CAM-ICU criteria; none of these patients presented a decrease of baseline rSO2 value > 20% intraoperatively (p=0.48). Postoperative noradrenaline requirements in ICU were higher in patients with postoperative delirium (p=0.012). 66% of the patients that presented delirium had a low daily physical activity preoperatively. No other differences were found between patients with or without delirium.

Conclusion: In our setting the delirium incidence was low and no relationship between intraoperative cerebral oximetry changes and postoperative delirium incidence. However, adult cardiac surgery patients with CPB performed an intraoperative use of noradrenaline in the ICU was associated with a higher incidence of postoperative delirium in our patients. More studies are needed to explore this hypothesis.
Preoperative arterial and venous cannulation in RE-DO cardiac surgery: from the points of safety and cost-effectiveness

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Background and Goal of Study: Re-do cardiac surgery carries certain risks of myocardial injury and postoperative complications. Therefore, damages attributed to myocardium may be life-threatening and consequences may increase the hospital costs. The aim of the current research is to investigate the safety and cost-effectiveness of pre-operative cannulation and conventional approach techniques.

Materials and Methods: In total of 63 patients whom underwent re-do open cardiac procedures between September 2015 and September 2017 are grouped into two groups as; Group A (n:31): conventional cannulation after sternotomy and Group B (n:32), cannulation before sternotomy group. Patients were evaluated retrospectively for general complication rates and total hospital costs.

Results and Discussion: Mortality occurred in 4 patients in Group A and in 1 patient in Group B. Four patients required ECMO in Group A where as 2 in Group B. Duration of total operation, cardiopulmonary bypass and cross clamp time were longer in the conventional surgery group than pre-sternotomy cannulation group (420.29±188.84 vs 314.7±187.36, p: 0.036; 171.8±85.59 vs 141.7±82.47, p: 0.089; 102.9±50.76 vs 60.9±52.81, p: 0.009; respectively). Total blood and blood product use were higher in Group A when compared with Group B. Postoperative intensive care unit stay was 62.77±14.53 hours vs. 25.13±11.11, ventilation time 5.16±5.09 hours vs. 3.03±2.78 hours; duration of ward stay was 5.23±2.52 days vs. 5.57±2.16 days and hospital stay was 9.58±5.85 vs. 9.8±5.31 days in conventional sternotomy and pre-sternotomy cannulation groups. Total hospital costs were calculated for 35663.9±20803.99 Turkish Lira in Group A and 26744.7±16472.03 Turkish Lira in Group B (p=0.042).

Conclusion: Arterial and venous cannulations before sternotomy decreased myocardial injury and complication rates, blood and blood product use, hospital stay and in the end hospital costs in our modest cohort.

Comparison of the ultrasound sonorheometry based Quantra® System with rotational thromboelastometry ROTEM® Sigma in cardiac surgery

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Background and Goal of Study: In cardiac surgery point of care coagulation monitoring is commonly used for detection of severe coagulopathy enabling goal-directed and timely treatment. Measures of the novel sonorheometry based Quantra Viscoelastic Hemostatic Analyzer (HemoSonics, Charlottesville, VA, USA) were compared with corresponding results of the ROTEM sigma device (Instrumentation Laboratory, Bedford, MA, USA).

Materials and Methods: In elective cardiac surgery patients, blood samples were taken after induction of anesthesia (sample 1) and after termination of cardiopulmonary bypass and heparin neutralization (sample 2). Samples were measured on Quantra (QPUS+cartridge) and ROTEM sigma device with recording of time-to-results (first available and complete), clot times and clot stiffness values. For comparison of clot stiffness values, ROTEM amplitudes (A in mm) were converted to shear modulus (G) in hectoPascal (hPa): G (hPa) = (500xA) / (100-A). Correlation analysis was performed by Pearson correlation. Bland Altman analysis was performed to determine agreement of methods. P-value <0.05 indicated statistical significance.

Results and Discussion: In total of 63 patients whom underwent re-do open cardiac procedures between September 2015 and September 2017 are grouped into two groups as; Group A (n:31): conventional cannulation after sternotomy and Group B (n:32), cannulation before sternotomy group. Patients were evaluated retrospectively for general complication rates and total hospital costs.

Results and Discussion: Mortality occurred in 4 patients in Group A and in 1 patient in Group B. Four patients required ECMO in Group A where as 2 in Group B. Duration of total operation, cardiopulmonary bypass and cross clamp time were longer in the conventional surgery group than pre-sternotomy cannulation group (420.29±188.84 vs 314.7±187.36, p: 0.036; 171.8±85.59 vs 141.7±82.47, p: 0.089; 102.9±50.76 vs 60.9±52.81, p: 0.009; respectively). Total blood and blood product use were higher in Group A when compared with Group B. Postoperative intensive care unit stay was 62.77±14.53 hours vs. 25.13±11.11, ventilation time 5.16±5.09 hours vs. 3.03±2.78 hours; duration of ward stay was 5.23±2.52 days vs. 5.57±2.16 days and hospital stay was 9.58±5.85 vs. 9.8±5.31 days in conventional sternotomy and pre-sternotomy cannulation groups. Total hospital costs were calculated for 35663.9±20803.99 Turkish Lira in Group A and 26744.7±16472.03 Turkish Lira in Group B (p=0.042).

Conclusion: Arterial and venous cannulations before sternotomy decreased myocardial injury and complication rates, blood and blood product use, hospital stay and in the end hospital costs in our modest cohort.
Incident and outcomes of cerebrovascular events in patients with prolonged left ventricular assist device support: experience from a single university center

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Background and Goal of Study: More than 90% of heart transplantation (HT) candidates are bridged with a ventricular assist device (VAD) in Japan. In these patients, anticoagulant therapy is administered to prevent thromboembolic complications. Cerebrovascular events (CVEs) such as intracranial hemorrhage (ICH) and cerebral infarction may be life-threatening. Patients surviving such complications may require strict control of blood pressure and intracranial pressure during anesthetic management during HT surgery. We conducted a retrospective review and investigated the incident rate and the outcome of cerebrovascular events in patients with VAD.

Methods: After review board approval, we conducted a retrospective review of all VAD implantation cases at our center from 2005 to November 2019. Collected data included age, sex, type of CVE, severity, and survival. Our primary outcome was the rate of CVE. Secondary outcomes included severity of event, survival rate, and type of implanted VAD. Student t-test and chi-square tests were used for statistical analysis.

Results and Discussion: A total of 209 patients were included for this study. The average age at the time of initial VAD implantation was 43.4±14.6 years and 67.6% (n=141) were male. We found 38.7% (n=87) of patients experienced CVEs within an average of 142.5±273.0 days post implantation. Intracranial hemorrhage, cerebral infarction, and subarachnoid hemorrhage occurred in 46.5% (n=34), 36.9% (n=27), and 10.9% (n=8), respectively. The severity for cerebral infarction was moderate (mean National Institute of Health Stroke Scale 9.0±8.0). Subarachnoid hemorrhage was occurred with moderate severity (mean Hunt and Hess scale 2.39±1.33). There were 16 mortality cases which directly due to CVEs in which 15 cases due to cerebral infarction. Of the patients which survived the CVE, 29.6% continued VAD support and 23.5% were able to undergo HT. The majority of implanted VAD were HeartMate II (35.8%). We did not find any association between the type of VAD and rate of CVEs.

Conclusion: Patients requiring prolonged periods of VAD support are vulnerable to CVEs. Cerebral infarction was a major cause of death. Our results should be taken into account during anesthetic management of HT surgery.

Survival after heart retransplantation in late cardiac allograft failure

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Background and Goal of Study: Heart transplantation continues to be the gold standard treatment of end-stage heart failure. Among patients who survive heart transplant, recurrent end-stage heart failure is a major cause of morbidity and mortality. Heart retransplantation (HRT) offers the potential for long-term survival; however, there is controversy about the appropriateness of retransplantation because of limited organ availability and outcomes that tend to be worse than in primary transplantation. The aim of this study was to determine the mid-term survival after HRT.

Materials and Methods: After obtaining IRB approval, the authors retrospectively studied all consecutive adult patients who underwent orthotopic heart transplantation between January 2009 and December 2018 at a tertiary care university hospital and followed them up until November 2019. Patients included in the analysis had undergone HRT and were 18 years or older.

Results and Discussion: During the study period, 250 patients underwent orthotopic heart transplantation. Among these patients, 2% (n=5) underwent HRT. The end-stage heart failure diagnoses leading to first heart transplant in our study were hypertrophic cardiomyopathy (40%) and idiopathic cardiomyopathy (40%) and myocarditis (20%) and the major indications for HRT were chronic rejection (60%) and cardiac allograft vasculopathy (40%). Grafts failed at a median follow-up of 9 (5) years after first heart transplantation. Median HRT recipient age was 28 (8) years, and all patients were males. The majority of patients (80%) required combined simultaneous second cardiac and first renal transplantation. Heart-kidney combined transplantation were performed with organs coming from the same donor and with no-staged modality. Actuarial survival rate was 60%, after a median follow-up of 17.8 (39.6) months. Heart retransplantation survival has improved over the decades, but it is still inferior to primary transplantation.1,2

Conclusions: Heart retransplantation is a viable treatment option for patients with late failing allografts. Judicious patient selection and careful perioperative care are of utmost importance considering limited allograft availability.

References:

Burnout syndrome among healthcare professionals of Centre of Cardiac Surgery

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Background and Goal of Study: Healthcare professionals with high occupational load work under a stressful environment which can lead to burnout syndrome. The purpose of the study was to investigate the degree of burnout experienced by anesthesiologists in compare with surgeons and cardiologists in Cardiac Surgery Centre of Kaliningrad and justify the need for education in stress management.

Materials and Methods: Forty-eight health professionals were surveyed. The sample was divided into three groups: anesthesiologists (n=16), surgeons (n=17) and cardiologists (n=15). There were 18 female and 30 male respondents. The questionnaire of burnout by V. Boyko was used to measure symptoms, phases, and degree of burnout syndrome.

Results and Discussion: We observed symptoms of burnout in all participants of the study. Comparative analysis showed lower degree of burnout among anesthesiologists in comparison with surgeons and cardiologists (p<0.05). In the group of anesthesiologists, the burnout symptom - reduction of professional obligations and achievements level - had statistically significant positive correlation with age and occupational experience of participants (p<0.01). Besides, our study revealed significant differences between anesthesiologist, cardiologist, and surgeons in the following symptoms: depersonalization (p<0.01), personal accomplishment (p<0.01), psychosomatic and psycho-vegetative problems (p<0.05), and experience of psychotraumatic events (p<0.05).

Conclusion: Specialisation based strategies in stress management education are needed to overcome the difficulties of emotionally charged issues of health professionals.

Acknowledgements: A.Vygovskiy, Yu. Shneyder, Federal Centre of High Medical Technologies, Kaliningrad, supported this research.

Evaluation of the compliance with the ESA Guidelines for fibrinogen concentrates prescription in adult cardiac surgery in France: the prospective observational FibCard study

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Background and Goal of Study: Cardiac surgery is associated with bleeding and transfusion of blood products (BP) and blood-derived products including fibrinogen concentrates (FC). The goal of this study was to evaluate compliance with the ESA Guidelines (1) for prescription of FC in adult cardiac surgery in French practice.

Materials and Methods: FibCard was a multicentre, prospective, observational study; 14 centres included adults who underwent cardiac surgery with cardiopulmonary bypass. Indication for FC administration was defined as: documented/suspected plasma fibrinogen <2g/L before FC prescription and ‘clinically relevant’ perioperative bleeding defined as blood loss from chest tubes within 24h of surgery >720mL (75% percentile of blood loss of all patients). The main criterion was evaluated with its 2-sided 95% Confidence Interval (95%CI). A logistic regression model was used to identify the factors associated with FC prescription after adjustment on the centre. The main criterion was evaluated with its 2-sided 95% Confidence Interval (95%CI). A logistic regression model was used to identify the factors associated with FC prescription after adjustment on the centre.

Results and Discussion: Between March 2017 and April 2018, 2665 patients (72.2% males) were included; 374 (14.0%) patients were administered FC at least once (PFC). FC prescription rates varied among centers from <1% to 31.2% (p<10-3). Perioperative administration of blood products (BP) was higher in the PFC patients (p<10-3). After adjustment on the centre, per- and post-operative administrations of BP were significantly associated with FC prescription (Table).
Successful anaesthesia management in patients with explanation of two different types of left ventricular assist devices

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Background: Left ventricular assist devices (LVAD) are implanted in cases of heart failure refractory to medical therapy. LVADs are used mostly as a bridge to heart transplantation; but, in specific cases, myocardial function recovers and LVADs can be explanted. In order to avoid complications, LVAD surgery requires a meticulous anaesthesia management. Furthermore, explanation of LVAD is more complicated in terms of that all work is left to the patient's own heart.

Case report: First case: A 10-year-old male, who underwent LVAD (Heartware®) placement after acute myocarditis. Second case: A 20-year-old male, who underwent LVAD (Heartmate III®) placement after acute myocarditis. Both cases showed marked recovery of their cardiac functions in 3 years and scheduled for LVAD explantation.

Discussion: Surgery of LVAD explanation is highly stressful in terms of anaesthesia management after recovery is thought to occur in patients with heart failure. During the anaesthetic management of this susceptible period, it is quite useful to monitor the cardiac output in a continuous and less invasive fashion without introducing a pulmonary artery catheter and to assess the ventricle functions using continuous TEE. We would like to present two successful anaesthesia management of two different type of LVAD devices explanation surgery.

Learning points: It is a critical period in which the LVAD device is stopped and the patient's heart has taken over all circulation works again. Carefully anaesthetic drug titrations and close hemodynamic monitoring with PICCO, TEE and NIRS are helpful for LVAD explanation surgeries.

5841

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Dynamics of neuropsychological testing results as a response of patients with surgical aortic pathology to surgery using cardiopulmonary bypass

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Background and Goal of Study: The aim of the work was to analyze the dynamics of the results of neuropsychological testing as a reaction of patients with surgical aortic pathology to the surgical intervention using cardiopulmonary bypass (CPB).

Materials and Methods: In 118 patients with surgical pathology of the aorta (SPA) found that surgery itself - operational stress, as well as general anesthesia and the use of the CPB device during surgery adversely affect almost all indicators of cognitive function. The aim of the work was to analyze the dynamics of the results of neuropsychological testing as a reaction of patients with surgical aortic pathology to the surgical intervention using cardiopulmonary bypass (CPB).

Results and Discussion: The use of the MMSE scale in the postoperative period in patients of groups K, I and II with the MMSE scale in the postoperative period in patients of groups K, I and II significantly different between the numbers and the starting indicators and the numbers of the test result of 5 words in points in any of the control points. Regarding the Doskin scale, as a test to identify postoperative cognitive dysfunction (PCD), when assessing its component - the expressiveness of patient activity, the K, I and II group did not determine a significantly significant difference between its numbers and the starting level.

Conclusion: It can be noted that the indicator of PCD depends on the severity and mechanisms of the effect of hypoxia on the background of artificial brain perfusion, the most influential factor in assessing the patient's condition in the postoperative period.

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Patient flow and clinical decision making through the vascular MDI

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Background and Goal of Study: The UK National Quality Improvement Programme for the management of Abdominal Aortic Aneurysm (AAA) identified multi-disciplinary team (MDT) meetings including anaesthetic assessment to be key to effective care. Studies in cancer surgery suggest that 15% of MDT decisions are not implemented. (1) This service evaluation reviewed decision implementation following a vascular MDT and the factors affecting the decision-making process.

Materials and Methods: Consecutive AAA patients discussed at the vascular MDT at a large UK teaching hospital between October 2017 and August 2018 were identified. Data on MDT decision and clinical management were collected from patient's electronic health record. Actual management was compared to the MDT decision and coded as concordant, discordant or undecided. Cases coded as discordant or undecided were reviewed to identify contributing themes. Data are reported as number[%] and median[range].

Results and Discussion: 106 patients, (age 78[56-96] years, 85[80%]) male, were discussed in 42 meetings. Meetings were attended by 3[1-6] interventional radiologists, 6[4-11] surgeons, and 10[1-1] anaesthetists. Aneurysm size was 6[5.0-9.5]cm. 52[77%] patients were discussed at one MDT, 20[19%] at two, and 4[4%] at three MDTs. Following the first MDT 23[22%] patients did not have a settled management plan; this reduced to 12[11%] by the end of the MDT process. 18 of the 24 repeat discussions were prompted by the absence of key clinical information, including anaesthetic or cardiopulmonary assessment, at a prior MDT. Planned management was not implemented in 11[10%] of the 94 patients who had a settled management plan. Reasons for deviation from the MDT decision were multifactorial. An incomplete assessment of the severity of comorbidity was important in 3 cases. Patient preference was a key factor in 8 cases.

Conclusion: Our data suggest that failure of information from preoperative investigations and anaesthetic assessment to be transmitted to the MDT played a role in the need for multiple MDT discussions and may have contributed to delays in care. Complete assessments of co-morbidity or patient choice were important in the majority of patients who did not receive planned care. These may be addressed by changes to the preassessment process. We are now conducting qualitative work to inform process improvement for our MDT.

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Prolotherapy for the patients with chronic pain: Systematic review and meta-analysis

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Background and Goal of Study: Chronic pain (>3 months) involved in musculoskeletal system is usually due to the laxity of ligaments or tendons by strains, tearing of the fibers after trauma. Nonsurgical treatment such as prolotherapy can provide a cost-effective, reduced risk, and rapid healing, which is an injection treatment to stimulate healing process for the loosened ligament and tendon. Dextrose is currently most common being used. Recently many literatures about the effect of prolotherapy with dextrose including randomized controlled trials (RCTs) have been published. However, the real benefits may be affected by differences in injection protocols, comparative regimens, and evaluation scales. The aim of this systematic review and meta-analysis is to determine the effectiveness of prolotherapy for long-term treatment of chronic musculoskeletal pain and osteoarthritic pain.

Materials and Methods: We searched Medline (n=250), Embase (n=64), Cochrane Central (n=168), KoreaMed and KMBase (n=198) databases through March 2019 to identify relevant RCTs. We conducted a systematic review and meta-analysis according to the Cochrane Collaboration guidelines. The primary outcome of interest was pain score change during daily life. Effects were summarized using standardized mean differences (SMD) compared to other therapies such as exercise, saline, platelet-rich plasma and steroid injection.

Results and Discussion: Ten RCTs involving 608 participants were included in qualitative and quantitative synthesis. The prolotherapy with dextrose compared to saline significantly reduced the pain score from 6 months to 1 year [SMD=-0.44 (-0.76,-0.11)] and compared to exercise [SMD=0.42 (0.17,0.67)]. However, dextrose injection did not showed significant difference compared to saline in randomized platelet-rich plasma [SMD=0.19 (-0.20,0.59)] and steroid injection [SMD=0.45 (-0.57,1.47)].

Conclusion: Overall, prolotherapy using dextrose provide a positive and significant beneficial effect in the treatment of chronic pain followed from 6 months to 1 year. There is an evidence of better therapeutic effect than exercise, and showed a corresponding effect over platelet-rich plasma or steroid injection. Adequately powered, longer-term trials with uniform end points are needed to better elucidate the efficacy of prolotherapy.

4619

Facial neuropathic pain: a successful clinical case with 8% capsaicin patch

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Background: Neuropathic pain is defined as a direct consequence of an injury or disease that affects the somatosensory system and may affect 7-10% of the world population. It is often described as disabling, chronic, difficult to treat and with a noticeable impact on patients’ quality of life.

Case Report: Female patient, 37 years old, is referred to the Chronic Pain consultation on after 5 years of medical follow-up with marked unsuccess of the therapy instituted for neuropathic pain. In the early beginning, the patient described a two-week history of left maxillary pain with progressive, constant worsening, with resolution after the applied therapy. The pain, however, remained to a vesicular rash in the left mandibular zone and upper left cervical platysma left hemifacial mimic muscles. Approximately one month after this clinical scenario, the NRS in Group B were higher than in Group A at 15, 30, 60 minutes and 7 days after each procedure. The SAT in Group A was higher than in Group B at 15, 30, 60 minutes and 7 days after each procedure. The SAT in Group A was higher than in Group B at 15, 30, 60 minutes and 7 days after each procedure. The NRS in Group B at 15, 30, 60 minutes and 7 days after each procedure. The pain was detected in Group A. The SAT in Group B and the NRS in Group A were higher than in Group B at 15, 30, 60 minutes and 7 days after each procedure. The SAT in Group A were higher than in Group B at 15, 30, 60 minutes and 7 days after each procedure.

Conclusion: We conclude that prolotherapy can be a good substitutes treatment or adjuvants for post neck pain management of disc or spinal stenosis disease with Disc Herniation traction®. Compared to a long period of pain, traction therapy with Disc Herniation® Immediate treatment was also instantaneous and effective. This allows effective early treatment and prevents the post neck pain of neuroaxial spine origin.

References:

4766

Different patterns of opioid interactions on oxidative-antioxidative balance in chronic non-cancer pain

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Background and Goal of Study: The oxidative - antioxidative balance is the crucial mechanism of opioid-induced immunomodulation. This phenomenon was clearly described in opioids abuse. This is interesting to evaluate the importance of this subject in chronic pain. The aim of the study was to investigate the oxidative - antioxidative homeostasis using serum total oxidative capacity (TOC) and total antioxidative capacity (TAC) tests in patients with chronic non-cancer pain treated with opioids.

Materials and Methods: The project was approved by Ethical Committee and supported by Medical University in Bialystok (Poland). The serum TOC and TAC measurements were performed in total group of 50 adult patients: Study Group - 36 patients with chronic Low-Back Pain with opioids pharmacotherapy and Control
Group - 14 patients, healthy volunteers. In Study Group anthropometric parameters, duration in opioid therapy, type of opioid, total dose, and form of application were registered. TOC and TAC measurements were performed using ImAnOx and PerOx tests (Immunoagnostik, Germany). Data were analyzed using non-parametric tests. Results and Discussion: The median TOC and TAC values in Study Group were 320 µmol/L and 260 µmol/L and in Control Group were 160 µmol/L and 310 µmol/L, respectively. In patients with buprenorphine and tramadol therapy TAC was significantly increased compared with oxycodone, (p<0.005), while TOC did not differ between these groups. In group of oxycodone pharmacotherapy TOC and TAC values correlated with age, (rho=0.6) and total daily dose, (rho=0.7). Opioids modulate the oxidative homeostasis and the effects are exerted through different mechanisms. The gradation of opioids-immunomodulation were described. The phenomenon of opioid-immunomodulation is not described in details in chronic opioid therapy. Conclusions: Tramadol and buprenorphine have the smallest activity in oxidative-antioxidative balance and this mechanism does not depend on anthropometric parameters. Oxycodone induces oxidative changes in oxidative-antioxidative homeostasis in elderly patients with high daily doses.

References:

5601
Case report: transcranial magnetic stimulation to control refractory central pain; with evaluation by the Qualitative Sensitive Test (QST)
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Background: Classified as a neuropathic pain, the central pain is usually caused by a structural injury of the central nervous system (CNS). It is considered one of the most complex and intriguing painful syndromes; its intensity varies from moderate to disabling. It demonstrates a mood change in 87% of cases and sleeping disorder in 50%. The Qualitative Sensory Testing (QST) evaluates small sensitive nerve fibers, in a controlled way, quantifying the threshold of sensitivity and pain; being a noninvasive method to access the sensory function. With a challenging diagnosis and difficult treatment, full control of the pain is improbable; aiming the balance between the best analgesia and maintenance of a desirable cognitive and functional ability.

Case Report: We report the case of a 59-year-old woman with central pain in left dimid after a stroke in 2016, presenting hypodense, cortical and subcortical region, right parieto-temporal, on CT scan. Accompanied by the neurology service and Pain Management Clinic of Hospital Universitario Pedro Ernesto (RJ). She received optimized pharmacological therapy, psychosocial and physiotherapy support; with no satisfying improvement of the pain and humor. Being proposed then a Repetitive Transcranial Magnetic Stimulation (RTMS), Protocol attack with ten sessions in three weeks and a maintenance monthly session; with evaluation by QST before and after the treatment.

Discussion: The difficulty of diagnosis of symptom quantification interfere in the treatment, presenting poor results in monotherapeutic approaches. The association of techniques with pain description suggests benefits for improving quality of life. Some previous studies demonstrate positive effect of RTMS in motor cortex to control the central pain after ischemic cerebrovascular accident, and the permanence of this effect for approximately 2-4 weeks. Hasan & cols (2014); Sañol & cols (2013); de Oliveira & cols (2014).

References:

Learning points: Central pain as a pain syndrome that is difficult to control and often disabling. Difficulty of measuring the pain (subjectivity). Frustrating treatment for both professional and patient.

4840
Severe atrophy of the ipsilateral psoas muscle associated with hip osteoarthritis
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Background: It is difficult to diagnosis the origin of lower leg pain in patients with both lumbar spinal stenosis and hip joint osteoarthritis. However, hip arthritis is usually an uncomplicated diagnosis by itself that should not be overlooked as this could lead to inappropriate spine surgery.

Case Report: We report a patient with lower leg pain who did not respond to spinal blocks, but in whom hip osteoarthritis was considered since severe atrophy of the ipsilateral psoas m. was identified on MRI. The patient was a 54-year-old female with chronic rt. anterior hip pain with radiation above the knee and mild back pain. Prior to visiting our clinic, she had been diagnosed multilevel lower lumbar degenerative changes, including a disc bulging and foraminal stenosis at L2-3, L3-4 and L4-5 on MRI, and received transforaminal epidural blocks. The blocks were not effective for her anterior hip pain, and so surgery was planned. But she refused to have surgery and visited our clinic. On physical examination, she showed a positive result for Patrick’s test. She was unable to extend fully her right hip joint to neutral because of reproducing the hip pain and a sensation of tightness. We had a clinical suspicion that her right hip pain had been caused by other problems, and so rechecked her MRI and were able to identify a severe atrophy of rt. psoas m. (Figure 1). And x-ray showed rt. hip joint osteoarthritis with narrowing of joint space. We performed US guided intra-articular injection of the rt. hip. Her pain was 70-80 % reduction after injection. But the limitation of range of motion of rt. hip joint was remained. After 1 week, the anterior hip pain aggravated gradually, and then the patient was referred to orthopedic surgery for consideration of hip joint arthroplasty.

Discussion: Weakness of the psoas m. related to compression of 2-4 spinal roots has been reported as a clinical feature of lumbar spinal stenosis. Report shows that in as many as 50% of elderly patients, MRI could give a false positive diagnosis of spinal stenosis.

References:

Learning points: It is necessary to have attention of excluding the presence of osteoarthrosis of the ipsilateral hip because degenerative disease of the hip also can be associated with reduction of strength in the psoas m.

5952
Long-term individual art therapy sessions in complex treatment of pain in patients with chronic migraine – a randomized controlled trial
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Background and Goal of Study: Art therapy aimed to treat the psychological aspects of chronic pain and reduce accompanying physical symptoms. [1] Chronic headaches are often identified with co-morbid conditions, worsening pain and influencing psychological aspects as well. [2] This study aims to evaluate the art therapy effectiveness in complex chronic migraine treatment.

Materials and Methods: The prospective randomized study included 80 patients with chronic migraine (CM), who attended the Pain clinic in Sep.2018-Aug.2019 and were divided into two groups (40patients each) by the sealed envelope method. Migraine was diagnosed using the International Classification of Headache Disorders criteria. Both groups received topiramate 100 mg/day during 12 weeks. The study group additionally completed art therapy individual sessions, 50 min each, occurring biweekly. Participants were invited to express their feeling for their pain experience by representing it visually. For all sessions, participants could work outside of any given theme or directive if they wished. They were assured that no previous art-making experience was required. During the session and upon completion of the art, patients were encouraged to discuss their art with the therapist as a means of processing. The treatment effectiveness was evaluated prior to and 12 weeks after the treatment by pain attacks frequency and severity with the Visual Analog Scale (VAS) and Pain Catastrophizing Scale (PCS).

Results and Discussion: The mean age was 30.2±9.1 and 27.5±8.4 in the study and control group, respectively. The majority of participants were women (36 and 32, respectively). At admission the VAS score was 6.3±1.9 and 5.7±1.6 points, respectively.
pain attack frequency was 6.7±2.0 and 6.2±1.9 days per month, total PCS score – 22.4±8.1 and 19.8±9.2 points in the study and control groups, respectively. After the 3-months treatment, VAS score was significantly lower in the study group (1.5±0.4) than in control group (2.7±0.7; p<0.05), as well as total PCS score (12.4±8.1; 15.7±1.0 respectively; p<0.05).

Conclusion: Art therapy may be a safe and cost effective intervention as an adjunct to traditional medical management in chronic migraine patients.

References:

5940

Prosopalgia As One Of The Syndromes Of Fibromyalgia

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Background: Fibromyalgia(FM) is one of the most persistent chronic pain syndromes and is common with a prevalence of 6% in the population. Patients with FM often go to doctors of various specialties and do not always receive proper therapy.

Case Report: Patient E., 43 years old, came to the Pain Clinic in September 2018 complaining of constant aching, pressing, bursting pain in the upper jaw and cheeks, articulation and chewing disorders, symmetrical pain in neck, shoulders and back, intensity of 7-8 points on the Visual Analogue Scale(VAS);night awakenings, tiredness in the mornings. The patient first contacted a neurologist in 2013 with complaints of severe pain in the right shoulder’s muscles and back. She received treatment: lidocaine blockades of trigger points, pregabalin 150 mg/day, injections of botulinum toxin type A (BTA)(Stroplasts) with a positive effect. In May 2016, after the right molar of the upper jaw extraction there was an aching pain in the right side of the face, and later intense (8-9 by VAS) throbbing pain in the face. From 2016 to 2018, the patient was consulted by neurologists, dentists, orthodontists, maxillofacial surgeons with the following diagnoses: chronic trigeminal neuralgia, myofascial facial pain syndrome, chronic subluxation of the lower jaw heads,somatoform disorder. She regularly received treatment with a change of methods: orthopedic correction with a relaxing mouth guard, constant wearing of a corrective mouth guard to position the jaw, analgesics, anticonvulsants, tricyclic antidepressants in short courses, BTA, alternative medicine. Nevertheless, pain syndrome persisted and significantly impaired the patient’s quality of life.Objectively no data for focal neurological pathology were identified.In the pain clinic patient was diagnosed with fibromyalgia, bilateral myofascial facial pain syndrome. Dolutexine 60 mg/day for 6 months, clonazepam 0.5 mg/night for 2 weeks,a course of relexofomy were prescribed. After 2 months of treatment pain decreased to 4 points, and after 6 months to 2 points according to VAS, mood and sleep returned to normal.

Discussion and learning points: The presented clinical case demonstrates a lack of awareness among specialists of various specialties about the possible variants of the course of FM.

References:

5932

Accupuncture analgesia in chronic pelvic pain treatment

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Background and Goal of Study: Chronic pain affecting the pelvic and urogenital area is a major clinical problem with heterogeneous etiology, affecting both male and female patients and severely compromising quality of life. [1] Concerning the pharmacological treatment it is associated with adverse events as well as delayed effect due to dose titration. This indicates the need of complex pathogenic treatment plan organization to help patients in short terms. [2] The goal of study is to evaluate the effectiveness of acupuncture analgesia in patients with chronic pelvic pain.

Materials and Methods: A randomized double-blinded placebo-controlled study, approved by local Institution Review Board, involved 58 patients with chronic pelvic pain, who attended the Pain clinic in Sept. 2018 – Sept. 2019 and were randomized into two comparable groups (29 patients each) by the sealed envelope method. The study group completed a classic acupuncture treatment course (15 sessions every other day), the control – a sham-acupuncture course using the same characteristics but with needles placed not deep enough. The treatment effectiveness criteria included pain severity by visual analogue scale (VAS), the pain attack frequency and duration, evaluated prior to and 3 months after treatment. The data was analyzed with IBM SPSS Statistics and MS Excel software.

Results and Discussion: The majority of participants were women (21 and 18, respectively). The mean age was 35.4±8.2 and 29.1±9.3 in the study and control group, respectively. At admission the VAS score was 7.2±0.9 and 6.9±1.2 points, pain attack frequency was 6.1±1.8 and 6.5±2.1 days per month with its duration 18.8±5.4 and 16.6±3.1 hours in the study and control groups, respectively. After the 3-months treatment pain severity decreased to 1.9±0.5 points in the study group, whereas in the control group it was statistically significantly higher (p<0.05) – 4.8±0.9 VAS points. The pain attack frequency was also significantly lower in the study group than in control (2.5±0.4 and 6.1±1.2 attacks; p<0.05) as well as its duration (6.7±1.3 and 14.7±4.9 hours; p<0.05).

Conclusion: Classical acupuncture in chronic pelvic pain treatment helps to reduce the severity, frequency and duration of pain attacks.

References:
Intrathecal vs intravenous morphine chloride for postoperative analgesia after hysterectomy with adnexectomy

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Background and Goal of Study: The efficient pain control after surgery leads to the earlier mobilization of patients and their faster recovery, thus leading to shorter hospitalization and lower treatment expenses. The aim of this study was to compare the effects of intrathecal and intravenous administration of morphine chloride after hysterectomy with adnexectomy.

Materials and Methods: This prospective, randomized study consisted of 50 patients (≥18 years, ASA I/II) who were to undergo hysterectomy with adnexectomy. They were divided into two groups of 25 each. The group T patients were given the combination of 0.3 mg of morphine chloride with 1.7 ml of 0.5% levobupivacaine intrathecal, immediately before the surgery, whereas the group V patients were administered 5 mg of morphine chloride intravenous before the end of surgery and after the surgery at certain time intervals. The postoperative pain was assessed by Numeric Rating Scale (NRS) at 1, 6, 12 and 24 hours. Side effects, such as nausea, vomiting, itching and respiratory depressions were followed as well. All patients had urinary catheter so we could not follow urinary retention. In addition, the patients were asked to keep records of their subjective feeling of satisfaction with analgesia.

Results and Discussion: There were no statistically significant differences in age, body weight, ASA classification and the length of surgery between the group T and the group V. The postoperative pain was less pronounced in group T at all assessment intervals (p=0.001) and consequently the additional need for analgesia 1h after the end of surgery was less in that group (p<0.001). There was no statistically significant difference in the incidence of nausea and vomiting. No patients complained of itching and there was no respiratory depression. The subjective feeling of satisfaction with postoperative analgesia was statistically significant in group T (p=0.001).

Conclusion: Intrathecal administration of morphine chloride combined with levobupivacaine ensures better postoperative analgesia after hysterectomy than intravenous morphine chloride, their side effects being equally frequent.

Implementation of opioid-free anesthesia during abdominal surgery: a retrospective study

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Background and Goal of Study: Opioids are potent analgesics but they have been linked to periperaoperative morbidity (e.g., post-operative nausea, paralytic ileus, respiratory insufficiency, and death). Opioid free anesthesia has shown potential in increasing perioperative comfort most notably by decreasing postoperative nausea and vomiting. Anesthesiologists in our institution thus decided to progressively switch from an opioid based to an opioid free analgesic strategy during abdominal surgery. The aim of this study was to examine the amount of prescribed drugs during the three main periods of this transition (i.e., opioid-based anesthesia (OBA), opioid-reduced anesthesia (ORA), and opioid free anesthesia (OFA).

Materials and Methods: This retrospective study was approved by the French National Ethics Committee. Three periods were studied: OBA (2011-2012), ORA (2014-2015), and OFA (2017-2018). Single year trinomials were selected each period. The amount of vials per patient of administered drugs was calculated by six month period. Groups were compared using student t-test.

Results and Discussion: There were no statistically significant differences in the number of studied patients during the three main periods of this transition (i.e., opioid-based anesthesia (OBA), opioid-reduced anesthesia (ORA), and opioid free anesthesia (OFA)). Postoperatively both morphine and antiemetic prescription significantly decreased during OFA. The amount of morphine required per patient decreased from 2 vials during OBA to less than 0.3 vials (p=0.0001) under OFA (Figure 1).

Conclusion: Opioid free anesthesia was associated with decreased postoperative morphine use and antiemetic requirements.

High therapeutic buprenorphine levels reduce IV fentanyl respiratory depression

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Background and Goal of Study: Previous studies indicate that plasma concentrations of the partial mu opioid receptor agonist buprenorphine ≥2 ng/mL achieve 70% brain mu-opioid receptor occupancy and block the subjective drug-liking effect of full opioid agonists (1). This study examined the effects of sustained intravenous buprenorphine concentrations on respiratory depression induced by intravenous (IV) fentanyl injection.

Materials and Methods: Eight opioid-tolerant patients using >90 mg daily morphine equivalents completed this open-label crossover study. Patients received placebo/ fentanyl (PLC) and buprenorphine/fentanyl (BUP). Ventilation was measured at isohypercapnia (baseline minute volume (MV) ~20 L/min), followed by pulsed-continuous infusions of placebo or buprenorphine (targeted plasma concentrations of 1 (n=2), 2 (n=3) or 5 ng/mL (n=3)) for 6 h. Subsequently, IV fentanyl boluses of 250, 350, 500 and 700 mcg/70 kg were administered. Drug effects were measured as a decrease in MV, number/duration of apneic events (lasting >20 seconds), need for ventilatory stimulation and changes in oxygen saturation.

Results and Discussion: During the PLC period, abrupt declines in MV were evident following each fentanyl bolus and 6 of 8 patients (75%) experienced 1 or more apneic events requiring verbal ventilatory stimulation to maintain adequate MV. With BUP, none of the patients required verbal stimulation and oxygen saturation did not drop below 90%. For the high-dose BUP infusion targeting 5 ng/mL, marked changes in MV did not occur after the fentanyl infusions, and repeated apneic events did not occur.

Conclusion: These data suggest that buprenorphine acts as a competitive inhibitor of fentanyl boluses at doses up to 700 mcg/70 kg. This competitive inhibition reduces the magnitude of fentanyl-induced respiratory depression, most notably at buprenorphine concentrations ≥2 and 5 ng/mL. Although this is a small patient sample, the potential protective effect of ≥2 ng/mL and 5 ng/mL plasma concentrations against fentanyl-induced respiratory depression warrants additional investigation.

The Network of Formulæ and Crude Drugs Follows the Power Law and Has Scale Freeness in the Japanese Herbal Medicine System

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Background: Japanese herbal medicine system is a representative alternative complement therapy and is widely used not only in pain treatment and perioperative management but also in clinical practice. The network of the formulae and crude drugs has been formed by sorting out a large number of crude drug over a period of about 1500 years. It consists of about 150 formulæ. Each formulæ consists of two to dozens of crude drugs. However, the network of the combination of formulæ and crude drugs is not known. In this study, we mathematically investigated whether the network of the formulæ and crude drugs fits the power law.

Methods: We targeted 118 crude drugs that constitute 148 formulæ of Japanese herbal medicine. The number of times each crude drug is selected as formulæ is totaled according to herbal medicine, and the number of selections (Y) is plotted on the vertical axis, and the rank of crude drugs sorted by number of selections (X) is plotted on the horizontal axis. This was graphed into a double logarithm graph, and its linearity was examined using regression analysis.

Results: The highly linked nodes (hub) considered to be the head part were licorice (94 formulæ), ginger (51 formulæ), agate (46 formulæ), a glaze (44 formulæ), and cinnamon (39 formulæ). In the long tail, 18 crude drugs selected in 2 formulæ and 34 crude drugs selected only in one formulæ were located. In the double-logarithm plot, the regression function was logY = 2.622-1.234 logX. The power exponent was 1.234 ± 0.33. The adjusted degree of freedom determination coefficient was 0.912, p < 0.0001, and the fitness was significant. This connectivity shows that this network has topology consistent with scale-free networks.

Conclusion: This result indicates that the network of the formulæ and crude drugs has scale freeness in the Japanese herbal medicine system. This connectivity shows that this network has topology consistent with scale-free networks. Scale-free means system redundancy and robustness. The conditions for the power law to appear include (1) continuous input and growth into the system, and (2) accumulation of strengths and preferential selection within the interior. Japanese herbal medicine is the result of a trade-off based on prior choices at the clinical site in the past. It may achieve further adaptation and evolution in the future.

Can medical hypnosis or Virtual Reality Glasses reduce the amount of additional analgesodatives needed to alleviate pain and anxiety in patients undergoing medical procedures?

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Background and Goal of Study: Patients undergoing medical procedures benefit from distraction techniques to reduce the need for drugs alleviating pain and anxiety. Aim of this study to investigate if medical hypnosis or virtual reality glasses (VR glasses) as adjuvant method reduces the need for additional drugs.

Materials and Methods: In a prospective, randomised, interventional trial, after getting informed consent, patients undergoing procedures were stratified in four age groups, and randomly assigned into three arms by means of a closed envelope system. All patients received standard care for pain before the procedure; the control group received further drugs for pain and stress as indicated by the Visual Analog Scale (VAS; threshold 3/10) and ComfortScore (threshold 14/30), two index groups received either medical hypnosis or VR glasses as a plus before and during the procedure. VAS and Comfort were scored continuously during procedures and analysed with the Kruskal-Wallis Test. Patients, parents and healthcare providers scored their satisfaction at the end.

Results and Discussion: Of 104 included patients 6 to 86 years old, 47% were female. Regardless of the age, pain and comfort scores were similar before and at the start of the procedure (VAS 3.7±4.2; Comfort 16-16.7), but as of 1 minute after starting the procedure, both VAS and ComfortScore reduced significantly more in both index groups compared to the control (p<0.001), remaining far below the three past parameters of pain and stress. There was no significant difference between the other (p>0.43). There were no adverse effects. Patients in the VR group were more satisfied than in the standard group (p=0.02) or in the hypnosis group (p=0.04). There was no significant difference in the satisfaction of parents or healthcare providers.

Conclusion: From the very start of the intervention, the application of either medical hypnosis or VR glasses significantly reduces pain and anxiety in patients undergoing medical procedures. More studies are needed but both are promising safe adjuvant tools to standard pharmacological treatment.

References:

Opioid free anaesthesia (OFA) versus balanced anaesthesia: impact on early and late postoperative outcomes after knee arthroplasty

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Background and Goal of Study: Opioid free anaesthesia (OFA) has gained in popularity. Whether OFA feasibility and safety have been shown, benefits remain to be established (1). We here assessed whether OFA compared to balanced anaesthesia affected early and late outcomes after major orthopaedic joint surgery.

Materials and Methods: After IRB approval, retrospective analysis (January 2017-December 2018) of medical records of patients included in an enhanced recovery programme who underwent knee arthroplasty by a single surgeon was performed. Preoperative and postoperative management were standardized. All patients received general anaesthesia and LIA. Records of 102 OFA patients were matched with 99 patients who received intraoperative balanced anaesthesia. Postoperative opioid consumption in PACU and from day1 to day4, adverse events, pain and functional outcome using the Forgotten Joint Score (2) at 3 and 12 months after surgery were recorded. Statistics used unpaired t-test and Fisher exact test, P<0.05 was significant.

Results and Discussion: Demographic data did not differ (age, BMI, gender, preoperative pain scores and opioid intake). Intraoperative ketamine was 0.8mg/kg (IQR 0.7-1.0) vs 0.4mg/kg (IQR 0.3-0.5), clonidine 150µg (IQR 75-150) vs 0µg (IQR 0-60) respectively in OFA and balanced anaesthesia groups (p<0.001). Average sufentanil dose was 7.5 to 20µg in balanced anaesthesia group. OFA patients had less pain at PACU arrival (p<0.001). PACU morphine dose was similar between groups but OFA patients had significantly less episodes of desaturation (p=0.0059).

Confusion, urinary retention, nausea and vomiting were lower in OFA group (n.s.). OFA patients used significantly less postoperative oral morphine, specifically at day2 and day3 (p=0.01). At 3 and 12 months, functional outcome (FJS), knee pain at mobilization and at night did not differ between groups.

Conclusion: Compared with balanced anaesthesia, OFA use in patients undergoing knee arthroplasty with enhanced recovery programme only demonstrated early benefits in term of pain and opioid sparing effects. Later functional outcomes and knee pain at 3 and 12 months were not improved.

References:

Detecting hyperventilation on the hospital floor using respiratory volume monitoring and pulse oximetry

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Background and Goal of Study: Pulse oximetry is used to assess respiratory status but does not directly measure ventilation, leading to delayed response. Supplemental O2 can further delay detection of respiratory compromise by masking effects of hypoventilation. We used respiratory volume monitoring (RVM) and pulse oximetry to detect hyperventilation and desaturation following abdominal surgery.

Materials and Methods: This observational study monitored minute ventilation (MV) (ExSpiron 1X), Respiratory Motion, Watertown, MA) and SpO2 (VisiModal, Sotera, San Diego, CA) in the post anaesthesia care unit (PACU) and up to 48 h on the general hospital floor (GHF). Low minute ventilation events (LMEs) were defined as MV< 40% predicted MV for ≥ 2 min and desaturation events (DSe) as SpO2 < 90% for ≥ 5 min. Patients with ≥ 1 LMEs in the last 1 h of PACU were identified as At Risk. MV, SpO2 and % of patients with LMEs and DSe were quantified for each hour on the GHF. Statistical comparisons were performed with mixed effects models.
Low-level light therapy (LLLT) reduces the heat pain threshold in a human pain model, a sign for the modulating of the peripheral sensitization. A promising tool in pain management

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Background and Goal of Study: Low-level light therapy (LLLT) is an effective analgetic treatment, although the mechanism of action by which LLLT relieves pain is not yet finally clarified. An unanswered question is, in particular, whether peripheral or central mechanisms contribute to the analgetic effect of LLLT. This study aimed to evaluate the effect of LLLT on primary hyperalgesia as an indication for a peripheral mechanism in a human pain model with a view to a possible non-pharmacological analgetic therapy method.

Materials and Methods: In a randomized controlled double-blinded trial with 10 healthy volunteers, a 3cm x 3cm cutaneous capsaicin patch 8% (Quilenza, Grünenthal, Aachen, Germany) with 640 micrograms of capsaicin per cm² (corresponding to 5.76mg of capsaicin in total) was applied in the middle of both distal forearms of the test persons to produce a neurogenic inflammation. One of the two forearms was irradiated with pulsating, cold red light of 660 nm wavelength (RepulS7, Repuls Lichtmedizintechnik GmbH, Vienna, Austria) for 12 minutes. The second arm received no irradiation and served as control area. Immediately after the one-sided LLLT application heat pain threshold (HPT) was assessed on both, the LLLT-irradiated and the non-treated forearm (=control), exactly positioned in the area of the capsaicin patch. It was evaluated using the TSA-II Quantitative NeuroSensory Analyzer (Medoc Ltd., Ramat Yishai, Israel) with a 30x30mm thermode.

Results: The comparison of the LLLT treated side vs. the no-treatment side for every single patient is presented in figures 1. The effect size was 1.54 (95% CI: 0.544-2.541) for HPT.

Conclusion: The data presented in this study, indicates that LLLT using red LED light has a significant modulating effect on the peripheral sensitization, gaining a better understanding of the underlying action mechanisms, although there is lack of information about the central effect and a possible modulation of the central sensitization. Effective at reducing the heat pain threshold in a human pain model, the results point to a promisingly therapeutic modality in the treatment of acute pain.
nerve territory contribution). The patient developed progressive myofascial lower back pain probably due to persistent long-term neuropathic pain. We were able to distinguish the different pain etiologies and act accordingly.

References:

Learning points: Persistent postoperative pain can be complex and of multifactorial etiology. It usually has a neuropathic component and therapeutic strategies are similar to those used to treat neuropathic pain. Capsaicin skin patch may be a useful weapon in the treatment of postoperative neuropathic pain.

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Dexamethasone administration reduces the frequency of analgesic use in the first 24 hours after laparoscopic cholecystectomy

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Background and Goal of Study: A common complaint who underwent surgery is postoperative pain, which causes prolonged hospital stay and lead to postoperative ileus, nausea, vomiting, and urinary retention, thus increasing morbidity. We usually administrate single perioperative dose of dexamethasone to patients in laparoscopic cholecystectomy in order to prevent postoperative nausea and vomiting (PONV). At the same time, corticosteroid is known to decrease inflammation and may provide postoperative analgesia. In this study, we evaluate the efficacy of dexamethasone in decreasing the frequency of analgesic use after laparoscopic cholecystectomy.

Materials and Methods: This study was a single-center retrospective observational study conducted from May 2019 to October 2019. All patients who underwent elective laparoscopic cholecystectomy under general anesthesia were included (n = 108). Patients with diabetes mellitus and patients who had been received steroid before surgery were excluded. Patients were divided into two groups according to the use of dexamethasone during surgery. The dose of dexamethasone administrated during surgery were between 3.3 – 6.6 mg. Postoperative pain intensity was assessed using a 0 – 10 numerical rating scale (NRS). The primary outcome was the frequency of analgesic use during the first 24 hours after surgery. The secondary outcome was the maximum of NRS during the first 24 hours after surgery. Univariate analysis was performed using t-test and Chi-square test. Linear regressions were performed to analyze the relationships between variables (age, sex, and dexamethasone administration) and the intensity of postoperative pain.

Results and Discussion: A total of 88 patients were included in the analysis. There were no significant differences between the groups in age, the frequency of analgesic use, and the maximum of NRS, except the sex (p = 0.008) with t-test and Chi-square test. However, the frequency of analgesic use during the first 24 hours after surgery in dexamethasone given group was lower than the non-dexamethasone group (95% CI 0.010 – 1.511, p = 0.047), and the maximum of NRS was not (95% CI -0.573 – 1.569, p = 0.358) with linear regression analysis.

Conclusion: Our study suggests that dexamethasone administration during surgery is associated with the decrease in the frequency of analgesic use during the first 24 hours after laparoscopic cholecystectomy.

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Evaluation of oral use of dexketoprofen/tramadol in acute postoperative pain in patients undergoing total hip replacement with a minimally invasive anterior approach (amis)

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Background and Goal of Study: Pain is a global public health issue and represents the most common reason for both physician consultation and hospital admissions . When unreplied or poorly controlled, it is associated with medical complications, poor patient satisfaction and increased risk of developing chronic pain. Dexketoprofen is a new NSAID treating acute postoperative pain when it combined with tramadol may have a better effect. The purpose of this study is to evaluate the analgesic effect of the oral use of the combination of dexketoprofen/tramadol on the reduction of postoperative pain after total hip arthroplasty with minimal invasive anterior approach (AMIS).

Materials and Methods: This prospective, randomized study included 126 patients, with a mean age 67.6 years, who underwent AMIS total hip arthroplasty. All patients were under spinal anesthesia and all patients were given intracuticular injection with a dilution of 100mL N/S 0.9% with 300mg ropivacaine and 0.5mg epinephrine. Population study was divided into 2 groups: Group A (n = 58) was given dexketoprofen/tramadole (25mg/75mg) 2h after surgery every 8h for 72h and Group B (n = 68) was given 2h after surgery pethidine IM 50mg and paracetamol 1g every 6h. Pain intensity (VAS score) and analgesic consumption were evaluated within the first 72 hours after surgery for all participants in the study.

Results and Discussion: There were no statistically significant differences between the two groups, with respect to age, sex, BMI, ASA score and surgical duration (p > 0.05). Pain intensity in group A was significantly lower than group B at 8,24,48,72 hours post-operative (p-value <0.05). For the first 24 hours after surgery, analgesic consumption in group A was significantly lower than group B (p-value = 0.001).

Conclusion: Fixed-dose combination of dexketoprofen (25 mg) and tramadol (75 mg) provides a comprehensive multimodal approach for moderate to severe acute pain in patients undergoing unilateral total hip arthroplasty AMIS. Thanks to central analgesic effect, peripheral analgesic action and anti-inflammatory activity. Together with an effective analgesic efficacy, the combination shows a good tolerability profile.

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The effect of Patient Controlled Analgesia containing opioid with and without basal infusion on postoperative pain, Nausea and Vomiting

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Background and Goal of Study: Studies comparing the efficacy of PCA with and without a basal infusion for postoperative analgesia vary considerably in terms of doses and dosing methodology, making it difficult for practitioners to derive clinically useful information. The purpose of this study was to assess whether the addition of a basal infusion to PCA bolus administration of an opioid analgesic is more effective (defined as lower pain scores) than PCA bolus alone in the patients underwent gynecologic surgery.

Materials and Methods: Sixty patients aged 20-60 undergoing gynecologic surgery were randomly to receive postoperative i.v. fentanyl by a patient-controlled analgesia system (bolus dose 1 ml with a lockout interval of 15 min) (experimental group) or the same PCA with a basal infusion of 2 ml (control group) for 48 hours postoperatively. Pain intensity with visual analogue scale (VAS) at 1h, 24h and 48h after surgery, postoperative nausea and vomiting, nurses and patients' satisfaction.

Results and Discussion: There were no significant differences in the pain scores of the two groups. POVN in experimental group was significantly less than control group (P = 0.02), however rescue antiemetic administered was not significant between two group. Nurses' satisfaction in experimental group was significantly higher than control group. (P = 0.028). Patients satisfaction was negatively associated with postoperative 48 h pain VAS (r = -0.38, P = 0.004) and Nurses' satisfaction was positively associated with patients' POVN (r = -0.27, P = 0.034).

Conclusion: Experimental group with patients with PCA+basal infusion suffered more POVN. Because nurses' satisfaction was positively associated with patients' POVN, PCA without basal infusion is recommend to enhance nurses' satisfaction and appropriate patient analgesia without side effect.

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Prediction of early pain score at the post-anesthesia care unit with heart rate variability by the end of surgery

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Background and Goal of Study: Postoperative pain is highly subjective and distressful, and it imposes adverse effects on multi-systems. To facilitate early intervention and improve pain management, establishing a prediction model of postoperative pain severity would be helpful. Heart rate variability(HRV) is an indirect measure of autonomic nervous system activities that has been used as an indicator of anti-nociception/nociception balance under sedation. Our goal is to predict the pain scores after surgery so we can better perform the pain management in the early recovery stage.

Materials and Methods: Our study protocol was approved by the Institutional Review Boards of the Chi Mei Medical Center on March 26, 2018 (IRB serial 4556).
number: 10703-005. We conducted an observational study that enrolled 80 patients scheduled for gynecological surgeries under general anesthesia. Of all, 28 patients received traditional surgery and the others received laparoscopic surgery. All the participants were ASA class 1 to 3 without using drugs affecting HRV. Blood pressure (BP), electrocardiography (ECG) and other physiological signals were collected across the perioperative period. After patients were sent to the post-anesthesia care unit (PACU), the numeric rating scale (NRS) was recorded within 5 minutes upon arrival for evaluation of the pain severity in the early recovery phase. Offline we extracted 10-minute data during the wound-closure period. Time-domain and frequency-domain analyses of HRV were done using Matlab software. Then we compared results between different surgical types and generated a linear regression model for prediction of the NRS in the early recovery phase.

Results and Discussion: There were significant differences in blood pressure, low-frequency power spectrum (LF) of HRV, very low-frequency power spectrum (VLF) of HRV between the laparoscopic group and the traditional group, and this indicated higher sympathetic activities in patients of the traditional group near the end of surgery. However, there were no differences in heart rate, surgical pleth index, opioid consumption between groups. After adjustment for systolic blood pressure (SBP) and surgical type, we could predict the NRS on the arrival of PACU. NRS=0.371*VLF-0.171*Lapa-0.021*SBP (Lapa: 1 for laparoscopy surgery, 0 for traditional surgery)

Conclusion: VLF of HRV in the wound-closing period could predict the NRS on the arrival of PACU after adjustment for surgical type and SBP.

Pre-emptive and preventive NSAIDs for postoperative pain in adults undergoing all types of surgery: a Cochrane review

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Background and Goal of Study: Postoperative pain is a common consequence of surgery and pre-emptive or preventive analgesia has been suggested to help reduce this. We have previously demonstrated little efficacy for preventive opioids [1]. This review aimed to assess whether NSAIDs have a pre-emptive or preventive effect in all types of surgery.

Materials and Methods: We included 67 randomised controlled trials. Pre-emptive NSAIDs reduced early pain (MD -0.68, 95% CI -0.97 to -0.39; moderate quality) and 24-hour morphine consumption (MD -5.62mg, 95% CI -9.00mg to -2.24mg; low quality). However, there were no differences in heart rate, surgical pleth index, opioid consumption between groups. After adjustment for systolic blood pressure (SBP) and surgical type, we could predict the NRS on the arrival of PACU. NRS=0.371*VLF-0.171*Lapa-0.021*SBP (Lapa: 1 for laparoscopy surgery, 0 for traditional surgery)

Conclusion: VLF of HRV in the wound-closing period could predict the NRS on the arrival of PACU after adjustment for surgical type and SBP.

Efficacy and safety of interventions to prevent acute and chronic postoperative pain following breast surgery: a systematic review with meta-analyses and trial-sequential analyses

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Background and Goal of Study: Breast surgery is a common surgical procedure, often followed by the emergence of chronic pain. This systematic review compares the efficacy and safety of different interventions to prevent acute and chronic pain after breast surgery.

Materials and Methods: We searched in Pubmed, Medline, Embase, Google Scholar and the Cochrane Library for all RCTs (randomised controlled trials) comparing the prophylactic use of pharmacological or regional anaesthesia interventions to placebo or standard care in the setting of breast surgery. We excluded studies including other types of surgery. Primary outcome was pain intensity up to 6h postoperatively. Secondary outcomes were morphine consumption at 24h, postoperative nausea and vomiting (PONV) and chronic pain 3 to 12 months postoperatively. Random-effects meta-analyses and trial sequential analyses were performed when at least 3 studies were identified for an intervention.

Results and Discussion: We included 73 trials. The overall quality of evidence was rated low to high according to GRADE guidelines. Paravertebral blocks, PECs (pectoralis nerve) and serratus plane blocks, glucocorticoids, intravenous lidocaine, alpha2-agonists and gabapentinoids reduced pain up to 6h postoperatively, whereas local anaesthetic infiltration and NMDA antagonists had no clinically useful impact on pain reduction at 6h postoperatively. PECs and serratus blocks and gabapentinoids reduced morphine consumption at 24h, and paravertebral blocks and glucocorticoids reduced risk of PONV. No conclusive evidence was found regarding chronic pain. Only limited and non-conclusive safety data were found.

An investigation of factors associated with postoperative pain trajectories and morphine consumption after hepatic cancer surgery

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Background and Goal of Study: Suboptimal pain control after hepatic cancer surgery is an important issue in clinical practice. This retrospective study aimed to investigate the influential factors of postoperative (post-op) pain trajectories and morphine consumption in patient undergoing hepatic cancer surgery and intravenous patient-controlled analgesia (IVPCA) with particular interest in multimodal analgesic regimens.

Materials and Methods: Patients with hepatic cancer receiving tumor resection and morphine consumption in patient undergoing hepatic cancer surgery and intravenous patient-controlled analgesia (IVPCA) with particular interest in multimodal analgesic regimens.

Results and Discussion: We included 73 trials. The overall quality of evidence was rated low to high according to GRADE guidelines. Paravertebral blocks, PECs (pectoralis nerve) and serratus plane blocks, glucocorticoids, intravenous lidocaine, alpha2-agonists and gabapentinoids reduced pain up to 6h postoperatively, whereas local anaesthetic infiltration and NMDA antagonists had no clinically useful impact on pain reduction at 6h postoperatively. PECs and serratus blocks and gabapentinoids reduced morphine consumption at 24h, and paravertebral blocks and glucocorticoids reduced risk of PONV. No conclusive evidence was found regarding chronic pain. Only limited and non-conclusive safety data were found.
The effect of preoperative pregabalin on persistent chronic pain after cardiac surgery

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Background and Goal of Study: This study investigated the effect of preoperatively administered pregabalin (1) on chronic pain after elective cardiac surgery (2).

Materials and Methods: This prospective-double-blind study included 123 consecutive patients, who were randomly assigned into three groups (Placebo group (P), Oral pregabalin 75 mg group (OP 75), Oral pregabalin 150 mg group (OP 150)). Patients were assessed postoperatively (12 months and 24 months) regarding the presence of persistent chronic pain (Numeric Rating Scale, NRS) and any potential sleep disturbances (Pittsburg Sleep Quality Index, PSQI). Statistical analysis was performed by using IBM, SPSS statistics, version 22.

Results and Discussion: Patients receiving pregabalin reported lower pain scores (NRS) 12 months (4 in (P group), versus 3 in (OP 75 group), versus 3 in (OP 150 group), p-value = 0.001) and 24 months postoperatively (3 in (P group), versus 2 in (OP 75 group), versus 2 in (OP 150 group), p-value = 0.000). Of note, at 12 months patients on both groups (OP 75 and OP 150) reported lower daily intake of analgesics (30/41 in (P group) versus 19/41 in (OP 75 group) versus 12/41 in (OP 150 group), p = 0.000) and fewer sleep disturbances (20/41 in (P group) versus 9/41 in (OP 75 group) versus 5/41 in (OP 150 group), p = 0.000) respectively. At 24 months the daily intake of analgesics (28/41 in (P group) versus 17/41 in (OP 75 group) versus 11/41 in (OP 150 group), p = 0.000) and the sleep disturbances (18/41 in (P group) versus 7/41 in (OP 75 group) versus 4/41 in (OP 150 group), p = 0.000) were still lower in both groups.

Conclusions: It seems that the preoperative administration of pregabalin, at the dose of 75 mg or 150 mg, in patients undergoing cardiac surgery, results in lower pain scores, lower daily intake of analgesics and fewer sleep disturbances at 12months and 24 months postoperatively.

References:

A TREP channel family activator with well-defined structure-channel activation relationship for polyiodomal pain

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Background and Goal of Study: Two-pore-domain (K2P) potassium channels possess four transmembrane helices (M1-M4) with two-pore domains (P1 and P2). K2P channels generate background K+ leak currents, and are involved in the regulation of excitability in neurons. TWIK-related K+ channel (TREP) is a subfamily of K2P, including TREK-1, TREK-2, TWIK-related arachidonic acid-stimulated K+ channel (TRAK). The TREP subfamily channels share >76% sequence homology and some common activation mechanisms. Recent studies suggest that TREP subfamily is potential analgesic target. However, selective activators of TREP subfamily with both clear action mechanism and in vivo analgesic activity for chronic pain have been lacking.

Materials and Methods: We performed the in-house experimental screenings to identify a small molecular C3001a. Computational analysis and site directed mutagenesis were used to determine the binding modes of C3001a to TREP subfamily channels. The whole-cell patch-clamp electrophysiology in HEK-293T and isolated dorsal root ganglia (DRG) neurons was used to identify the effect of C3001a on TREK subfamily. In a neuropathic pain model of spared nerve injury and the chronic inflammation pain model induced by complete Freund’s adjuvant, the analgesic effects of C3001a on thermal and mechanical allodynia were evaluated in mice.

Results and Discussion: C3001a selectively and efficaciously activated TREK-1 and TREK-2 channels. The whole-cell patch-clamp electrophysiology in HEK-293T and isolated dorsal root ganglia (DRG) neurons was used to identify the effect of C3001a on TREK subfamily. In a neuropathic pain model of spared nerve injury and the chronic inflammation pain model induced by complete Freund’s adjuvant, the analgesic effects of C3001a on thermal and mechanical allodynia were evaluated in mice.

Conclusion: This study reports C3001a as a selective activator of TREP channels. C3001a represents a lead compound with well-defined structure-function relationship, which could advance the rational design of peripherally-acting analgesics targeting K2P channels without opioid-like adverse effects.

Co-analgesics and opioid-sparing effect in parathyroid surgery

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Background and Goal of Study: The majority of cases of primary hyperparathyreosis (PHPT) due to solitary adenoma and require the target surgery. Research of new anaesthesia/analgesia methods, which afford to have an opioid-sparing effect, is going. The Goal: Assessment of using combine method anaesthesia with co-analgesics on the intra- and post-op opioid requirement in parathyroidectomy patients.

Materials and Methods: 124 patients with PHPT were divided into 3 groups: the group STI-BCSPB (n=26) was used combined general anesthesia (GA) with sevoflurane (SEV), the tracheal intubation (TI) with the myorelaxant introduction (LM) and BCSPB. In both groups (STI-BCSPB and PLM-BCSPB) were used co-analgesics, such as dexamethasone (DXM) 8 mg IV, 2% lidocaine (L) 1,0-1,5 mg/kg IV, metamizole (M) or paracetamol (P) 1 g IV, dexketoprofen (DKTP) 50 mg IV, as pre-emptive analgesia 30 min before surgery. Ketamine 25 mg IV was used for induction anaesthesia in these groups: STI group only opioid with P were used for induction of GA. Duration of surgery (DoS), anaesthesia (DoA), opioid consumption, time from the operation ending until the eyes opening (EyOp), desaturation were measured. All data M±σ.

Results and Discussion: DoS for STI, STI-BCSPB and PLM-BCSPB was respectively 37.8±13.9, 38.2±14.4 and 35.6±12.6 min (NS), DoA was respectively 59.4±17.3, 63.8±18.5 and 48.1±16.5 min (p=0.028 STI vs PLM-BCSPB, p=0.024 STI-BCSPB vs PLM-BCSPB, the difference is significant (DS)). EyOp was 15.4±3.6, 15.6±4.0 and 11.2±2.6 min respectively for STI, STI-BCSPB and PLM-BCSPB.
Endoscopic surgery is associated with lower incidence of chronic postsurgical pain: a nationwide population-based study in Taiwan

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Background and Goal of Study: Chronic post-surgical pain (CPSP) impairs patients’ long-term quality of life and causes significant economic burden. However, compared to acute postoperative pain, CPSP is often neglected by clinicians. Most studies on CPSP have collected data in a single institution with a limited number of patients which provide limited power. The reported incidences of CPSP varies between studies and ethnic variation also makes generalization of aforementioned studies to the population in Taiwan not feasible. Thus, we aim to investigate the epidemiology of CPSP in Taiwan and to determine the association between different surgical procedures and its incidence.

Materials and Methods: The data was collected from Longitudinal Health Insurance Database (LHID), a sub-dataset of the National Health Research Database (NHIRD) in Taiwan, which contains claim-data of 2 million randomly selected beneficiaries. In-patients who underwent surgery with general anesthesia was identified using the ICD-9-CM code. Prescriptions after operation in-out patient clinics was traced. We evaluated the incidence of prolonged post-operative opioid use more than 3 months and accordingly the incidence of severe CPSP. We compared the incidences for traditional and endoscopic surgery, including thoracoscopy and laparoscopy, using adjusted odds ratios (aOR) with 95% confidence interval.

Results and Discussion: Between 2005 and 2015, we identified 121127 patients who underwent surgery with general anesthesia. 1331 (1.10%) of them developed severe CPSP 3 months after operation. Among different surgical procedures, thoracic surgery (3.26%), hepatectomy (2.80%), renal surgery (1.92%), gastric surgery (1.43%), and cholecystectomy (1.13%) were associated with higher incidence of prolonged opioid use, whereas herniorrhaphy (0.70%), appendectomy (0.50%) and gynecological surgery (0.44%) were associated lower incidence. Compared to traditional surgical approach, endoscopic approach for thoracic surgery (aOR 1.47, 95% CI 1.09-1.99), cholecystectomy (aOR 1.86, 95% CI 1.38-2.52), gastric surgery (aOR 1.91, 95% CI 1.56-2.34), herniorrhaphy (aOR 1.83, 95% CI 1.13-2.98), and renal surgery (aOR 3.00, 95% CI 1.08-8.37) was associated with significantly lower incidence of severe CPSP.

Conclusion: Thoracic and upper abdominal surgery were associated with higher incidence of CPSP. Compared to traditional approach, endoscopic surgery was associated with lower incidence of severe CPSP.

An investigation of influential factors of postoperative pain trajectories after surgery for gastric cancer

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Background: Pain is common after upper abdominal surgery for gastric cancer and this retrospective study aimed to investigate the influential factors of postoperative pain trajectories for patients receiving gastric cancer surgery.

Methods: After the approval of our Institutional Review Board, we performed electronic medical chart review to retrieve data from patients undergoing tumor resection for stage I through III stomach cancer at Taipei Veterans General Hospital in Taiwan from 2012 to 2018. Numeric rating pain scores in the first postoperative week were gathered and mean values were calculated on a daily basis. We also collected patients’ demographics, ASA physical status, analgesic methods, anesthetics time, etc. Linear mixed models were employed to evaluate the effects of collected variables on postoperative pain scores over time and potential interactions with variables over time were also assessed. A backward elimination strategy was used to select independent factors significantly associated with the changes in postoperative pain over time.

Results: A total of 497 patients were included in the analysis and on average, daily pain scores during the first postoperative week ranged between 1.9 and 3.2. Linear mixed model analysis identified that ASA class > 3 (p = 0.012), analgesic methods (p = 0.023), age (p = 0.04), anesthesia time (p = 0.005) and postoperative day (POD, p < 0.001) were associated with postoperative pain trajectories and an interaction was noted between POD and analgesic methods or age (p <0.001 and < 0.001, respectively). Sex, body weight and body mass index were not related to the variations in postoperative pain scores over time.

Conclusion: Age, ASA physical status, analgesic methods and anesthesia time were associated with baseline pain trajectories and age and analgesic methods were related to the trend of pain resolution over time after surgery for gastric cancer. Our analytical approach provided valuable information to elucidate the complex and dynamic changes in postoperative pain scores over time.

An Investigation of Factors Associated with Postoperative Pain Trajectories after Abdominal Surgeries Using Latent Curve Model

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Background and Goal of Study: Although intravenous patient-controlled analgesia (IVPCA) is commonly used to relieve acute pain after abdominal surgeries, few studies have ever evaluated the influential factors of the variations in postoperative pain trajectories over time in these patients. This study aimed to fill this gap by using latent curve models to analyze postoperative pain trajectories and explore their potential predictors.

Materials and Methods: This retrospective study was conducted in a medical center in Taiwan and we collected data from patients receiving abdominal surgeries and postoperative IVPCA between Jan and Dec 2012 by reviewing our electronic medical recordings. We also collected daily mean numeric rating pain scores in the first postoperative week and other potentially influential factors of postoperative pain trajectories. Latent curve analyses using two latent variables, intercept and slope, were employed to model the changes in postoperative pain scores over time. We also evaluated the effects of collected variables on these two latent variables and conduct the backward model selection processes to determine the final multipredictors model which best account for the variations in postoperative pain trajectories over time.

Results and Discussion: There were 1243 patients collected in this study and among them, 542 (43.6%) received upper abdominal surgeries and the others underwent lower abdominal surgeries. The mean daily pain scores during the first postoperative week ranged from 2.0 to 2.7. The latent curve analysis identified four influential factors of postoperative pain trajectories over time, including age, weight, sex and surgical sites. Body weight and age were negatively associated with the baseline level of mean pain scores (p < 0.001 and p = 0.001, respectively).

Regarding the trends of pain resolution reflected by slope parameters, younger age, male gender and lower abdomen surgery tended to steepen the decreasing trends (p = 0.011, 0.015 and p < 0.001, respectively). The analysis of fit statistics revealed acceptable model fit to the data (RMSEA = 0.08, CFI = 0.92).

Conclusion: Sex, weight, age, and surgical sites worked in combination to affect postoperative pain trajectories over time in patients receiving abdominal surgeries and IVPCA. Latent curve analysis provided insight into the dynamic relationships and complicated interactions between the postoperative pain and their predictors.
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Vaso-occlusive Crisis in Sickle Cell Disease: An Acute Pain Challenge
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Background and Goal of Study: Sickle cell anemia is an inherited hemoglobinopathy, multisytemic, chronic and debilitating condition characterized by vaso-occlusive episodes that result in severe acute pain. In this context acute pain units play a leading role in the proper control of painful symptoms, since they are the most common reason for resorting to medical care. This study aims to analyse our hospital protocols and compare them to the most recent scientific evidence, aiming at effective treatment.

Materials and Methods: Through an observational, descriptive and retrospective analysis we identified all patients with vaso-occlusive painful episodes managed by the acute pain unit, from 2017 to 2019. The therapeutic protocols used, and the respective evolution of pain intensity were investigated, as well as other clinical issues, such as adverse effects and complications that may have resulted from the given analgesic and adjuvant therapy.

Results and Discussion: Among the 4420 patients managed by the acute pain unit, during this time period, 11 met our inclusion criteria: patients with hospital admissions during vaso-occlusive crisis. Patient Controlled Analgesia (PCA), with intravenous opioids, was used in all the cases, morphine being the most commonly used, and others such as nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol. The average length of stay in hospital, for pain control, was 7.63 days. Regarding the symptoms, we registered a favourable evolution with minimal side effects.

Conclusions: We highlight that our hospital protocols meet the criteria of the best scientific evidence. However, and despite well-defined strategies for pain management, they are still insufficient in their current state. Little progress has been made in this field, even with recent investigations into new drugs, such as ketamine or gabapentin. We hope for new trials on the latest findings and a better definition about the standard opioid-dosing for these cases.

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5699

A Study of Factors Affecting Use of Patient Controlled Analgesia Systems: Nurse Anesthetists Perspective
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Background: Pain management is a critical but complex issue for the relief of acute pain, particularly for postoperative pain and severe pain in cancer patients. It also plays important roles in promoting quality of care. The introduction of pain management decision support systems (PM-DSS) is considered a potential solution for addressing the complex problems encountered in pain management. This study aims to investigate factors affecting acceptance of PM-DSS from a nurse anesthetist perspective.

Materials and Methods: A questionnaire survey was conducted to collect data from nurse anesthetists in a case hospital. A total of 113 questionnaires were distributed, and 101 complete copies were returned, indicating a valid response rate of 89.3%. Collected data were analyzed by structure equation modeling using the partial least square tool.

Results and Discussion: The results show that perceived information quality (γ=.451, p<.001), computer self-efficacy (γ=.315, p<.01), and organizational structure (γ=.210, p<.05) significantly impact nurse anesthetists perceived usefulness of PM-DSS. Information quality (γ=.267, p<.05) significantly impacts nurse anesthetists perceptions of PM-DSS ease of use. Furthermore, both perceived ease of use (β=.436, p<.001, R²=.487) and perceived usefulness (β=.443, p<.001, R²=.646) significantly affect nurse anesthetists of PM-DSS acceptance (R²=.640). Thus, the critical role of information quality in the development of clinical decision support system is demonstrated.

Conclusion: The findings of this study enable hospital managers to understand the important considerations for nurse anesthetists in accepting PM-DSS, particularly for the issues related to the improvement of information quality, perceived usefulness and perceived ease of use of the system. In addition, the results also provide useful suggestions for designers and implementers of PM-DSS in improving system development.

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Postoperative analgesia techniques in major pancreatic surgical resection – Is subarachnoid morphine an effective alternative to thoracic epidural?
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Background and Goal of Study: Pancreatic surgical resection remains the only curative treatment for pancreatic cancer. As a major abdominal procedure, thoracic epidural (TE) is considered the analgesic gold standard. However, there are important limitations described such as high failure rates and postoperative hypotension. Hence, subarachnoid morphine (SM) has been hypothesized as an equally effective and simpler approach. This study aims to compare the postoperative analgesic efficacy between SM and TE with opioids and local anesthetics administration in patients undergoing open pancreatic surgical resection.

Materials and Methods: We retrospectively investigated medical records of patients who underwent open pancreatic surgical resection between September 2017 and September 2019. Demographic data, perioperative variables, analgesic management decision support systems (PM-DSS) is considered a potential solution for postoperative pain and severe pain in cancer patients. It also plays important roles in promoting quality of care. The introduction of pain management decision support systems (PM-DSS) is considered a potential solution for addressing the complex problems encountered in pain management. This study aims to investigate factors affecting acceptance of PM-DSS from a nurse anesthetist perspective.

Materials and Methods: A questionnaire survey was conducted to collect data from nurse anesthetists in a case hospital. A total of 113 questionnaires were distributed, and 101 complete copies were returned, indicating a valid response rate of 89.3%. Collected data were analyzed by structure equation modeling using the partial least square tool.

Results and Discussion: The results show that perceived information quality (γ=.451, p<.001), computer self-efficacy (γ=.315, p<.01), and organizational structure (γ=.210, p<.05) significantly impact nurse anesthetists perceived usefulness of PM-DSS. Information quality (γ=.267, p<.05) significantly impacts nurse anesthetists perceptions of PM-DSS ease of use. Furthermore, both perceived ease of use (β=.436, p<.001, R²=.487) and perceived usefulness (β=.443, p<.001, R²=.646) significantly affect nurse anesthetists of PM-DSS acceptance (R²=.640). Thus, the critical role of information quality in the development of clinical decision support system is demonstrated.

Conclusion: The findings of this study enable hospital managers to understand the important considerations for nurse anesthetists in accepting PM-DSS, particularly for the issues related to the improvement of information quality, perceived usefulness and perceived ease of use of the system. In addition, the results also provide useful suggestions for designers and implementers of PM-DSS in improving system development.

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Laser acupuncture after cesarean section: a prospective, double-blind, randomized, placebo controlled study
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Background and Goal of Study: The aim of our prospective, randomized, double-blind, placebo-controlled study is to investigate whether active laser acupuncture treatment is superior to placebo laser treatment in postoperative pain control of women undergoing cesarean section. The study was approved by the ethical committee of the University of Saarland and is registered with the number 133/17.

Materials and Methods: Patients were randomized to receive a course of 3 treatments over 1 day with either active or placebo laser. The treatment was highly standardized, each acupuncture session treated Di-4 at the hand and Shen-men of the ear on both sides, for one minute each. The primary outcome measure was a difference in pain severity in rest on the first postoperative day measured with Numeric Rating Scale (NRS) between the placebo group and the active laser treatment group. Furthermore we analyzed pain on movement and worst pain on each postoperative day. Secondary outcome measures included changes in analgesic medication consumption and time to mobilization and hospital
discharge. Treatment occurred on the operation day and on the following two days. Measurements were taken on the day before the operation as well as on the first and the second postoperative day and on the day of discharge.

Results: The mean pain severity in rest on the first postoperative day after cesarean section showed no significant difference ($p=0.85$) between the treatment groups (mean pain 3.32±2.07) and the placebo group (mean pain 3.24±1.98). We obtained similar results for pain in rest on the second postoperative day ($p=0.525$) and on the day of discharge ($p=0.227$). Secondary outcome measures regarding analgesic medication consumption was not significantly different in NSAR use in postoperative period. Opioid use between treatment and placebo group. Laser acupuncture showed no effect on the mobilization of the patients. The day of hospital discharge was also no significantly different between the two groups ($p=0.162$).

Conclusion: Our analysis showed no additional pain control effect through laser acupuncture on patients with postoperative pain after cesarean section. Further studies are needed to investigate the role of laser acupuncture in postoperative pain therapy.

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Benefits of intraoperative intravenous infusion of lidocaine for acute pain management after laparoscopic gastric sleeve

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Background and Goal of Study: Postoperative pain treatment after laparoscopic bariatric surgery is a challenging task for the anesthesiologist because bariatric population is highly sensitive to cardiorespiratory depressive effects of opioid usage. Our prospective randomized double blind placebo controlled study analyzes the impact on the quality of postoperative analgesia after laparoscopic gastric sleeve of lidocaine, intravenously infused during surgery versus saline.

Materials and Methods: After institutional approval and informed written consent were obtained, 62 patients (BMI=38-49kg/m2) scheduled for laparoscopic gastric sleeve under standard general anaesthesia were recruited for the study. They were randomly assigned to one of the two groups: group S (n=22 patients), that received 1mg/kg lidocaine as iv bolus, followed by a continuous infusion of 2mg/kg/h during surgery and group C (n=20 patients), treated with the same volume of a saline placebo, administered according to the above mentioned protocol. The primary outcomes were pain intensity assessed by VAS every 6 hours and total morphine consumption by PCA during first 24 hours postoperatively. The secondary outcomes were the incidence of nausea/vomiting and sedation documented during the same period. Data were analyzed by means of ANOVA and Fisher’s exact test, the statistical significance being considered for p<0.05.

Results and Discussion: No differences between groups were found in terms of demographics and duration of surgery. Statistically lower VAS scores were documented in lidocaine group versus placebo ($p<0.05$). Patients in group S required significantly less morphine compared to those from group C during study period ($p<0.05$). Concerning the adverse events, the advantage of group S was remarkable, too. Thus, we reported for both nausea/vomiting and sedation statistically reduced values of incidence in group S compared to group C ($p<0.05$).

Conclusion: Lidocaine, intravenously infused during laparoscopic gastric sleeve seems to be a cheap, efficient and safe agent that improves the quality of postoperative recovery comparing to placebo, by a significant decrease of acute postoperative pain intensity and reduction of opioid request.

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Ketamine added to morphine patient-controlled analgesia for acute postoperative pain in patients suffering from sickle-cell disease: a retrospective study

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Background and Goal of Study: Sickle cell disease is an autosomal recessive inherited hemoglobinopathy. The main clinical expression is the vaso-occlusive crisis (VOC) which leads to intense pain syndromes. Treatment is challenging due to its episodes of unpredictable severe pain, managed mainly with opioids based patient-controlled analgesia (PCA). Ketamine added in morphine PCA has shown its efficacy in improving postoperative analgesia. It has never been investigated in the context of sickle cell disease. The aim of this study was to evaluate whether the addition of ketamine to morphine PCA could be effective in the treatment of vaso-occlusive event related acute pain.

Materials and Methods: After approval of institutions ethics committee (CE/19/12/24), we retrospectively analysed medical records from patients suffering from sickle cell disease, referred to the acute pain service, from Jan. 2015 to Nov. 2019. Patients who benefited from morphine (M gr.) or morphine and ketamine (MK gr.) PCA were compared for the following parameters from day (D) 1-6: demographics, pain at rest and movement, PCA duration, attempted and administered bolus and adverse effects. Statistical analysis was realised using the T-test, Bartlett’s, Shapiro-Wilk, Wilcoxon test, and Pearson’s test for the correlations between variables. Results are expressed in means ±SD, p < 0.05 considered significant.

Results and Discussion: Data from 43 patients, (21 M gr. And 23 MK gr.), were analysed. 20 males and 23 females, aged 30.71 ±10.00, were enrolled in the study. Patients in M gr. presented lower VAS max at rest on D1 (5.18 ± 2.20 vs 3.57 ± 2.34, p=0.04) when compared to MK gr. (4 [2-5] vs 4 [4-5.75], p=0.04). The total dose of morphine administrated was significantly higher in the MK than in M gr. (207 vs 104 mg, p=0.001). No correlation was found between PCA duration and total ketamine dose or VAS.

Conclusion: Our results suggest that ketamine co-administered with morphine PCA, does not seem to be beneficial in controlling VGC related acute pain.

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Uptregulation of NaV1.7 sodium channels expression and the effects of pulsed radiofrequency treatment in rat DRG with resiniferatoxin-induced neuropathic pain

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Background and Goal of Study: Resiniferatoxin (RTX) is an ultrapotent analog of capsaicin and irreversibly binds transient receptor potential vanilloid 1 (TRPV1). RTX treatment can deplete capsaicin-sensitive C fibers in rats and produces long-lasting paradoxical changes in thermal and mechanical sensitivity; diminishes the thermal pain sensitivity but increases the sensitivity to tactile stimulation, which mimic the unique clinical symptoms of postherpetic neuralgia (PHN). Pulsed radiofrequency (PRF) treatment was effective for RTX-induced mechanical allodynia in rats (Tanaka N, et al. Anesth Analg. 2010;110:784-90). The objective of this study was to investigate the mechanism of PRF treatment of RTX-induced mechanical allodynia.

Materials and Methods: For the culture study, the dorsal root ganglion (DRG) were dissected from Sprague-Dawley (SD) rats (ages 3 weeks) under sevoflurane anaesthesia. These neurons were then treated in the fresh medium without or with RTX for 1 week after 3 to 4 days in culture and NaV1.7 expression was measured using western blot. For the whole-body study, Adult SD rats were used. Rats received PRF (2Hz) to the right sciatic nerve for 2 minutes 1 week after RTX treatment. RTX treatment can deplete capsaicin-sensitive C fibers in rats and produces long-lasting paradoxic changes in thermal and mechanical sensitivity; diminishes the thermal pain sensitivity but increases the sensitivity to tactile stimulation, which mimic the unique clinical symptoms of postherpetic neuralgia (PHN). Pulsed radiofrequency (PRF) treatment was effective for RTX-induced mechanical allodynia in rats (Tanaka N, et al. Anesth Analg. 2010;110:784-90). The objective of this study was to investigate the mechanism of PRF treatment of RTX-induced mechanical allodynia.

Results and Discussion: In cultured DRG with treatment of RTX (1, 10, 100 nM, and 1 μM) for 1 week, NaV1.7 was upregulated in a concentration-dependent manner (P < 0.038). In the whole-body study, the both hindpaw withdrawal thresholds were significantly decreased 1 week after RTX treatment as compared to baseline (right paw: 6.6±0.9 vs. 4.5±2.8 g; P < 0.001, and left paw: 5.7±0.8 vs. 4.5±2.8 g; P < 0.001)
and TG. We recently discovered a selective TASK-3 agonist which has shown
activation of two-pore-domain potassium (K2P) channels inhibits sensory
ganglion (TG) neurons plays an important role in the pain transmission of migraine,
limited and also induces adverse side effects. The sensitization of trigeminal
Background and Goal of Study: Some of the pharmacokinetic properties of LAs
(i.e. lower activity in acidic environments and poor cell penetration) can often limit
their efficacy and safety. nMOFs are a novel class of nanomaterials (e.g. ZIF-8,
ZIF-90, UIO-68) used in an expanding array of applications, including as smart
carriers for LAs, to modify their pharmacokinetic properties, and potentially, to
introduce better therapeutic options for patients in pain.
Materials and Methods: We synthesized ZIF-8 particles loaded with either
lidocaine or bupivacaine. These particles degrade faster when exposed to a more
acidic environment. Similarly, we created pH-sensitive UIO-68 particles loaded
with doxorubicin (DOX), as a model for LAs, by capping them with pH-responsive
molecules such as potassium or pH-responsive G-quadruplex DNA sequences and exposing them to solutions containing different
concentrations of potassium.
Results and Discussion: We were able to show faster release of lidocaine from ZIF-
particles at a lower pH, simulating the conditions around hypermetabolic tumors
and infections. The same effect was not seen with the release of bupivacaine, which was
pH-independent and several theories are proposed for this discrepancy. The
UIO-68 particles also released their payload faster when exposed to a lower pH,
by a different mechanism. The ZIF-90 particles released DOX faster when exposed to
higher concentrations of potassium, simulating the intracellular environment. The
nMOFs are known to be able to penetrate eukaryotic cellular membranes and can
thus bypass its chemical barrier, preferentially releasing the LAs in the potassium-rich
intracellular environment. Faster release in acidic environments can create
higher local concentrations of LAs in painful acidic conditions (e.g. abscesses).
Conclusion: We have shown that it is possible to use certain nMOFs as novel drug
carriers for LAs, to modify their pharmacokinetic properties, and potentially, to
introduce better therapeutic options for patients in pain.
References:
29, 1602782.

5034
Polydeoxynucleotide ameliorates the pain by diminishing the inflammation and apoptosis in the Achilles tendon injury rats
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Background: Achilles tendon disorders including tendinopathy and rupture
currently cause pain and disability in athletes and non-athletic individuals. These
injuries are difficult to treat, require prolonged rehabilitation and have a high
frequency of recurrence. Polydeoxynucleotide (PDRN), an A2A receptor agonist,
has been suggested for the treatment of various diseases and broadly studied for its
anti-inflammatory effect. In the present study, the effect of PDRN on Achilles tendon
injury using rats was investigated.
Materials and Methods: Achilles tendon injury was induced by cutting half of the
Achilles tendon with surgical scissors after anesthesia. One day after Achilles tendon
injury, PDRN in 100 μL respective dose (2 mg/kg, 4 mg/kg, and 8 mg/kg) was directly
applied to the injured Achilles tendon, once a 2 days for 16 days (total 6 times). Von
Frey test and plantar test for the pain threshold were conducted. For this study,
histological analysis was performed by hematoxylin and eosin staining. Enzyme-linked
immunosassay (ELISA) for tumor necrosis factor-α (TNF-α), interleukin (IL)-6, and
cytokine adenosine-3’,5’-monophosphate (cAMP) were performed. Additionally,
immunohistochemistry for cleaved caspase-3, -9, and western blotting for cAMP
response element-binding protein (CREB), protein kinase A (PKA), Bax, Bcl-2.
Results and Discussion: In the present results, Achilles tendon injury increased
pain susceptibility. In addition, Achilles tendon injury was found to remarkably up-
regulate the inflammation and apoptosis. In contrast, PDRN treatment suppressed
inflammation and apoptosis, resulting decreased pain susceptibility. These results
showed that PDRN facilitated inhibited pain susceptibility, inflammation, and
apoptosis from Achilles tendon injury.
Conclusion: Here in this study, it can be suggested that PDRN can be used a new
therapeutic intervention for pain control from Achilles tendon injury.

45.5±1.5 g. P < 0.001, respectively). RTX+PRF group (right paw) had a significantly
greater antiallodynic effect compared with RTX group (left paw) for 4 weeks after
PRF treatment. On the day 35 after RTX injection, NaV1.7 was upregulated in left
DRG, and this NaV1.7 upregulation was inhibited in right DRG (Control vs. RTX vs.
RTX+PRF, 1.31±0.11 vs. 1.0±0.14; P = 0.028).
Conclusions: NaV1.7 is upregulated by RTX and PRF inhibits RTX-induced
upregulation of NaV1.7 in DRG. These findings may provide a better understanding of the molecular alterations in the development of RTX-induced neuropathic pain.

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Potassium- and pH-dependent controlled release of local anesthetics (LAs) from nanometric metal-organic frameworks (nMOFs) to achieve favourable pharmacokinetics
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Background and Goal of Study: Some of the pharmacokinetic properties of LAs
(i.e. lower activity in acidic environments and poor cell penetration) can often limit
their efficacy and safety. nMOFs are known to be able to penetrate eukaryotic cellular membranes and can
thus bypass its chemical barrier, preferentially releasing the LAs in the potassium-rich
intracellular environment. Faster release in acidic environments can create
higher local concentrations of LAs in painful acidic conditions (e.g. abscesses).
Conclusion: We have shown that it is possible to use certain nMOFs as novel drug
carriers for LAs, to modify their pharmacokinetic properties, and potentially, to
introduce better therapeutic options for patients in pain.
References:
1. Liao, P. et al. Selective activation of TWIK-related acid-sensitive K+ channels:
subunit-containing channels is analogous in rodent models. Science Translational

4787
Selective activation of TASK-3 K+ channels in trigeminal ganglion attenuates chronic migraine
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Background and Goal of Study: Migraine is one of the most prevalent headache
disorders, chronic migraine (CM) is more disabling, and for which the treatments
is limited and also induces adverse side effects. The sensitization of trigeminal
ganglion (TG) neurons plays an important role in the pain transmission of migraine,
and activation of two-pore-domain potassium (K2P) channels inhibitss sensory
neuron excitability. TWIK-related acid-sensitive K+ 3 (TASK-3, Kcnk9) channel, a
member of K2P channel family, has been detected in dorsal root ganglion (DRG) and
TG. We recently discovered a selective TASK-3 agonist which has shown
therapeutic potential in treating chronic neuropathic and inflammatory pain that
involves DRG. But It is not known if selective activation TASK-3 in TG is effective
against migraine. In this study we hypothesized that CHET3 may contribute to CM
related pain and TASK-3 channel in TG serves as a therapeutic target for migraine.
Materials and Methods: The nitric oxide (NO)-induced CM model of C57BL/6C
mice was used in this study. Mechanical allodynia and cold hyperalgesia were
measured by Von-Frey and acetone stimulus, respectively, in periorbital area, after
intraperitoneally injecting CHET3 (10 mg/kg) or topiramate (30mg/kg) or vehicles.
In situ hybridization (ISH) (RNAscope technique) was applied to map the mRNA
expression of TASK-3 in TG.
Results and Discussion: Mechanical allodynia and cold hyperalgesia were
reduced following both CHET3 and topiramate injection. Compared to topiramate,
CHET3 has similar analgesic effect during 30 minutes to 90 minutes. ISH revealed
that Kcnk9 was identified in a subset of neurons in TG, and was down-regulated
in CM mice. TRPV1 and TRPM8 were abundantly expressed in Kcnk9+ neurons,
respectively. Furthermore, more than 50% of Kcnk9+ neurons express TH, whereas
Kcnk9 rarely colocalized with P2rx3 or Ntrk2.
Conclusion: CM down-regulation of the expression of TASK-3 channel in TG
neurons, which may contribute to the hyper-excitability of the nociceptive neurons,
leading to the occurrence of CM. Enhancing TASK-3 mediated K+ conductance in
nociceptive neurons effectively relieves pain behaviors in a mouse model of CM.
References:
1. Liao, P. et al. Selective activation of TWIK-related acid-sensitive K+ channels:
subunit-containing channels is analogous in rodent models. Science Translational
5055
Effects of N-type calcium ion channel function on the neuronal activities of the primary somatosensory cortex in inflammatory pain model

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Background and Goal of Study: Accumulated evidence suggests that plastic changes of neuronal circuits in the primary somatosensory cortex (S1) are essential for the transition of acute to chronic pain. In this study, we focused on calcium ion (Ca2+) channel expression in S1 of inflammatory pain model, and investigated the effects of antagonists on neuronal activities and pain threshold.

Materials and Methods: This study was approved by the Animal Research Committees of Kobe University and the National Institute of Neural Science (Permission number: P170801). We used C57BL/6J male (6-8 weeks) mice for all experiments. We used inflammatory pain model received the injection of Complete Freund's adjuvant (CFA) into the right hind paw. Three days after the injection of CFA, S1 brain tissue was dissected, and the expression of each Ca2+ channel (L-type, P/Q-type, N-type) was analyzed by flowcytometry compared to wild type (WT) mice. In addition, intraventricular administration of N-type Ca2+ channel blocker (PD173721) and local administration to S1 of slow release drug of PD173721 were performed, and the pain threshold and S1 neuronal activity were analyzed. Behavioural responses to mechanical stimulation (von Frey filament) and thermal stimulation (hot-plate) were evaluated in this study. To visualize neuronal activity, the adreno associated virus encoding the synapsin promoter driven calcium indicator protein GCaMP6f was expressed in excitatory neurons of S1 hind paw region. Then, in vivo two-photon calcium imaging was repeated and traced single cell activity before and after the administration of PD173212. We used MATLAB to analyze imaging data. Data were analyzed by repeated measures ANOVA followed by a Bonferroni’s multiple comparison test or paired t-test, and a value of P < 0.05 was considered statistically significant.

Results and Discussion: In acute phase of inflammatory pain, the expression of N-type Ca2+ channel was significantly increased compared to WT mice, but the other type Ca2+ channels were not significantly different. Intraventricular administration of PD173212 significantly inhibited S1 neuronal activity and improved pain threshold. Moreover, local administration to S1 of slow release drug of PD173212 significantly improved pain threshold of inflammatory pain model. Results and Discussion: This research suggests that neuronal activity via S1 N-type Ca2+ channel may affect with the threshold of inflammatory pain.

Conclusion: The present study demonstrates that the regulation of spinal RNF31 on bias excitation of Gai signaling pathway via ubiquitin-MrgC may be crucial in the process of BCP. These findings may provide further insight into the mechanisms and treatment of BCP.

Acknowledgements: This work was supported by National Natural Science Foundation of China (no. 81870871) and Medical Science and Technology Development Foundation, Nanjing (QRX17138, ZXK18018).

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Functional macrophage subtype changes in a mouse model of inflammatory low back pain/radiculopathy

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Background and Goal of Study: Macrophages play key roles in many pain states. They have been broadly classified as M1 or pro-inflammatory, and M2 or anti-inflammatory/involved in tissue repair. Macrophages can change their polarization in response to the local tissue environment. Our previous studies in rat showed that macrophage density (pan-macrophage Iba1 labeling) increased in the DRG after localized inflammation of the DRG (LID; a low back pain/radiculopathy model), but little is known about the functional macrophage subtypes involved in low back pain.

In this study, we examined how different functional macrophage subtypes were involved in the LID model.

Materials and Methods: The CX3CR1 eGFP+/ CCR2 RFPI+/ transgenic mouse model was used to separately label CX3CR1-expressing (primarily resident) macrophages and CCR2-expressing (primarily infiltrating) macrophages. The LID model was established by a 3 μl immune activator zymosan (2 mg/ml) injection into the right L4 intervertebral foramen, over the DRG. Results and Discussion: Local DRG inflammation caused mechanical hypersensitivity and increased guarding (spontaneous pain) in the ipsilateral paw, as previously shown for rats. Quantitative microscopy revealed that infiltrating macrophages increased after LID in the inflamed DRG on day 4, 7 and 14. Liposomal clodronate or vehicle (200 μl) was injected intravenously 2 days before LID surgery in order to deplete macrophages, as verified by decreased expression of CCR2+ macrophages in spleen and DRG. After clodronate, the mice had less LID-induced mechanical hypersensitivity and spontaneous pain, compared with i.v. vehicle-injected mice. We found it feasible to amplify specific macrophage polarization markers with qPCR using small samples of individually identified fluorescently labeled macrophages isolated from blood or DRG, which will enable studies of macrophage polarization in vivo. Avenanthramides C (Avn-C), one of the major forms of Avns has the highest antioxidant properties in vitro and in vivo. Avenanthramides C (Avn-C), one of the major forms of Avns has the highest accumulation of formalin solution applied to the hind paw. Pain behavior was quantified by periodically counting the number of flinches of the injected paw after injection. The number of flinches was counted for 1min periods at 1 and 5 min and at 5 min intervals from 10 and 60 min. For the intrathecal dose-response study, Avn-C was administered intrathecally 10 min before the formalin injection.

Results and Discussion: Intrathecal administration of Avn-C decreased dose dependently the sum of the number of flinches during phase 2, but not during phase 1 in the formalin test.

Conclusion: These findings indicate that Avn-C is effective against facilitated pain evoked by formalin injection at the spinal level. Thus, the spinal Avn-C may be useful in the management of tissue injury pain.

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The regulation of spinal RNF31 on bias excitement of Gai signal pathway via ubiquitin-MrgC in bone cancer pain

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Background and Goal of Study: Our previous studies confirmed that Mas-related G protein-coupled receptor subtype C (MrgC) plays a vital role in the development of bone cancer pain (BCP). And its ubiquitin level increased in spinal neurons during the process of BCP. E3 ubiquitin ligase RNF31 can produce a complex of linear ubiquitin chains and may serve as a critical mechanistic link in the relationship between bias excitement of Gai signal pathway and MrgC. However, whether RNF31 participates in BCP by mediating ubiquitination of MrgC remains unclear. To answer this question, we designed and performed this study.

Materials and Methods: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeN mice to induce progressive BCP. Adenoviruses expressing RNF31-small interfering RNA (siRNA) and expressing RNF31 were repeated intrathecal administration on day 14 after BCP was successfully carried out. The pain behaviors, the MrgC ubiquitination levels, the expression of Gai, RNF31, NF-κB and intracellular calcium concentration in spinal neurons were measured before and after injection, respectively.

Results and Discussion: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeN mice to induce BCP. With continuation of tumor group, mice in tumor group exhibited serious pain on day 14, and the level of MrgC ubiquitination, Gai, RNF31, NF-κB and intracellular calcium concentration in spinal neurons was significantly higher. Intrathecal repeated injection of Adenoviruses expressing RNF31 attenuated pain hypersensitivity and raised spinal MrgC ubiquitination, Gai protein and RNF31 expression, down-regulated the expression of spinal NF-κB, and decreased intracellular calcium concentration in spinal cord dorsal horn (SCDH) neurons. Conversely, repeated intrathecal injection of siRNA, produced the opposite effect. Meanwhile, MrgC-like immunoreactivity (IR) co-localizes with ubiquitination, Gai, RNF31, NF-κB in SCDH neurons.

Conclusion: The present study demonstrates that the regulation of spinal RNF31 on bias excitation of Gai signaling pathway via ubiquitin-MrgC may be crucial in the process of BCP. These findings provide further insight in the mechanisms and treatment of BCP.

Acknowledgements: This work was supported by National Natural Science Foundation of China (no. 81870871) and Medical Science and Technology Development Foundation, Nanjing (QRX17138, ZXK18018).

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Antinociceptive effect of Avenanthramide C in a rat model of inflammatory pain

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Background and Goal of Study: Avenanthramides (Avns) extracted from oats and those synthetically prepared exhibit potent antioxidant properties in vitro and in vivo. Avenanthramides C (Avn-C), one of the major forms of Avns has the highest antioxidant activity in vitro. Therefore, the purpose of this study was to examine the effect Avn-C in the rat formalin test.

Materials and Methods: An intrathecal catheter was inserted in male Sprague-Dawley rats. For induction of pain, 50 μL of 5% formalin solution was applied to the hind paw. Pain behavior was quantified by periodically counting the number of flinches of the injected paw after injection. The number of flinches was counted for 1min periods at 1 and 5 min and at 5 min intervals from 10 and 60 min. For the intrathecal dose-response study, Avn-C was administered intrathecally 10 min before the formalin injection.

Results and Discussion: Intrathecal administration of Avn-C decreased dose dependently the sum of the number of flinches during phase 2, but not during phase 1 in the formalin test.

Conclusion: These findings indicate that Avn-C is effective against facilitated pain evoked by formalin injection at the spinal level. Thus, the spinal Avn-C may be useful in the management of tissue injury pain.
Acknowledgements: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2018R1D1A1B07041771).

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Combined pregabalin and tianeptine effect in spinal nerve ligation induced neuropathic pain rats

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Background and Goal of Study: Neuropathic pain impaired quality of life around 7–8% of adults, but the treatment was not satisfied because of partial pain relief and side effects in clinical settings. Pregabalin and tianeptine are used for first line drug of neuropathic pain. The experiment study evaluate the pharmacological interaction of pregabalin and tianeptine in a neuropathic pain model.

Materials and Methods: Neuropathic pain was induced by L5 nerve ligation in Sprague–Dawley rats. The effect of intrathecal tianeptine (30, 100, 300 μg) and pregabalin (0.3, 1, 3 μg) were investigated (5–7 rats per group) in allodynia using the von Frey hair test. And dose-response curves and isobolograms were used for investigating drug interactions.

Results and Discussion: Intrathecal administration of pregabalin and tianeptine dose-dependently reduced tactile allodynia. The ED50 values of pregabalin was 0.76 μg and tianeptine was 110 μg. Pregabalin + Tianeptine at 1:1 ratios were characterized as synergistic fashion by isobolographic analysis.

Conclusion: In this study, we demonstrated that intrathecally administered pregabalin and tianeptine have synergistic interaction on decreasing allodynia using spinal nerve ligation rats.

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Caspase-1 inhibitor reduces remifentanil-induced postoperative hyperalgesia in rat

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Background and Goal of Study: Remifentanil induces postoperative hyperalgesia, which may affect postoperative recovery of patients. This study was designed to evaluate the relationship between remifentanil-induced postoperative hyperalgesia and caspase-1 in spinal dorsal horn in a rat model of incisional pain.

Materials and Methods: Sixty male Sprague-Dawley rats, aged 6-8 weeks, weighing 200-250 g, were randomized divided into 4 groups (n = 15 each group): incisional pain group (group I), incisional pain + remifentanil group (group IR), incisional pain + caspase-1 inhibitor group (group IA) and incisional pain + remifentanil + caspase-1 inhibitor group (group IRA). Normal saline (2 ml) was intravenously infused for 90 min in group I and IA after incisional surgery. Remifentanil at dose of 1 μg·kg·min-1 was intravenously infused in group IR and IRA for the same period. Caspase-1 inhibitor Ac-YVAD-CMK 10 nmol (dissolved in 10 ul DMSO) was intrathecally injected 30 min before surgery and once a day during 5 days after incision in group IA and IRA, while the same intrathecal injection with DMSO in group I and IR. The mechanical withdrawal threshold (MWT) and paw withdraw thermal latency (PWTL) were measured respectively at 30 min before surgery and at 2 hours, 1, 2, 3, 4, 5 days after surgery.

Results and Discussion: MWT and PWTL of all rats from the four groups decreased at 2 hours after surgery in the incisional side. MWT and PWTL of healthy foot only decreased in group IR and IRA at 2 hours after surgery. MWT significantly declined and PWTL shortened in IR and IRA group at 2 hours after surgery compared with group I and IA. MWT increased and PWTL prolonged in IRA group at 2 days after surgery compared with IR group. This study indicates that caspase-1 inhibitor could cut off the formation of hyperalgesia induced by remifentanil since 2 hours after surgery by modulating the process of pyroptosis conducted by caspase-1 spinal dorsal horn.

Conclusion: Caspase-1 inhibitor could be effective to decrease the development and maintenance of remifentanil-induced hyperalgesia, as well as increase pain threshold in rats. Further study could focus on the specific relationship between opioid induced hyperalgesia(OIH) and the pyroptosis conducted by caspase-1.
Efficacy of dexmedetomidine or clonidine as adjuncts to bupivacaine hydrochloride for serratras plane block in patients undergoing minimally invasive thoracic surgery

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Background and Goal of Study: Clonidine and Dexmedetomidine have been used to prolong the duration of local anesthetics in peripheral nerve blocks. With the present study we looked at the role of Dexmedetomidine compared to Clonidine when added to bupivacaine hydrochloride for serratras plane block (SPB) in patients undergoing minimally invasive lung lobectomy (MITS).

Materials and Methods: After IRB approval, 46 records of MITS were retrospectively reviewed. Dexmedetomidine (Group D, N=19, 50 mcg) or Clonidine (Group C, N=27, 100 mcg) were used in adjunct with dexamethasone (4mg) to prolong the duration of bupivacaine hydrochloride (0.375%) in ultrasound guided SPB administered at the end of surgery. Cases receiving neuraxial analgesia were excluded. Multimodal analgesia was used in every patient. Intra- and post-operative morphine equivalents, non-opioid anti-inflammatory drugs requirements, sedation (Richmond Agitation Sedation Scale), pain scores and mean arterial pressure (MAP) were compared between the two groups at PACU arrival and after 4 hours. Fisher’s exact test was used for categorical variables, and Wilcoxon rank sum test for continuous one.

Results and Discussion: Demographic data and comorbidities were comparable between the two groups. Group D required less intraoperative narcotics in the presence of similar multimodal analgesia. There was no difference in time for first opioid rescue, RASS, pain score and MAP on arrival and at 4 hours in PACU. Postoperative use of narcotics and adjuvants was similar in the two groups. There was no difference in surgical times, PACU and hospital length of stay.

Conclusions: In the presence of multimodal analgesia, Dexmedetomidine seems to be comparable to Clonidine for postoperative analgesia, sedation and hemodynamics when added to bupivacaine hydrochloride in patients undergoing SPB for MITS.

Comparison between bipolar pulsed radiofrequency and genicul nerve radiofrequency ablation in chronic knee pain

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Background and Goal of Study: Gonarthrosis is one of the most common articular diseases in older adults. Pain treatment using bipolar transcustaneous pulsed radiofrequency (TPRF) is very well extended therapeutic procedure in units of chronic pain during the last years; nevertheless, many studies have shown some efficacy for pain management with genicular nerve techniques. The main goal of our study is comparing the analgesic efficacy of genicular nerve radiofrequency ablation (GNRFA) to TTRF treatment.

Materials and Methods: We reviewed the clinical files of those patients who had these procedures between January 2014 and December 2018 at our Chronic Pain Department. We evaluated the analgesic efficacy of both techniques. Besides, we also measured Patient Global Impressions-Improvement (PG-I) and Clinical Global Impressions-Improvement (CGI-I) in both techniques. The statistical study was performed with SPSS® program. Qualitative variables were analyzed with chi-square test and Fisher’s exact test, meanwhile, quantitative variables were analyzed with no parametric Mann Whitney-U test.

Results and Discussion: A total of 55 patients were analyzed: 80% (44 patients) had TRPF, and 20% (11 patients) had GNRFA. There were no differences between sexes. Before the technique, NRS mean at movement was 8 (IQR: 8-7) and at rest was 4 (IQR:4-2) for bipolar TRPF, meanwhile for those with GNRFA was 8 (IQR:10-7) at movement and 3 (IQR:7-0) at rest. After performing these techniques, NRS during activity and rest were 7 (IQR: 8-5) and 2 (IQR: 3-0) for bipolar TRPF, and 7 (IQR: 10-5) and 3 (IQR: 7-0) for GNRFA, respectively. We did not find any differences among both groups, but there is a tendency in pain reduction, which we can also find in the literature. The majority of our patients related not feeling “any change” after performing both techniques, and there were no significant differences among both techniques. Improvement perception by physicians was similar without finding differences among both groups.

Conclusion: Patients’ NRS, both at rest and at movement, improved lightly in both groups, without significant differences between them. The majority of patients in both groups referred not feeling “any change”. We cannot conclude that one procedure is better than the other regarding pain reduction or patient satisfaction.

Peroperative pain management in Breast Reconstructive Deep Inferior Epigastric Perforator (DIEP) artery Flap Surgery: a retrospective study

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Background and Goal of Study: pain management in reconstructive breast surgery with Deep Inferior Epigastric Perforator (DIEP) artery flap remains a challenge. There is no consensus about what’s the most suitable analgesic approach nor which paper locoregional anesthesia may have. The aim of our study was to audit acute postoperative pain management and to assess its impact on peroperative outcomes in our patients

Materials and Methods: After approval from IRB (19/46), we gathered data from medical records of patients who underwent DIEP flap surgery in our centre between 2014 and 2019. We collected: anthropometric data, ASA, comorbidities, anesthetic technique, peroperative complications; postoperative numerical pain rating scale (NPRS) and morphine consumption; hospital stay, chronic pain rate and outcomes. Results were reported as mean (SD) in quantitative data and percentage in qualitative data. Student's t-test was used to test differences between continuous data and χ2 test to assess relationship between categorical data. If not applicable, we ran a Mann−Whitney U or a Fisher's Exact Test respectively. P values <0.05 were considered statistically significant. Analyses were carried out using SPSS v 22.0

Results and Discussion: Sixty-seven patients were included: 35.8% under general anaesthesia (GA), 64.2% under combined anaesthesia (CA): BRILMA and/or TAP block, ESP block, Paravertebral and/or interpectoral block, thoracic epidural. Postoperative analgesia consisted on NSAIDs and morphine if needed. NPRS at rest and movement at 24h postintervention were lower in CA group (p=0.032/p=0.004 respectively). Seven patients (10.4%) required morphine PCA; 6 of them in GA group (p=0.004). Complications related to analgesia were all due to morphine secondary effects. Nine patients developed postoperative chronic pain: incidence was higher when NPRS at rest and movement were higher in postanaesthesia unit...
Factors affecting the spread of local anesthetic in fascial-sheath blockade of the anterior abdominal wall in the cadaver experiment

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Background and Goal of Study: In recent years, there has been an increasing interest in various methods of regional anesthesia, including fascial-sheath blockade of the anterior abdominal wall (FSBAW). FSBAW have proven themselves in clinical practice. Unfortunately, the factors affecting the spread of local anesthetic (LA) in the fascial sheath are still unclear and so an objective of this study was to investigate these unknown factors.

Materials and methods: Studies were performed in the pathology department in 15 corpses (n=6, W=9), which at the time of death was from 54 to 80 years. The weight of the corpse was 44-97 kg, height 163-185 cm. 10 lateral, 10 upper and 10 lower TAP-blocks were performed with the ultrasonic (US) navigation. Identical blocks were performed on two sides on one corpse. The FujiFilm Sonositeedgeinc-US device with a Sonosite HFL 38 13-6 MHz linear ultrasonic sensor and SonoPlexStimCannula needles 22G 60-120 mm were used. To assess the solution’s distribution the methylene blue was used for 20 (group A) or 30 (group B) ml. The dependence of the solution’s distribution on the volume, weight and growth of the corpse as well as on damage in the area of the solution’s distribution (surgical incision and scars) was studied. The spread of the dye was assessed 20 minutes after the injection.

Results and discussion: The injection of a larger dye volume led to a larger area of distribution. The injection of the solution in group A didn’t provide the necessary coverage area in corpses whose growth exceeded 175 cm (n=11). The weight of the corpse didn’t significantly affect the zone of solution’s distribution. Thus, the area of solution’s distribution in the fascial sheath depended on the growth of the corpse and almost didn’t depend on the weight. Damage of anatomical structures in the dye distribution zone led to restriction of its distribution which led to a decrease in the staining zone (n=6).

Conclusions: The preliminary data suggest that the patient’s weight has little effect on the volume of LA must be administered when performing FSBAW. The volume of the fascial sheath more depends on the patient’s height. Growth determines the volume of LA that must be injected for adequate analgesia. Injection of 20 ml of LA may not be sufficient for adequate analgesia when performing FSBAW in patients whose height is higher than 175 cm. Injuries in the AREA of LA may cause restriction of LA distribution and inadequate analgesia.

References:
Ultrasound Guided Bilateral Cervical Plexus Block Versus Multimodal Analgesia For Thyroid Surgery

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Background and Goal of Study: The pain after thyroid surgery is considered of moderate intensity and short duration. Ultrasound-guided bilateral Superficial Cervical Plexus Block is proposed to relieve pain from patients undergoing thyroid surgery in the postoperative period. This study aimed to evaluate the analgesic effect of ultrasound (US) guided bilateral superficial cervical plexus block (SCPB).

Materials and Methods: We conducted a randomized, comparative, prospective, simple blind study undergoing 80 patients allocated to receive either Ultrasound-guided superficial cervical plexus block associated with multimodal analgesia or multimodal analgesia (control group). We included ASA class I or II patients aged more than 18 years and scheduled for elective thyroid surgery under general anesthesia. We performed ultrasound-guided SCPB before general anesthesia (10mL of bupivacaine 0.25 % injected bilaterally). Multimodal analgesia was performed by ketamine and lidocaine, ketoprofene, acetaminophen, and nefopam. We assessed postoperative pain using the Visual Analogue Scale (VAS) and the total morphine consumption. We administered morphine titration if the VAS is more than 30. Statistical significance was stated at p-value < 0.05.

Results and Discussion: We included 40 patients in the SCPB Group and 39 patients in the control group (we excluded one patient due to hemodynamic instability). There was no statistically significant difference in the demographic data and the incidence of postoperative nausea and vomiting between the two groups. The postoperative consumption of remifentanil was reduced in the SCPB group. The postoperative pain score (VAS) was higher in the control group at the 15, 30, 60, 75, 90,105, 120 postoperative minutes and 6, 12, 18, 24 postoperative hours (p < 0.05). Postoperative morphine consumption was higher in the control group (p < 0.05).

Conclusion: Ultrasound-guided SCPB for thyroidecctomy under general anesthesia decreases postoperative pain score and postoperative morphine consumption.

Is Transnasal Sphenopalatine Ganglion Block a worth trying technique in Chronic Headaches? – A series of cases

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Background: Transnasal Sphenopalatine Ganglion Block (SPGB) is emerging as an effective and safe option for the treatment of several disabling headache1. The authors describe a series of cases in which SPGB was used to treat chronic headaches with complete resolution of the symptoms.

Case Reports: (1). 56 years-old (yo) woman was referred to Chronic Pain Unit (CPU) due to frontal tension headache refractory to several therapies. Structural changes were excluded by a MRI. Patient complained of an oppressive, non-pulsating pain. Acupuncture sessions were made and suspended for lack of results. SPGB with Ropivacaine 0.2% (w/Ropi 0.2%) was performed with immediate relief of symptoms, which recurred after 4 weeks. SPGB was repeated with symptoms resolution. (2). 47-yo man with neuropathic pain in superficial peroneal right nerve territory, caused by a nerve injury following hospitalization in ICU (status pos pancreatitis). He also presented a right upper limb pain after a meningoecephalitis. He was under several analgesics (gabapentin, opioids, capsaicin and baclofen) with adequate pain control. He began to experience an intense and fronto-cocciplal tension headache. An occipital block was performed without pain relief. SPGB w/ Ropi 0.2%was performed with sustained relief of symptoms for 4 weeks. Symptoms recurrence was noticed and a new SPGB produced a definitive resolution of the headache. (3). 61-yo woman with history of depression and obesity. Medicated with gabapentin, fluoxetine, amitryptiline. Referred to CPU for constant cervical pain with ocipital irradiation in the last 4 years. From the study performed we report a Chiai Malformation. Patient was oriented for neurosurgery consultation. Cervical TENS was realized with a brief pain relief. A SPGB w/Ropi 0.2%was performed with immediate symptom relief for 4 weeks. Total resolution of headache was possible after brain surgery.

Discussion: SPGB is an easy and effective technique that can be used for treatment of various aetiologies of headache. Further studies need to be conducted to determine the best pharmacologic agents, the optimal guided technique and how it may be use as part of a headache management program.

References:

Unusual displacement of subcutaneously tunnelled intrathecal catheter

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Background: Intrathecal drug delivery systems (IDDS) are used in the care of patients with complex chronic non-cancer pain and cancer-related pain. IDDS deliver drugs into the intrathecal space by way of a subcutaneously tunnelled catheter. The catheter may be connected to an internally implanted IDDS or an external pump and reservoir. Subcutaneously tunnelled catheters connected to an external pump via an implanted Port-A-Cath are considered a reliable and safe method of intrathecal drug delivery.

Case Report: External displacement of subcutaneously tunnelled intrathecal catheters is widely not reported in the literature. A subcutaneously tunnelled intrathecal catheter and Port-A-Cath connected to an external pump was placed in a patient with complex cancer-related pain. We aim to present a case report of intrathecal catheter displacement through the patient’s skin. The subcutaneously tunnelled catheter was removed with a minor complication. The patient did not suffer any sequelae.

Learning points: Displacement of subcutaneously implanted intrathecal catheters through skin may occur, leading to potential complications for patients.

Complete recovery after triple epidural blood patch for the treatment of spontaneous orthostatic headache

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Background: Cerebrospinal fluid (CSF) leakage might be iatrogenic or spontaneous in its nature. This outflow of CSF leads to intracranial hypotension that is felt as an orthostatic headache by the patient. Epidural Blood Patch (EBP) is considered the therapy of choice for orthostatic headaches derived from intracranial hypotension. Even though the EBP is considered the gold-standard treatment, its administration method (treatment level, volume used, number of EBPs and interval between them) for optimal efficacy is still debatable.

Materials and Methods: A 42 year old female presents intense orthostatic headaches in the temporo-occipital region. No iatrogenic cause was found. After conservative treatment failure, she underwent several lumbar punctures, MRI scans and CAT scans and was diagnosed with Liquor-Hypotension Syndrome. A Cisternography showed multiple CSF leakages from thoracic to lumbar L4-L5 levels. Our Pain Management Unit was consulted. During our visit, 45 days after the onset of the headaches, the patient presented bilateral temporo-occipital orthostatic headache 6/10, increasing bilateral tinnitus. Three EBP were performed with 1month interval between each, following the same protocol using 20ml of autologous blood which was drawn meanwhile an epidural needle was inserted into the L4-L5 intervertebral level with saline loss of resistance technique. The blood was slowly injected (30-60 seconds). VAS scales were accessed before, 1min after ,1 hour after and 1 week after which were 6-3-2 and 0 respectively and a complete recovery 2 months past.

Results and Discussion: According to bibliography, there seems to be a need for additional EBPs when it comes to spontaneous orthostatic headaches or multiple
Harmonization of multimodal analgesia. Surgery has a positive effect in terms of reducing opioid consumption and improving patient satisfaction. Recommendations for postoperative analgesia in the Department of Urology are low. Adherence to analgesia according to the anestesiologist's recommendations is shown in Figure 1. Most common prescriptions, % of cases, in surgical units (SUs) were as follows: ketorolac 34 vs 36.2, diclofenac 20.2 vs 5, dexketoprofen 5.3 vs 7.5, 2016 vs 2018. Pain intensity was neither assessed nor documented in the Post-Anesthesia Care Unit (PACU) assessed in 88.6% vs 97.5% of cases was 1.2 vs 1, ranging from 0 to 10 (VAS 0-10). Data are presented as ratio, no (%) of cases, mean ± SD, range, analgesics dosage as mg and g. SPSS 23.0 was used for statistical calculations. Traits evaluated as significant at p < 0.05.

Results and Discussion: Median pain intensity in Post-Anesthesia Care Unit (PACU) assessed in 88.6% vs 97.5% of cases was 1.2 vs 1, ranging from 0 to 6 scores, 2016 vs 2018. Pain intensity was neither assessed nor documented in surgical units (SUs). The doses of i.v analgesics assessed in PACU, and SUs in 2016 vs 2018 according to the same patients selection criteria and methodology of the study. Following this study performed in 2016, the General Surgery Unit introduced pain management recommendations. Meanwhile, the Urology Unit did not follow the pain management recommendations. The data of the prescription and nursing sheets were compared with the 2016 study of 94 pts using the same patients selection criteria and methodology of the study. After bioethical approval, a prospective analysis of 80 patients (pts), who underwent elective surgery in Departments of General Surgery, and Urology of Hospital of Lithuanian University of Health Sciences Kaunas Clinics in November, 2018 was performed. The results were compared with a 2016 study of 94 pts using the same patients selection criteria and methodology of the study. Following this study performed in 2016, the General Surgery Unit introduced pain management recommendations. Meanwhile, the Urology Unit did not follow the pain management recommendations. The data of the prescription and nursing sheets including the range, dosage of analgesics, methods of administration, pain scores (VAS 0-10) were analysed. Data are presented as ratio, no (%) of cases, mean ± SD, range, analgesics dosage as mg and g. SPSS 23.0 was used for statistical calculations. Traits evaluated as significant at p < 0.05.

Results and Discussion: Median pain intensity in Post-Anesthesia Care Unit (PACU) assessed in 88.6% vs 97.5% of cases was 1.2 vs 1, ranging from 0 to 6 scores, 2016 vs 2018. Pain intensity was neither assessed nor documented in surgical units (SUs). The doses of i.v analgesics assessed in PACU, and SUs in 2016 vs 2018 according to the same patients selection criteria and methodology of the study. Following this study performed in 2016, the General Surgery Unit introduced pain management recommendations. Meanwhile, the Urology Unit did not follow the pain management recommendations. The data of the prescription and nursing sheets including the range, dosage of analgesics, methods of administration, pain scores (VAS 0-10) were analysed. Data are presented as ratio, no (%) of cases, mean ± SD, range, analgesics dosage as mg and g. SPSS 23.0 was used for statistical calculations. Traits evaluated as significant at p < 0.05.

Conclusion: The majority of patients during the stay in PACU, receive postoperative analgesia according to the anestesiologist's recommendations. Adherence to the recommendations of postoperative analgesia in Department of Urology is low. Implementation of postoperative analgesia guidelines in Department of General Surgery has positive effect in terms of reduction of opioid consumption and better management of multimodal analgesia.

References:
Perioperative acute pain management in Chinese institutions: preliminary result from a perioperative acute pain registry

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Background and Goal of Study: Perioperative acute pain is still an important clinical problem worldwide. Chinese medical institutions also made great efforts to relieve patients’ acute pain after surgery. However, there is still no large-scale investigation on the current acute pain management in China. Therefore, led by the Chinese Association of Anaesthesiologists, we started an observational study using the perioperative acute pain management registration database in China. In this abstract, we analyzed the initial results of the study to evaluate the postoperative acute pain control.

Materials and Methods: This study was approved by the ethics committee of Chinese PLA General Hospital. At present, 45 medical institutions in mainland China participated in this study. 2069 patients aged ≥18 years old were asked to complete a pain outcome questionnaire. Medical treatment that related to pain management was documented. Descriptive statistical analysis was used to analyze the demographic data, pain treatment and patients’ reported pain outcomes. The differences of pain outcomes among different surgical departments were compared with ANOVA.

Results and Discussion: 2012 patients were included in the current analysis. The worst postoperative pain reported by patients was scored at 4.0 ± 2.6 (Figure 1), and the duration of worst pain was 17.6 ± 24.7%. Patients’ reported satisfaction was 4.0 ± 2.6 (Figure 1), significantly higher than that in other departments. In addition, the departments with the worst pain score higher than 4 were orthopedics, urology and thoracic surgery. (Figure 2).

Conclusion: In this abstract, we have made a preliminary analysis on the current profile of postoperative acute pain management in China. Our further study, we believe, will be able to provide valuable information to improve acute pain management in China, which include find the most vulnerable patients who need the most attention.

Acknowledgements: We thank for the contribution of our colleagues in the 45 hospitals participated in our study.

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Prospective audit: adequacy of pain assessment in the medical and surgical ward

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Background: Accurate assessment of pain is associated with improved pain management, which can lead to better patient outcomes. Pain is a fifth vital sign in Early Warning Scoring (EWS) chart. The Royal College of Anaesthetists has recommended regular pain assessment.

Aims: 1. Determine the prevalence of pain experienced by patients in Our Lady of Lourdes Hospital, Drogheda. 2. Determine the accuracy of documentation on observation charts and analgesia plans available for pain.

Method: After approval from the local audit committee, a prospective audit was conducted in the medical and surgical wards. Data was collected on proforma by direct questioning as well as reviewing patient charts.

Results: Of the 81 patients included, 55% were from the medical ward and 45% from the surgical ward. Documentation of pain was not universal, with 52 patients having no score documented with their last set of observations, but on direct questioning, 21% of patients had a pain score ≥4/10. Of those with a score recorded, the recorded score was not found to correlate with the scores reported on direct questioning in 60% of patients. Approximately 88% of the patient had appropriate analgesia plan available in charts.

Conclusions: The documentation of pain in the wards falls below the standard set by the Royal College of Anaesthetists. Regular education and training programs are needed to improve pain assessment and management to enhance the patient experience.

References:
Results: 3315 patients were included in the general analysis. Combining intraoperative and PACU data, 31% of the patients received at least 4 non-opioid analgesics and 23% received opioids with a median morphine dose 6 mg (IQR 4 – 9). In PACU, 81% of the patients experienced a NRS ≤ 3. Maximal NRS and morphine consumption from postoperative day (POD) 0 to 6 and during the hospitalization are presented Table 1. Opioid’s adverse effects were rare. Concerning sub-groups, patients who had a preoperative NRS > 0 had significantly higher pain scores during their hospitalization. Patients who benefited of a regional anesthesia (RA) were more painful than others on POD 1 and 2.

Conclusion: Our study showed that good quality postoperative analgesia is possible without high opioid consumptions. Thanks to a systematic use of multimodal analgesia involving the frequent use of RA and the association of 2 non-opioid analgesics at least, only 32% of patients received opioids during their hospitalization. These results contrast with other countries where the vast majority of the patients receive postoperative opioids.

References:

4444

Dose of intrathecal diamorphine (ITD) for laparoscopic colorectal resections: a survey of current practice in the UK

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Background and Goal of Study: Intrathecal diamorphine (ITD) is an established technique to provide post-operative analgesia following laparoscopic colorectal resections in the UK. However, there is no consensus available as to what the optimal dose that should be used. The aim of this survey was to establish the dose of ITD used by consultant anaesthetists across the UK.

Materials and Methods: Online questionnaires were distributed to anaesthetists at 100 UK hospitals. Respondents were asked to indicate the most common and the maximum dose of ITD they use, the timing of injection in relation to the anticipated length of surgery and the number of patients that they anaesthetise per month for laparoscopic colorectal resections. Frequencies of each dose were calculated. Non-parametric data are reported as medians (IQR) and were compared using Mann-Whitney U-test. Pearson’s correlation was used to determine the association between the number of patients anaesthetised per month and the dose of ITD.

Results: Overall, 479 consultants responded. Of these, about 60% use ITD as primary mode of analgesia. The majority of spinal injections are performed with the patient awake [n=372, 77.7%], regardless of the anticipated duration of surgery. The most common dose of ITD used is 500 mcg [n=96/350, 27.4%; range= 200-1500 mcg; median=500 mcg; IQR=350]. The most frequent maximum dose used is 500 mcg [n=103/350, 29.4%; range=200-2000; median=600, IQR=500]. There was a positive correlation between the number of patients anaesthetised per month and the dose of ITD used, both in terms of most common dose [r=0.129, p=0.015] and maximum dose used [r=0.105, p=0.049]. Consultants who use higher doses of ITD (e.g. >500 mcg) anaesthetise more patients per month compared to those who use lower doses (e.g. <=500 mcg) [medians= 3 vs 2, respectively, IQR=1, p=0.012].

Discussion & Conclusions: We demonstrated that ITD is the most common primary mode of analgesia used for laparoscopic colorectal resections but the range of doses used is considerably large, indicating that there is currently no consensus on the dose of ITD. Consultants who perform anaesthesia for these procedures more regularly use higher doses of ITD, suggesting that higher doses of ITD may be more effective and improve patient outcomes. Dose-response trials specific to the colorectal population, are needed to investigate the relationship between doses of ITD and patient outcomes.

5704

To Investigate the Knowledge and Attitudes of Opioids Prescribing in Board Certified Physician Specialists in Medical Center and Regional Hospital in Taiwan

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Background and Goal of Study: The purpose of the investigation is to recognize the attitudes of opioids prescribing among the different field of specialists. The investigate for physicians of certified specialist either in medical center or in regional hospital included of knowledge and attitude of opioids prescribing and its, related side effects and adverse events, long-term opioids treatment, reasonable dose consumption, and frequency of prescriptions.

Materials and Methods: The physicians of certificated specialist either in medical center or in regional hospital included of knowledge and attitude of opioids prescribing and its, related side effects and adverse events, long-term opioids treatment, reasonable dose consumption, and frequency of prescriptions.

Results and Discussion: From 297 out of 304 valid questionnaires processing, opioid-related knowledge responses from specialists present better in the field of adverse effects than regulations. Regarding to correctness from the understanding to use controlled drugs and their adverse effects, a significant difference among different field of Board certified physician (BCH) specialists, physicians working place, and the habituation of prescription frequencies. In addition, BCH specialists

4614

Analysis of postoperative pain registers of bariatric surgery during the period 2012-2018

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Background and Goal of study: Severe pain after bariatric surgery occurs in 20-40% of patients. An epidemiological study 1 that analyzes the intensity of pain in the first 24 hours places it in place 37 of the 176 surgical procedures evaluated. The aim of our study is to analyze the indicators of Acute Postoperative Pain (APP) during hospitalization after bariatric surgery, to assess the effectiveness of the implementation of analgesic protocols.

Materials and Methods: We have analyzed 379 bariatric surgeries performed during the period 2012-2018. Postoperative analgesia consists of Continuous Epidural Perfusion (CEP) of levobupivacaine 0.0625% + fentanyl 2 μg / ml with an infusion rate between 2 to 4 ml / h during 48 h, plus desketoprofen 50 mg / 8 h iv, paracetamol 1 g / 6 h iv and morphine 0.05 mg / kg sc if pain ≥ 3 according to Verbal Numerical Scale (VNS) (0 = absence of pain, 10 = worst possible pain). The indicators analyzed were: percentage of patients with: VNS ≥3, VNS ≥7, and mean VNS value on the 1st and 2nd postoperative day.

Results and Discussion: We performed 379 bariatric surgeries (by pass and sleeve). Table 1 shows the percentage of patients with VNS ≥3 and VNS ≥7 and mean VNS value during the 1st and 2nd postoperative day. We believe that VNS ≥3 and VNS ≥7 percentages, better reflects patient’s pain intensity throughout the process.

Bibliography:

Table 1: Percentage of patients with VNS ≥3 and VNS ≥7 and Mean VNS value during the 1st and 2nd postoperative day.
in groups of seniority and high prescription frequencies may increase acceptance in patients long-term opioids prescribe practice and increasing daily dose consumptions in part of attitude to administer opioids. There is a positive correlation between attitude to administer controlled drugs and either the item of knowledge of opioids prescribing or hours spent in controlled drugs continuing education. Hours spent in controlled medicines continuing education also has a positive correlation with increased prescription frequencies. However, knowledge of opioids prescribing showed no positive correlations with hours spent in controlled drugs continuing education.

**Conclusion:** The controlled drugs continuing education should consider the trend. How to provide a proper continuing education program for physicians to improve prescriptions information in the future is an important issue. Due to the item of knowledge of prescribing opioids showing positive correlation with long-term Opioids use only, we suggest to enhance continuing education on how to safely prescribing and tapering Opioid doses to improve prescription physicians clinical related knowledges.

**4680**
Exploring Influential Factors of Postoperative Pain Resolution after Hip Fracture Surgery in Elderly Patients Using Latent Growth Curve Analysis
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**Background:** Hip fractures among elderly patients are major public health issues around the world and early surgery is of paramount importance to reduce morbidity and mortality of these patients. However, few studies have ever explored factors associated with the variations in postoperative pain trajectories over time in these patients and we conducted this retrospective study to investigate influential factors of postoperative pain after hip fracture surgery using latent curve models.

**Methods:** After the approval of our Institutional Review Board, we collected data from patients aged 70 or more with hip fracture surgery by electronic chart review between January 2012 and December 2015 in Taipei Veterans General Hospital in Taiwan. We also collected numeric rating pain scores in the first three days post-op days, demographic variables, ASA physical status, chronic renal insufficiency, diabetes, perioperative blood transfusion, type of anesthesia and so on. Latent curve models with two latent variables, intercept and slope, were used to depict the variations in postoperative pain trajectories over time. The effects of collected variables on these two latent variables were estimated as well and backward model selection processes were employed to determine the final multiple predictors model which explained the changes in postoperative pain resolution most parsimoniously. The comparative fit statistic (CFI) and root mean square error of approximation (RMSEA) were also used to evaluate the model fit to the collected data.

**Results:** There were 1034 patients included in our analysis and the mean pain scores of the first, second and third postoperative days were 3.9, 3.1 and 2.8, respectively. After the model selection, four influential factors were identified to be associated with postoperative pain trajectories over time. Increasing anesthesia time was correlated with higher baseline level of postoperative pain (p = 0.005) and general anesthesia, use of epidural analgesia and aging were connected to faster pain resolution after surgery (p = 0.008, 0.046 and 0.015, respectively). The fit statistic analysis demonstrated good model fit (RMSEA = 0.03, CFI = 0.98).

**Conclusions:** Anesthesia time, general anesthesia, use of epidural analgesia and aging were associated with the variations in postoperative pain trajectories over time in elderly patients receiving hip fracture surgery.

**5867**
Relief of neuropathic pain after spinal cord stimulator implantation in a patient with intramedullary cystic tumor. A case report
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**Background:** Syringomyelia is commonly associated with Chiari malformations, spinal trauma, arachnoiditis, or tumors. Intramedullary ependymal cysts of the spinal cord are rare, benign, fluid-filled cysts usually situated along the ventral surface of the spinal cord. Syringomyelia is characterized by an intraspinal cavity, it may cause central neuropathic pain.

**Case Report:** We report a case in a 25-year-old woman with 3-year history of cystic lesion intramedullary cystic tumor presented to the pain clinic. Clinical assessment demonstrated constant neuropathic pain which extended from left axilla to thigh. She rated her pain 5-6 / 10 on a numerical rating scale, which worsened over the day and increased to 10 / 10 during frequent exacerbations.

SL was prescribed multiple medications for pain including oxycodone, pregabalin, amitriptyline, duloxetine. Despite these, pain remained uncontrolled. Magnetic resonance imaging demonstrated a C6 nonenhancing anterior intramedullary hyperintense signal change at the T1 level spanning cephhalochordal 12 mm, 5.5 mm anteroposterior and 6.3 mm transversal. SCS was proposed due to her significant refractory pain. The patient has reported long periods of excellent relief of pain (VAS 1) with occasionally increased pain (VAS 3) relative to emotional stress.

**Discussion:** The supposed pain mechanism was spinalthalamatic tract injury due to the syrinx cavity. In several studies, no correlation has been found between cyst...
on the right hand. He said that all the symptoms began right after Paronychia. As a medication, Pregabalin was used. One year later, the patient reports a transmission of the pain on the left hand in the middle finger onto the index finger as well. Digital nerve block (DNB) was applied with 1% lidocaine and complaints significantly decreased. During DNB, the patient’s wife told us that the patient had played Billiards for 10 years. When we asked the patient, he told us that he didn’t use any glove while he was playing Billiards. In digital neuralgia, the level of the digital nerve damage ranges from minor damage as neuropaedia to more severe damages as neurorotaxis. Endocrinology can be due to many reasons. If’s diagnosed with nerve findings and symptoms that accompany the lesion which is often seen in chronic conditions. Treatment is primarily provided by awareness of risk scales and avoidance of repetitive activities that may pose a particular risk. The neural block may be applied as a therapy.

Discussion: It is useful to pay attention to handgrip in billiards and to be awake against neuralgia-like complaints. This is a rare occasion but we should still take this into consideration and hence, promote the measures for the people who play Billiards professionally, who have an increased risk of suffering from digital neuralgia.

References:

Learning points: In conclusion, acute neuralgia carries the danger of developing into chronic neuralgia if not diagnosed and treated early. Therefore, taking these pains into consideration and taking the necessary precautions in time is extremely important for the prognosis of patients.

6203

Preauricular infiltration in a case of persistent idiopathic facial pain

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Background: Persistent idiopathic facial pain (PIFP) is a peculiar disease, with non-specific symptoms, often related to psychological aspects. It’s an excruciating disorder of the face that cause persistent pain usually on one side of the face and that occurs in the absence of autonomic signs, laboratory or imaging abnormalities. It is usually described as a burning sensation.

Case Report: A 54 years-old male, referral due to excruciating facial pain in the left preauricular region, which started a year ago. He has pathologic history of anxiety and left masseter surgery 20 years ago. At the time of examination, he had a continuous pain in preauricular region, with sensation of electric shocks, that was rated on the visual analogue scale of 10, with interference with sleep. The episodes of pain relieved when he was hurrying in the area. The patient denied trauma, infections, headache and sensitive tongue disorders. On clinical examination, he presented alodynia in the left preauricular region. The cranioencephalic nuclear magnetic resonance exclude organic lesion and the computed tomography of the temporomandibular joint had a slight irregularity of the left condyle with millimeter osteophyte labiation on its posterior side, with no other alterations. The patient was treated with oxcarbamazepine 600 mg 12/12hr, tapentadol 50mg 12/12hr and paracetamol 1000mg SOS3, reporting 60% relief. Subsequently we did preauricular infiltration with 3ml of 0.2% ropivacaine with 100% relief of pain lasting about 3 months without the need for systemic medication. The patient repeated just one more infiltration and currently has controlled pain.

Discussion: PIFP has a much lower persistence than trigeminal neuralgia and can be quite disabling. The diagnosis is difficult and there are no curative therapies. The pathophysiology remains poorly understood, and patients often present with psychological complaints. The 1st-line treatment is a low-dose tricyclic antidepressant and in 2nd-line: SSRIs, SNRIs and anticonvulsants. Finding new, more effective treatments for PIFP will allow better understanding of pathophysiology.

References:

5769

Billiard player’s unexpected neuralgia

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Background: Digital nerve blocks are often used for many finger surgeons. Although many methods have been described, the traditional method of performing local anesthesia laterally to the extensor tendons by marking the finger at the base of the finger is the most preferred.

Case Report: We report the case of a 38-year-old male introduced himself with prickly pain, which was sudden, stabbing, stinging and tapping triggered in the middle finger of the left hand 2 years ago. There weren’t any similar symptoms
Ultrasound-guided pulsed radiofrequency in the management of unresponsive oncologic pain

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**Background:** Pulsed radiofrequency (PRF) is a novel therapeutic approach that could be useful in the management of oncologic pain unresponsive to conventional therapeutic strategies. PRF is based on an alteration in synaptic transmission and a neuromodulatory-type effect.

**Case Report:** We report a case of a 59-year-old male patient, with metastatic colorectal cancer and a 5 cm mass infiltrating left iliopecto muscle. The patient came to our attention due to severe pain (9 on NRS) to the anteromedial face of left thigh and knee paresthesia. Poor response and the onset of side effect to oxycodone/naloxone 10/5mg twice daily, pregabalin 75mg twice daily, fentanyl 100 mcg, were reported. On the basis of neuropathic pain, we applied ultrasound-guided (USG) PRF to the hip articular branches of femoral nerve and accessory obturator nerve (PENG), putting the active needle tip at 5 o'clock position. After sensory and quadriceps motor stimulation test, PRF was performed in “pulse dose” mode, delivering 1200 pulses at 42°C. 20 ml ropivacaine 0.15% plus dexamethasone 4 mg were administered at the end of the stimulation. Then we proceeded to apply PRF on the obturator and saphenous nerves, with an overall dose of 480 pulses at 42°C for each nerve, followed by injection of ropivacaine and dexamethasone according to the previous scheme. After 7 days follow-up visit, the patient reported pain relief with a significant reduction on NRS score from 9 to 4. Unfortunately, long term follow-up was not achieved due to patient’s death two months later.

**Discussion:** This case showed efficacy and safety of USG-PRF neuromodulation in oncologic pain associated with a major neuropathic component, unresponsive to conventional treatments. Moreover, it seems that PRF can improve quality of life of oncologic patients for long periods, with the possibility to repeat the treatment if needed.

**References:**

**Learning points:** PRF is a minimally invasive, well tolerated and safe procedure. It’s a valid alternative to conventional treatments for oncologic neuropathic pain in patients unresponsive or suffering from side effects.

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The effect of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain – a randomized controlled study

**Sahin A, et al.**


**Learning points:** This report highlights the importance of clinical doubt for final diagnosis, especially in chronic abdominal pain where there are many possible presentations, abdominal pain is the most frequent (up to 70%)1. Radiological features are very helpful, but just histological findings provide a definitive diagnosis. Despite MP represents a rare cause of abdominal pain, because of its favourable response to corticosteroids, this disorder should not be forgotten, especially when patient present risk factors.

**References:**

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Mesenteric Panniculitis: an often forgotten treatable cause of chronic abdominal pain

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**Background:** Management of chronic abdominal pain is challenging since the symptoms are frequently disabling and aetiological causes are diverse. Accurate characterization of symptoms often allows a correct diagnosis and avoids unnecessary invasive procedures. The authors present a case of chronic abdominal pain completely solved after the corticoid therapy.

**Case Report:** 77-years-old man presented to Chronic Pain Unit for persistent abdominal pain unresponsive to conventional analgesia. His past medical history was positive for insulin-treated Type II Diabetes and prostate carcinoma (stable and with no evidence of metastatic disease). The patient complained of spontaneous pain to the left upper quadrant of the abdomen with irradiation to the left hemithorax, with 4 years of evolution, worsen in the last 2 years. Pain was stab-like, had night aggravation and relief with gauze emission (patient patient intestinal transit disorders). Gastroenterological pathology was excluded. An abdominopelvic CT showed an incipient mesenteric panniculitis (MP), with no other relevant changes. Patient medication was optimized without any improvement. In the absence of any other aetiology, a therapeutic trial with prednisolone 20mg/day was started and gabapentin dose was adjusted. After 2 weeks, patient experience a markedly pain relief, with full resolution of symptoms after 4 months, allowing weaning of corticosteroids as well all analgesic medication. No recurrence of symptoms was noticed.

**Discussion:** MP is a benign condition characterized by chronic inflammation leading to fibrosis of the mesentery. Although there are many different clinical presentations, abdominal pain is the most frequent (up to 70%). Radiological features are very helpful, but just histological findings provide a definitive diagnosis. Despite MP represents a rare cause of abdominal pain, because of its favourable response to corticosteroids, this disorder should not be forgotten, especially when patient present risk factors.

**References:**

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The hidden culprit: Splenosis as a cause of Chronic Abdominal Pain

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**Background:** Disseminated splenosis (DS) is a rare condition caused by metastatic deposits of splenic tissue following trauma or surgery. Although DS is usually asymptomatic, it can also be present as persistent abdominal pain or other serious complications. This case report aims to alert to the fact that splenosis can be a hidden cause of chronic abdominal pain (CAP).**Clinical Report:** A 79-year-old woman with history of degenerative osteoarticular disease, bladder cancer, paracetamol±codeine-induced hepatitis and multiple abdominal surgeries, including a splenectomy. She suffered from CAP with 15 years of evolution, with multiple unsuccessful treatment attempts. She even performed a total colectomy for megacolon (a possible contribute for CAP). After this surgery, the patient present risk factors.

**References:**

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The effect of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain – a randomized controlled study

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**Background and Goal of Study:** After headaches and chronic fatigue, low back pain (LBP) is the most reported complaint, with more than 80% of the population reporting LBP at some point in their life.1This study aims to evaluate the effectiveness of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain.

**Materials and Methods:** The prospective randomized study included 162 patients with chronic non-specific low back pain (nsLBP), turned to spine surgery department in Aug.2018–Aug.2019. All the patients were allocated to two groups(81 each) using computerized randomization. The prospective randomized study included 162 patients with chronic non-specific low back pain (nsLBP), turned to spine surgery department in Aug.2018–Aug.2019. All the patients were allocated to two groups (81 each) using computerized randomization.

**Results and Discussion:** Man age was 38.1±8.2 and 42.3±6.7 in the study and control group, respectively. In a 6-month period patients of study group showed significant decrease in VAS score–2.9±0.8 and ODI improvement–20.2,(comparing to the controls: 4.5±0.7 and 34.1±3.5%).

**Conclusion:** The majority of patients with nsLBP demonstrated visceral laxity restriction and muscle tone changes in the abdominal and pelvic regions without clinical symptoms’ manifestation but accompanied with visceral palpation tenderness. Followed by OVM muscle tone and visceral movement normalization caused less visceral palpation tenderness, adequate pelvic bone biomechanics and pain relief in most patients of the study group. Patients with nsLBP may benefit from OVM.

**References:**
Clinical utility of ozone therapy in chronic shoulder pain

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Background: Oxygen-Ozone therapy is a treatment with anti-inflammatory and analgesic effects that relieves pain and improves joint function. Ozone is bacteriostatic, fungicidal and viricidal with a low risk of infection. Thus, it is advantageous in musculoskeletal disorders, including low back pain, disc herniation, periarthritis shoulder disease and knee osteoarthritis, and is considered a satisfactory treatment with low risk of complications and high success rate.

Case Report: A 87 years-old female, referred due to right omalgia because of degenerative osteoarticular pathology. It was an institutionalized patient, partially receptive to any other oral medication. She complains of LH constant and burning pain irradiated to the back and abdomen’s lower left quadrant, with a maximum pain score of 8/10. Before deciding another intervention, an abdominopelvic CT scan was performed, which revealed splenosis. The case was presented to General Surgery and definitive surgical solution was proposed.

Discussion: Despite splenosis affects up to 2/3 of patients that underwent a splenectomy, it is often silent and therefore sometimes a forgotten diagnosis. The existent literature especially addresses the surgical aspects and not the need of a high suspicion index for an early diagnosis.

References:

To conclude: In all patients with a history of spleen surgery, splenosis should be considered in differential diagnosis of CAP. In symptomatic patients surgery is the definitive solution and that way avoid years of ineffective treatments to pain control. It is essential that physicians be aware of this diagnosis in order to manage correctly this rare case of CAP.
Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in acute cerebrovascular pathology

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Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress adaptation hormones in relation to the neurological status by the end of the acute period of cerebral stroke in acute cerebrovascular pathology.

Materials and Methods: In 626 adult patients in the acute period of cerebral stroke (regardless of its type, variant, etc.) who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, in cerebrospinal fluid and venous blood samples colorimetric determination of adenine, guanine, hypoxanthine, xanthine, uric acid, magnesium was carried out, enzyme-linked immunosorbent assay for cortisol and dehydroepiandrosterone, thyroid-stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The relative risk of subsequent depression of consciousness is high when a stroke is detected on the 1st day of elevated levels of magnesium (3.34) and cortisol (2.33) in blood serum, hypoxanthine (2.82) and cortisol (2.52) in cerebrospinal fluid, as well as upon detection of a stroke on the 1st day of low level of adenine in the cerebrospinal fluid (2.60); when a stroke level of 3 cortisol (11.0), magnesium (2.13), uric acid (2.06) and xanthine (2.05) in the blood serum is detected on the 3rd day of a stroke. The highest chances of worsening neurological status by the end of the acute period of cerebral stroke in detecting elevated serum levels on the 1st day of magnesium (OR = 7.08), cortisol (OR 3.0), adenine (OR = 2.77); increased content on the 1st day in the cerebrospinal fluid of cortisol (OR 3.38) and hypoxanthine (OR = 4.69), low content of adenine in the cerebrospinal fluid (OR 4.21); increased content on the 3rd day in the blood serum of magnesium (OR 3.25), cortisol (OR 21), uric acid (OR 4.18), hypoxanthine (OR 3.03), xanthine (OR 2 9), adenine (OR 2.83), guanine (OR 2.77).

Conclusion: In patients in the acute period of cerebral stroke (regardless of its type), indicators of the purine spectrum, stress-adaptive hormonal status are highly informative factors in predicting worsening neurological status. The most "powerful" prognostic factors are cortisol and uric acid levels.

Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in acute cerebral ischemia: diagnostic and prognostic aspects

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Background and Goal of Study: We compare the prognostic value of indicators of the exchange of purines, magnesium, stress adaptive hormones in relation to the neurological status in acute cerebral ischemia.

Materials and Methods: In 402 adult patients in the acute period of cerebral ischemic stroke, who were treated in the intensive care unit and intensive care unit of the angioeurological department, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The relative risk of subsequent depression is high when a 3-day stroke is detected in serum with elevated cortisol (4.5), hypoxanthin (2.48), xanthin (2.85), adenin (2.16), guanine (2.08), uric acid (2.09); in the liquor with elevated total activity of xanthine-oxidase (2.25). The highest chances of deterioration of the neurological status by the end of the acute period of ischemic stroke are found at the detection of its increased content in the blood serum of magnesium (OR 4.8), cortisol (OR 2.5), reduced total activity of xanthine-oxidase in the blood serum (OR 2.5), reduced activity of the first stage of xanthine-oxidase reaction in the liquor (OR 3.27). There are high chances of deterioration of neurological status at detection of increased content of adenine (OR 4.0), guanine (OR 4.27), hypoxanthin (OR 7.7) in blood serum for 3 days, Xanthine (OR 5.1), uric acid.
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Purine metabolites, magnesium, corticosteroid, thyroid hormones and letal outcome in acute cerebral ischemia: diagnostic and prognostic aspects

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Background and Goal of Study: We study the possibility of predicting the onset of a fatal outcome using various hormonal and metabolic parameters in acute cerebral ischemia.

Materials and Methods: In 402 adult patients in the acute period of cerebral ischemic stroke, who were treated in the intensive care unit and intensive care unit of the angioeurological department, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive predictors of lethal outcome of ischemic strokes were: increased xanthine concentration in the 1st and 3rd day of stroke (0.83 and 0.76), reduced xanthine oxidase activity (in the second stage of the xanthine oxidase reaction - 0.61). Among the most specific factors: an increased concentration of uric acid in the blood serum on the 1st and 3rd day of a stroke (0.91 and 0.98), a combination of an increased content of uric acid in the blood serum and cerebrospinal fluid on the 1st day of a stroke (0.93). The relative risk of death is highest when a stroke concentration of uric acid in the blood serum is detected on the 3rd day (3.93). The highest chances of a fatal outcome when a stroke is detected on the 3rd day of an elevated blood serum uric acid (OR 21.5), adenine (OR 3.55), guanine (OR 3.27); a combination of increased serum uric acid and cerebrospinal fluid (OR 3.37), increased serum uric acid (OR 2.87), decreased xanthine oxidase activity in the second stage of the xanthine oxidase reaction on the 1st day of stroke (OR 2.67).

Conclusion: In patients with acute cerebral ischemia in the acute period of cerebral ischemic stroke, the most prognostically "powerful" lethal outcome factors are uric acid level and xanthine oxidase activity.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in intracranial hemorrhage: diagnostic and prognostic aspects

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Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress-adaptation hormones in relation to neurological status by the end of the acute period of hemorrhagic stroke.

Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke, who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive factor (0.72), "predicting" subsequent depression of consciousness by 7-10 days of hemorrhagic stroke, was increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction). The most specific factors were reduced levels in the cerebrospinal fluid of adenine (0.92) and guanine (0.86) on the 1st day of stroke. The relative risk of subsequent depression of consciousness is also high when detecting a reduced content of adenine in the cerebrospinal fluid (3.38) and increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction, 3.04) on the 1st day of stroke. The highest chances of deterioration of the neurological status by the end of the acute period of hemorrhagic stroke with the detection of reduced concentrations of adenine (OR 5.77) and guanine (OR 3.75) in cerebrospinal fluid, increased xanthine oxidase activity in blood serum (in the first stage of the xanthine oxidase reaction - OR 4.31) on the 1st day of a stroke.

Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factors in the deterioration of neurological status are the level of cerebrospinal fluid adenine and serum xanthine oxidase activity.

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Purine metabolites, magnesium, corticosteroid, thyroid hormones and letal outcome at hemorrhagic stroke: diagnostic and prognostic aspects

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Background and Goal of Study: We study the possibility of predicting the onset of death with the help of various hormonal and metabolic indicators in the acute period of cerebral hemorrhagic stroke

Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric determination of adenine, guanine, hypoxanthine, xanthine, uric acid, magnesium, malonic was carried out in samples of cerebrospinal fluid and venous blood dialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most sensitive factors for the subsequent onset of death in hemorrhagic stroke were: increased concentration of uric acid in cerebrospinal fluid on the 1st day of stroke (0.98), increased permeability through the BBB on the 1st day of guanine stroke (0.75) hypoxanthine (0.74), adenine (0.72). The most specific similar factors were: a combination of increased uric acid in blood serum and cerebrospinal fluid on the 3rd day of stroke (0.99); increased concentration on the 3rd day of a stroke in the blood serum of uric acid (0.97) hypoxanthine (0.83) and guanine (0.83). The relative risk of a fatal outcome is high when a stroke of an increased concentration of uric acid in the cerebrospinal fluid is detected on the 1st day of stroke (5.77); elevated serum levels on the 3rd day of a stroke of uric acid (3.0), hypoxanthine (2.90), a combination of elevated uric acid in serum and cerebrospinal fluid (2.31). The highest chances of a fatal outcome when a stroke of uric acid in the cerebrospinal fluid is detected on the 1st day (OR 8.75); when a stroke concentration of uric acid (OR 15.0), hypoxanthine (OR 5.0), guanine (OR 4.09), a combination of increased serum uric acid and cerebrospinal fluid (OR 10.2).

Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factor in fatal outcome is the blood level of uric acid.
Purine metabolites, magnesium, corticosteroid, thyroid hormones and lethal outcome in acute cerebrovascular pathology

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Background and Goal of Study: We study the possibility of predicting the onset of death with the help of various hormonal and metabolic indicators in the acute period of cerebral stroke.

Materials and Methods: In 626 adult patients in the acute period of cerebral stroke (regardless of its type, variant, etc.) who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, in cerebrospinal fluid and venous blood samples colorimetric determination of adenine, guanine, hypoxanthine, xanthine, uric acid, magnesium was carried out, enzyme-linked immunosorbent assay for cortisol and dehydroepiandrosterone, thyroid-stimulating hormone, thyroxine and triiodothyronine.

Results and Discussion: The most specific factors were: increased concentration of uric acid in the blood serum on the 1st and 3rd day of stroke (0.89 and 0.98), combination of an increased content of uric acid in blood serum and cerebrospinal fluid on the 1st and 3rd day of a stroke (0.90 and 0.97), reduced guanine in cerebrospinal fluid (0.84) on the 3rd day of stroke; increased content of free fractions of triiodothyronine and thyroxine on the 1st day of stroke (0.86 and 0.76). The relative risk of a fatal outcome is high when a stroke of increased concentration in the blood serum of cortisol is detected on the 1st and 3rd day (3.25 and 7.39); increased content of hypoxanthine (2.49), xanthine (2.49) and uric acid (3.53) on the 3rd day of stroke, a combination of increased serum uric acid and cerebrospinal fluid (2.71). The highest chances of a fatal outcome when a stroke is detected on the 1st day of a stroke are elevated concentrations of cortisol and free thyroxine in blood serum (OR 4.98 and 2.59, respectively), uric acid in cerebrospinal fluid (OR 2.79); when a stroke concentration of adenine (OR 2.81), guanine (OR 3.75), hypoxanthine (OR 4.55), xanthine (OR 3.56). Uric acid is detected in the blood serum on the 3rd day of a stroke (OR 20.0), cortisol (OR 10.4), a combination of high uric acid in blood serum and cerebrospinal fluid (OR 23.3).

Conclusion: In patients in the acute period of cerebral stroke (regardless of its type), indicators of the purine spectrum, stress-adaptive hormonal status are highly informative factors in predicting the onset of a fatal outcome. The most prognostically “powerful” of the studied parameters is the blood level of uric acid.

Diagnostic challenge of Euglycemic Diabetic Ketoacidosis in the ICU setting

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Background: In surgical patients with intestinal pathology who are on SGLT2 inhibitors (SGLT2-I), the pre-operative period of poor feeding coupled with the post-operative inability to initiate feeds makes the management of Euglycemic diabetic ketoacidosis (EuDKA) challenging. We present a rare case of a patient with persistent EuDKA on SGLT2-I.

Case Report: Mdm. X was a type 2 diabetic who was on Dapaglifozin. She presented with clinical dehydration, hypotension and severe abdominal pain. She was diagnosed with a rectosigmoid tumour complicated by sealed perforation. As she was presented with the triad of normoglycemia, high anion gap metabolic acidosis and ketonemia, a diagnosis of EuDKA was suspected and she was immediately started on IV insulin infusion. As her ketones normalized, she was transitioned to a subcutaneous insulin sliding scale regimen. However, she was kept fasted as she was planned for a trephine colostomy the next day. She then developed rebound ketosis requiring IV insulin.

Discussion: In patients with acidosis, the differentials of lactic acidosis and starvation ketosis should also be considered. The pathogenesis of euglycemic DKA includes decreased insulin secretion in the setting of increased counter-regulatory hormone secretion (1). In contrast to starvation ketosis, it has a precipitating critical illness, a bicarbonate concentration lower than 18mmol/L and rapid resolution of clinical abnormalities with administration of insulin (2). Our patient’s malignancy, infection, decreased dietary intake secondary to loss of appetite coupled with the use of SGLT2 inhibitors may have precipitated her condition. It is interesting to note that her EuDKA persisted despite having stopped dapaglifozin for 5 days. This appears to be longer than what was previously reported.

References:

Learning points: We suspect that the duration of action, metabolism and excretion of SGLT2 inhibitors could be longer in high risk patients. More studies should be performed to determine the appropriate duration to continue this medication preoperatively in order to minimize EuDKA risk.

Increase in serum sodium predicts mortality in ICU patients, even for patients admitted with mild hyponatremia

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Background and Goal of Study: Hyponatremia and hypermotremia in ICU patients are independently associated with mortality. It is unknown whether the association of mild hyponatremia with mortality is causal and whether correction improves survival. Our objective was to assess the independent association of change in serum sodium in the first 48 hours after ICU admission with hospital mortality.

Materials and Methods: Multicenter cohort study in ten Dutch ICUs between January 2011 and April 2017. Inclusion criteria: patients with at least one serum sodium measurement within 24 hours of ICU-admission [Na+] and at least one serum sodium measurement 24-48 hours after ICU admission [Na+24-48h]. A Cox proportional hazard model adjusted for age, gender, and APACHE-IV score was used to assess the association between ΔNa+[Na+] [ΔNa+][-Na+][Na+] and hospital mortality.

Results and Discussion: In total, 36,660 patients were included for analysis.

In patients with acidosis, the differentials of lactic acidosis and starvation ketosis should also be considered. The pathogenesis of euglycemic DKA includes decreased insulin secretion in the setting of increased counter-regulatory hormone secretion (1). In contrast to starvation ketosis, it has a precipitating critical illness, a bicarbonate concentration lower than 18mmol/L and rapid resolution of clinical abnormalities with administration of insulin (2). Our patient’s malignancy, infection, decreased dietary intake secondary to loss of appetite coupled with the use of SGLT2 inhibitors may have precipitated her condition. It is interesting to note that her EuDKA persisted despite having stopped dapaglifozin for 5 days. This appears to be longer than what was previously reported.

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Learning points: We suspect that the duration of action, metabolism and excretion of SGLT2 inhibitors could be longer in high risk patients. More studies should be performed to determine the appropriate duration to continue this medication preoperatively in order to minimize EuDKA risk.

Increase in serum sodium predicts mortality in ICU patients, even for patients admitted with mild hyponatremia

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Results and Discussion: In total, 36,660 patients were included for analysis.

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References:

Learning points: We suspect that the duration of action, metabolism and excretion of SGLT2 inhibitors could be longer in high risk patients. More studies should be performed to determine the appropriate duration to continue this medication preoperatively in order to minimize EuDKA risk.
Patients admitted with severe hyponatremia (<125 mmol/L) and hypernatremia (>145 mmol/L) had a higher risk of mortality. For mild hyponatremia, normonatremia, and hypernatremia at ICU admission, a ∆48h-[Na] >5 mmol/L was associated with larger hazards of mortality (Figure 1). Based on our findings, it is possible that mild hyponatremia may be a protective mechanism in critical illness, which questions common practice of routinely correcting serum sodium when it is too low.

Conclusion: An increase in serum sodium in the first 48 hours of ICU admission is independently associated with a higher mortality in patients admitted with mild hyponatremia, normonatremia, and hypernatremia. Further interventional trials are necessary to determine optimal policy in patients with mild hyponatremia, for whom unintentional or intentional correction of low serum sodium could be detrimental.

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Pancreatitis treatment with Lipopheresis in Pregnancy and Outcome

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Background: Acute pancreatitis in pregnancy is rare, occurring in approximately 1/3000 pregnancies. Significant maternal morbidity can occur including intensive care admission, metabolic disturbances, sepsis, pancreatic necrosis, and hypovolemic shock. Rates of preterm delivery, fetal distress, and demise are increased in pregnancies with pancreatitis.

Case Report: 21-year-old, 19 weeks pregnant woman presented to a emergency service with 4 h of abdominal pain that radiates to her back, nausea and vomiting. She doesnt use any medication and cigarettes. she only used folic acid. And she uses vitamin D for 15 weeks. 2 days ago she came to emergency services with Abdominal pain that radiates to her back. Nausea and Vomiting. In biochemistries markers didnt be concluded that lipemic serum and abdominal USG. A radiological and biochemical diagnosis of moderate acute pancreatitis was made. Bloodwork demonstrated prominent lipemic serum. Ketone levels were deemed >3. In abdominal usg: Free fluid was observed around the pancreas. The pancreas wall is edematous and heterogeneous. Appearance is compatible with pancreatitis. There was no known history of diabetes in the patient. She uses only vitamin D and folic acid. And the patient transferred intensive care unit support. The patient was consulted with the internal medicine department. Oral stop and lipopheresis are recommended. Management included aggressive rehydration and pain control, and we started lipopheresis, and we repeated that lipopheresis three times. At first her bloodworks were lipemic but after first lipopheresis, Bloodwork demonstrated prominent hypertriglyceridaemia (HTG) of 541 mg/dl.

Discussion: Patients with acute pancreatitis should be treated with analgesia and fluid resuscitation. Severe hypertriglyceride-induced pancreatitis includes similar management. Lipopheresis may be considered in refractory cases. Preventing severe dyslipidemia in gestation can decrease the risk of pancreatitis and improve maternal and neonatal outcomes. Lipopheresis in acute pancreatitis in perinatal outcomes are likely due to improvements in maternal and perinatal care.

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Matrix Metalloproteinase-9 Protects Against Sepsis-induced Lung Injury in a Murine Septic Model

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Background and Goal of Study: Acute lung injury (ALI) is one of the main complications of sepsis with a mortality rate as high as 45% in ICU patients. Therefore, it is requisite to explore the relevant mechanisms involved in septic lung injury. Matrix metalloproteinase-9, MMP-9 has been reported to be involved in acute lung injury, however, whether MMP-9 protect or exacerbate sepsis-induced lung injury is still controversial. So in our present study, we evaluated the role of MMP-9 and its potential mechanism in sepsis-induced lung injury in a Cecal Ligation and Puncture (CLP) mice model.

Materials and Methods: Male ICR mice(25±5g) were subjected to CLP, MMP-9 small interfering RNA (MMP-9 siRNA) was administrated intratracheally to locally knockdown the expression of MMP-9 in lung tissue to define the role of MMP-9 in sepsis-induced lung injury. Kaplan-Meier survival curves were used to estimate survival rate in mice. Pathologic changes were evaluated via hematoxylin and eosin (H&E) staining, pulmonary edema was estimated by cell count and protein concentration in BAL fluid. Relative mRNA and protein expression were determined by RT-PCR and Western blot analysis.

Results and Discussion: Our results suggested that MMP-9 knockdown exacerbated sepsis-induced lung injury as indicated by decreased survival rate and increased lung injury score and edema following 24h post-CLP. MMP-9 knockdown suppressed the shedding of the receptor for advanced glycation end products (RAGE) and aggrivated RAGE-mediated NF-κB signaling pathway.

Conclusion: In summary, MMP-9 knockdown aggravated lung injury and RAGE-mediated inflammatory response in our CLP model. These indicated that MMP-9 may exert protective role in sepsis-induced lung injury and this may attributed to proteolysis function on RAGE. This is different to other opinions that activation of MMP-9 damaged septic lung injury. Inhibition of MMP-9 as a strategy for limiting ALI in abdominal sepsis should be conserved.
Remote liver ischemic preconditioning protects rats against cerebral ischemia and reperfusion injury

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Background and Goal of Study: Remote limb ischemic preconditioning has been shown to have beneficial effects in protecting organs against ischemia and reperfusion (I/R) injury. However, whether brief ischemic preconditioning of vital organ, such as the liver, would exert brain protection against I/R injury is unknown. We therefore investigated the effect of remote liver ischemic preconditioning (RLIPC) on brain tissues suffering from I/R injury in a rat model.

Materials and Methods: Rats were anesthetized with pentobarbital sodium (50 mg/kg ip) and were randomly assigned to a sham group (sham operation), control group (CON) or a remote liver ischemic preconditioning group (RLIPC). Rats except for the sham group received middle cerebral artery occlusion (MCAO) for 1 h, followed by 48 h of reperfusion. For the RLIPC rats, four cycles of 5 min of liver ischemia (the portal vein, hepatic arterial and venous trunk occlusion) followed by 5 min reperusions were executed before brain ischemia. After the intervention, brains were collected at 48 h for analysis.

Results and Discussion: RLIPC decreased the volume of the MCAO-evoked infarct region when compared to CON (P<0.001). Meanwhile, RLIPC-treated rats showed significant improvements in neurological function compared with CON (P<0.001). There was a 44.7% and 26.4% reduction in serum LDH and CK-MB concentration from RLIPC rats compared with that of control ones, suggestive of relatively less cerebral damage in RLIPC-treated rats in response to I/R injury. Representative cerebral injury phenotypes, such as oedema, neuronal loss and vacuolization were visualized in brain tissue after I/R injury; however, the degree of brain damage was less severe in RLIPC-treated rats, as less neuronal loss and more intact neurons were detected in the vacuolated spaces. RLIPC treatment ameliorated the cerebral damage and largely recovered the number of Nissl bodies (P=0.001 vs CON). After reperfusion, sufficient TUNEL-positive cells were observed in brains, however, the number of TUNEL-positive cells was significantly reduced in the RLIPC-treated group compared with the CON (P=0.001), suggesting the antipapoptotic activity of liver ischemic preconditioning on the neurons.

Conclusion: Liver ischemic preconditioning effectively protects brain against I/R injury by reducing brain infarct volume, serum LDH and CK-MB concentration, inhibiting apoptosis, and improving neurological function.

Materials and Methods: After 120 minutes of ischemia of the superior mesenteric artery in male Wistar rats, the reperfusion was carried out for 120 minutes to induce intestinal ischemia-reperfusion injury. The experimental animals were divided into four groups: (i) surgical control (Sham), (ii) Sham and Ang-(1-7) (1 ml/kg intravenous infusion at 30 minutes before surgery), (iii) Ischemia-reperfusion (I/R), and (iv) I/R and Ang-(1-7). During this study, we examined the liver and kidney function index and intestine blood flow. In additional, we measured the survival rate in different groups. After 4-hour study the lung, liver and kidney tissues were harvested to investigate superoxide ion level and pathohistology.

Results and Discussion: Histological findings showed that intestine I/R caused widespread mucosal destruction, loss of villi and infiltration of inflammatory cells, while Ang-(1-7) administrationameliorated intestine injury after intestinal I/R. Ang-(1-7), given before ischemia, attenuated serum creatinine increase after intestine I/R, indicating Ang-(1-7) could improve renal dysfunction induced by intestine I/R. None of the 5 rats infused with Ang-(1-7) were dead 24 hours post-intestinal I/R, while three out of the 5 rats in the I/R group were still alive 24 hours after intestinal I/R, indicating that pre-ischemia treatment of Ang-(1-7) improved the survival rate after intestinal I/R.

Conclusion: These findings suggest that Ang-(1-7) appears to reduce organ damage and even death induced by intestinal ischemia-reperfusion, and may be a potential adjuvant for ischemia-reperfusion injury.

Angiotensin-(1-7) protects the intestinal injury after ischemia and reperfusion in rats

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Background and Goal of Study: Intestinal ischemia-reperfusion injury can lead to activation of local inflammatory response and changes in several inflammatory mediators, resulting in multiple organ failure and systemic inflammatory response. Previous study revealed that angiotensin (Ang)-(1-7) binds and activates a G protein-coupling receptor: Mas, through which Ang-(1-7) induces vasodilation, anti-inflammation, and proliferative effects, in general, oppose those mediated by Ang II. Ang-(1-7) can act via both the Mas receptor and the AT2R. In our previous study, we found that Ang-(1-7) could attenuate organ dysfunction, decrease inflammatory cytokines and improve survive in septic rats. In the rat model of intestinal ischemia-reperfusion, this study evaluated the role of Ang-(1-7) in inflammation, oxidative stress and organ injury.

New murine sepsis model for persistent inflammation, immunosuppression, and catabolism syndrome

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Background and Goal of Study: Sepsis, defined as dysregulation of immune and inflammatory responses to infection, can develop refractory shock and multiple organ failure (MOF) leading to early in-hospital death or persistent inflammation, immunosuppression, and catabolism syndrome (PICS) leading to extended recovery periods and multiple complications. The recent development of programs that support earlier diagnosis and intervention with best-practices for sepsis should be increase the portions of PICS. However, these processes of develop to PICS from sepsis are not well-understood.

Materials and Methods: In this study, we utilized cecal ligation and puncture (CLP) method in mice for three steps sepsis models involving SIRS and CARs (CLP only), MOF (lipopolysaccharide (LPS) + CLP), and PICS/LPS + CLP + Antibiotic) models. We examined mortality, the levels of pro- and anti-inflammatory cytokotos in serum. These findings suggest that Ang-(1-7) appears to reduce organ damage and even death induced by intestinal ischemia-reperfusion, and may be a potential adjuvant for ischemia-reperfusion injury.
Ferroptosis contributes to tissue injury in lung ischemia/reperfusion

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Background and goal of study: Ferroptosis, a form of regulated cell death triggered by lipid peroxidation is a therapeutic target in the pathological process of some diseases. The inhibitors of ferroptosis, have been reported to protect against heart, kidney ischemia-reperfusion. However, the role of ferroptosis in lung ischemia/reperfusion (IR) injury remains unknown. Considering the unique features required for ferroptosis, therefore we investigated whether ferroptosis is present in lung ischemia/reperfusion.

Materials and Methods: To establish the lung ischemia/reperfusion (LIR) model, a left thoracotomy was performed in Male C57BL/6 mice, the left pulmonary hilum was clamped for 60 min, followed by 60 or 120 min. The sham group received thoracotomy. We used (DAB)-enhanced Pearls’ staining to detect iron accumulation in lung sections. We determined the expression levels of two key protein involved in ferroptosis, glutathione peroxidase 4 (GPX4) and Acyl-CoA synthetase long-chain family member 4 (ACSL4), by western blotting. Also, transmission electron microscopy (TEM) from lung tissues was examined to confirm the morphological features of ferroptosis.

Results and Discussion: Pearls’ DAB staining disclosed that mice who received LIR had higher levels of non-heme iron compared to sham group. Accumulation of mitochondria with smaller appearance and increased membrane density was demonstrated in LIR mice, which was barely detected in control mice. Levels of GPX4 were significantly decreased in IR/120min treatment groups compared to the sham group (P<0.05). Both of the IR/60min and 120min groups showed significantly increased levels of ACSL4, as compared to the sham group (all P<0.05).

Conclusion: Our study demonstrates that ferroptosis is involved in the tissue injury from LIR. These results suggest a potential approach for lung IR injury prevention.

Effects of remote ischemic preconditioning on erythrocytes in sepsis

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Background and Goal of Study: Impaired tissue perfusion and microcirculation are hallmarks of septic shock. Therefore, preventing RBC rheologic alterations in may be important to help reduce morbidity and mortality from severe sepsis. Previous studies have shown that such remote ischemic preconditioning (RIPC) not only prevents tissue damage due to severe ischemia but also reduces inflammation and mortality due to sepsis. However, the effect of RIPC on the coagulation and elasticity of erythrocytes due to sepsis has not been established. Therefore, this study is to investigate the effect of RIPC on RBC rheologic alterations of erythrocytes in sepsis.

Materials and Methods: We used 30 male Sprague-Dawley rats. Endotoxin-induced sepsis model was created by injecting 20 mg/kg LPS intraperitoneally. RIPC was induced on the right hind legs with a tourniquet in three cycles of 10 min of ischemia and 10 min of reperfusion. And this study is to investigate the effect of RIPC elongation index (EI), aggregation index (AI), and Time to half-maximal aggregation (T1/2) of erythrocytes in sepsis.

Results and Discussion: EI values were significantly greater and the T1/2 values were shorter in the LPS group and the RIPC+LPS group than those in the control group. And, there was no significant difference between those values of the LPS group and the RIPC/LPS group. The EI decreased significantly in the LPS group compared to that in the control group, whereas the EI does not changed significantly in the RIPC/LPS group compared to that in the control group. Previous studies have shown that several proinflammatory cytokines were reduced by RIPC. However, in this study, RIPC has revealed no positive effects on the elasticity and cohesiveness of erythrocytes in sepsis.

Conclusion: The RBC rheologic alterations of erythrocytes due to sepsis is not improved by RIPC.

The Effects of Hydroxyurea on Proinflammatory Cytokine and Tissue Histopathology in Experimental Sepsis Model

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Background and Goal of Study: The diagnosis and treatment of sepsis is a costly healthcare service and it is an important disease with high mortality rates. In the pathogenesis of sepsis, which we still cannot provide complete cure, there is increased cytokine release in the acute period and organ damage in the following period. Hydroxyurea has been shown to reduce leukocyte count, decrease inflammatory cytokines, and limit organ inflammation in ischemia-reperfusion models. In this study, we aimed to evaluate leukocyte count, IL1 beta, IL6 and TNF alpha cytokine values and organ inflammatory processes in hydroxyurea treated rats with experimental sepsis model. To our knowledge, this study is the first research that combines sepsis and hydroxyurea.

Materials and Methods: After ethical approval, Sprague-Dawley rats were randomly divided into three groups, control(n=7), sepsis(n=7), hydroxyurea(n=7). Sepsis was created using the cecal ligation and perforation (CLP) method in rats other than control group. Rats in the hydroxyurea group received hydroxyurea (200 mg/kg) intragastrically while control and sepsis groups received sterile distilled water. IL1 β, IL 6 and TNFα levels were measured at 0, 8, and 24 hours post-CLP in all rats. The blood samples were collected during sacrfication at 24 hours after CLP and analyzed for the complete blood count, kidney and liver function plasma biomarkers. Tissue specimens (lung, heart, spleen, kidney and brain) were taken for histopathological examination. Damage rating was performed with the scoring system.

Results and Discussion: It has been shown that cytokine levels(IL1β, IL 6, TNFα), while blood cell counts and tissue damage are increased after sepsis model in rats. It was found that the amount of cytokine levels at 8th hour, white blood cell count and brain tissue damage in hydroxyurea group were decreased significantly compared to sepsis group.

Conclusion: We conclude that early hydroxyurea treatment in rats with sepsis decreases proinflammatory cytokine(IL1β, IL 6, TNFα ) levels and thus reduces brain damage.
Background and Goal of Study: Transpulmonary thermodilution is recommended in the treatment of critically ill patients with heart disease. However, so far it has not been validated in patients with mechanical circulatory support devices (MCSDs). The aim of this study was to validate the cardiac output obtained by transpulmonary thermodilution in partial support of the heart with a continuous-flow MCS in an experimental porcine model.

Materials and Methods: The study was conducted with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial assistance of left ventricle. Cardiac output measurements were made using a PICCO thermodilution catheter, and the reference method was the pulmonary artery catheter (PAC). Measurements where performed in four different moments of the study: immediately before MCS was initiated (basal cardiac output), meanwhile partial support was provided, in MCS associated with hypovolemia status and in MCS associated with hypovolemia. Bland-Altman plot was used for validation of transpulmonary thermodilution. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain.

Results and Discussion: Comparing continuous thermodilution measurements with bolus cardiac output through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 16% (Bias -0.08) in the basal moment, 27% (Bias -0.04) when partial support with MCS was provided, 14% (Bias -0.09) in hypovolemia model and 29% (Bias -0.63) in state of hypovolemia.

Conclusion: The results described above show that the transpulmonary thermodilution could be used as reliable method in the measurement of cardiac output in a continuous-flow MCS for partial support of left ventricle in a porcine model.

Background and Goal of Study: Acute respiratory distress syndrome (ARDS) is a high-mortality and treatment options are limited. Neuromuscular blocking agents (NMBAs) in ARDS have been inconclusive about effects on outcomes. The objective of this meta-analysis is to explore the effect of NMBAs in adults with ARDS.

Materials and Methods: Cochrane Library, PubMed, EMBASE, and MEDLINE were searched from inception up to June 30, 2019. Randomized controlled trials (RCTs) that investigated the effects of neuromuscular blocking agents in adults with ARDS were included. Two investigators independently retrieved studies for inclusion and performed data extraction.

Results and Discussion: Five trials involving 1463 patients with moderate-to-severe ARDS were enrolled. NMBAs was associated with a lower intensive care unit (ICU) mortality (RR 0.76, 95% CI, 0.76-1.08; P = 0.05) and 90-day mortality (RR 0.86; 95% CI, 0.86-1.2; P = 0.05) (Figure 1). NMBAs improved oxygenation at 24, 48, 72 hours after randomization, reduced the risk of barotrauma and pneumothorax, did not prolong ventilator-free days, and did not affect the duration of mechanical ventilation or the risk of ICU acquired weakness.

Conclusion: NMBAs reduced ICU mortality, barotrauma, and pneumothorax, improved oxygenation, did not affect the duration of mechanical ventilation, and did not appear to increase ICU-acquired weakness for ARDS subjects. Considering NMBAs use in ARDS has limited data supporting the practice, we suggested that NMBAs should not be used routinely in patients with ARDS, even in severe cases. Conversely, it should be used when physiologically and clinically indicated.
Subject-ventilator asynchrony does not increase lung injury in pigs

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Background and Goal of Study: During spontaneous breathing activity (SB) in mechanically ventilated patients with acute respiratory distress syndrome (ARDS) subject-ventilator asynchrony can occur, which has been associated with poor outcome. We hypothesized that asynchrony worsens lung injury.

Materials and Methods: In 21 anesthetized pigs, ARDS was induced by a double hit consisting of saline lung lavage and injurious ventilation. Animals were randomly assigned to one of three groups (n=7/group; 12 h): 1) SB + externally induced asynchrony (Async); 2) SB (Sync) and 3) control (Ctrl, no SB). All animals were ventilated in the pressure assist-control mode (VT=6 ml/kg, PEEP=10 cmH2O, and fraction of inspired oxygen (FiO2)=1.0). Remote control of the mechanical ventilator was used to induce asynchrony externally. Gas exchange, hemodynamics, respiratory variables, and distribution of ventilation (electro impedance tomography) were assessed. Postmortem quantitative histologic analysis, inflammatory markers, wet-to-dry ratio and diaphragmatic muscle fibre thickness were determined.

Results: The Asynchrony Index (AXI) (percentage of missed and double triggered breaths) was higher in the Async-group (AX: Async: 15.9±5.7, Sync: 1.6±0.9 %; p<0.001). PaO2/FiO2 and oxygen consumption did not differ significantly among groups. P0.1 did not differ significantly between Async and Sync groups, whereas respiratory rate was higher in the Async than in the Ctrl group. The percentage of pendelluft was higher in the Async compared with Sync group, whereas the distribution of ventilation did not differ significantly between SB groups. The gene expression and protein levels of interleukins 6 and 8, as well as wet-to-dry ratio did not differ between groups. Mean septal thickness, volume fraction of alveolar edema as well as the total surface area of aerated lung did not differ between groups. Diaphragmatic muscle fibre thickness did not differ among the groups.

Conclusion: In this experimental model of ARDS, subject-ventilator asynchrony neither increased lung injury, nor affected diaphragmatic muscle fibre thickness.

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High-flow oxygen (HFO) therapy for a case of acute hypoxemic respiratory failure (AHRF) with pulmonary edema and kidney failure

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Background: High-flow oxygen (HFO) therapy through a nasal cannula is a technique whereby heated and humidified oxygen is delivered to the nose at high flow rates. Low levels of positive pressure are generated in the upper airways and physiological dead space is decreased. This led to a decrease in the work of breathing improving the survival rate among patients with acute hypoxemic respiratory failure(AHRF).

Case Report: A 52-year-old smoking man was admitted in “L. Vanvitelli” Hospital (Naples, Italy) for AHRF. He had a medical history of hepatitis C and IDDM. In the suspicion of bacterial pneumonia he received empirical antibiotic and NPPV. Clinical symptoms showed deterioration and he was admitted in ICU. He was apyretic and tachypnoic. Weak respiratory sounds and coarse crackles were heard in right chest.Blood samples showed: WBCs 27.000/μL, Hb 9.1 g/dL, PLTs 295.000/μL, and CRP 23.84 mg/dL. ABG showed: pH 7.35, PaCO2 27.8 mmHg, PaO2 67.8 mmHg, HCO3 17.1 mmol/l and lactates 32 mg/dL. Viral and bacterial tests were performed.Chest X-ray indicated alveolar interstitial edema and bilateral pleural effusion; CT imaging showed bilateral ground-glass and consolidative opacities. High Flow Nasal Cannula Oxygen Therapy (HFNC) was started and empirical antibiotic started. On day 2, patient presented pulmonary edema and kidney failure. Levosimendan infusion (0.05 mcg/kg/min) was started.2 Cultural exams were negative. Progressive improvement of respiratory and general condition was obtained (see Table 1).

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Efficacy of the de-escalation therapy in patients with sepsis-induced ARDS

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Background and Goal of Study: During the de-escalation stage of therapy, the patients with acute respiratory distress syndrome (ARDS) can require more aggressive fluid removal by means of diuretics or renal replacement therapy (RRT). The aim of our study was to compare the efficacy of de-escalation therapy in patients with sepsis-induced direct and indirect ARDS.

Materials and Methods: Sixty adult patients with sepsis and ARDS, receiving mechanical ventilation ≥24 hours, were enrolled into a prospective study. All patients had invasive hemodynamic monitoring using transpulmonary thermodilution (PICCO2, Pulsion, Germany). The patients received active de-escalation by means of diuretics or RRT in case of global end-diastolic volume index (GEDVI) > 650 ml/m2 or extravascular lung water index (EVLWI) > 10 ml/kg. The primary goal of de-escalation was the achievement of fluid balance at 48 hrs from 0 to – 3000 ml. In case of GEDVI < 650 ml/m2 or EVLWI < 10 ml/kg, the target fluid balance was in range from 0 to 3000 ml. The measurements included hemodynamics and blood gases. The patients were divided into two groups with pulmonary (direct, n=30) and extrapulmonary (indirect, n=30) ARDS. The statistical analysis was performed using non-parametric tests.

Results and Discussion: We found no baseline changes regarding age, gender or SOFA score in direct and indirect ARDS. Despite active fluid removal, in patients with extrapulmonary ARDS EVLWI did not change significantly to 48 hrs (p=0.06), whereas PaO2/FiO2 increased from 251 (203 - 280) mm Hg at baseline to 260 (200 - 325) mm Hg at 48 hrs (p=0.05). By contrast, in direct ARDS we observed the decrements in EVLWI from 12 (10 - 12) to 11 (8 – 12) ml/kg (p=0.006) and GEDVI from 777 (677 - 934) ml/m2 to 728 (614 - 885) ml/m2 (p=0.04), accompanied by improvement of PaO2/FiO2 from 184 (131 - 207) mm Hg to 246 (183 - 323) mm Hg (p=0.001). There was no significant differences in target fluid balance during 48 hrs: -2300 (-3923 – -4250) ml in extrapulmonary ARDS vs. -2210 (-3200 – -9450) ml in pulmonary ARDS (p=0.8). The survival rate and the number of ventilator-free days did not differ between the groups.

Conclusion: In sepsis-induced direct ARDS, active de-escalation therapy is more effective than in patients with indirect ARDS.

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Use of high-flow oxygenation during weaning from ventilation of ARDS patients with burns and inhalation injury of respiratory tract

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Background: High-flow oxygenation (HFO) through nasal cannula allows the delivery of a moisturized and heated oxygen-air mixture with a fraction of inspiratory oxygen (FiO2) from 21 to 100% and a flow rate of up to 80 l/min. This method has several potential advantages compared with standard inhalation of oxygen and non-invasive ventilation in different settings including weaning from ventilation in acute respiratory distress syndrome (ARDS).

Case Report: A 65-year-old female was admitted to the multidisciplinary ICU of a university hospital on October 14, 2019 with burns of the face, back, and upper extremities with a total area of 40% and inhalation injury of respiratory tract. The patient was diagnosed with moderate ARDS and received mechanical ventilation during 5 days. After stabilization, the patient was weaned from ventilator on October 19, 2019, followed by oxygen inhalation through a standard nasal cannula. In one hour after tracheal extubation, we observed severe hypoxemia requiring urgent reintubation. The bronchoscopy has revealed the obstruction of a right bronchus by thick sputum. The patient received several bronchoscopies, mucolytic therapy, invasive hemodynamic monitoring (PiCCO2) and protective mechanical ventilation until October 24. The burns of face made impossible the use of mask for non-invasive ventilation to reduce risk of unsuccessful weaning and improve sputum discharge, during transfer of patient to spontaneous breathing after tracheal extubation we used HFO (Airvo2, Fisher &Paykel, New Zealand) with a flow of 50 l/min and FiO2 80% followed by gradual decrease to 40-50% for maintaining SpO2 within 92-97%. At 24 hrs, extravascular lung water increased from 7 to 10 ml/kg but we maintained HFO 50 l/min and achieved negative fluid balance using diuretics, thus extubation failure was avoided. The patient did not experience any discomfort from the procedure. To 72 hrs, lung water returned to baseline values, PaO2/FiO2 did not decrease below 200 mm Hg, and respiratory rate did not exceed 25 /min, allowing the start of standard oxygen inhalation on October 27. The patient was transferred to the trauma unit on November 1 and discharged from the hospital on November 29 in a satisfactory condition.

Learning points: The use of HFO during weaning from ventilation of ARDS patients with burns and inhalation injury can be a useful tool for prevention of respiratory failure and reintubation.

Impact of mechanical power on mortality in ARDS patients

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Background and Goal of Study: In ARDS patients, mechanical ventilation should minimize ventilator induced lung injury. The mechanical power, which is the energy released to the respiratory system according to the applied tidal volume, PEEP, respiratory rate and flow, should reflect the ventilator induced lung injury; however, similar levels of mechanical power applied in different lung size could be associated to different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on different effects.

Materials and Methods: Retrospective analysis of ARDS patients, previously enrolled in seven published studies. All patients were sedated, paralyzed and ventilation was in volume-controlled mode. Partitioned respiratory mechanics and CT scan quantitative analysis were performed.

Results and Discussion: A total of 222 ARDS patients were included, 88 (40%) died in ICU. Mechanical power was not different between survivors and non-survivors (16.97 [11.51-18.41] vs 15.46 [12.33-21.45] UI/m2) and did not affected intensive care mortality. The multivariable regression logistic model showed that mechanical power normalized to well inflated tissue (IRR: 2.83 [95% CI: 1.99-3.93] p = 0.003) and mechanical power normalized to respiratory system compliance (IRR 1.63 [95% CI: 1.18-2.32] p = 0.003) remained independently associated with intensive care mortality after adjusting for age, SAPS II and ARDS severity. With the same logistic model, transtranspulmonary mechanical power normalized to well inflated tissue significantly increased intensive care mortality (IRR 2.84 [1.19-7.63] p = 0.026).
Conclusion: In conclusions, mechanical power and transpulmonary mechanical power are associated to the short term outcome in ARDS patients only when normalized on the respiratory system compliance or on the amount of well aerated tissue.

References:
1. Minimisation of dissipated energy in the airways during mechanical ventilation by using constant inspiratory and expiratory flows – Flow-controlled ventilation (FCV).

Learning points: Further research and clinical evaluation of potentially beneficial flow controlled ventilation is needed to establish its role as a new method of mechanical ventilation.

Ventilator associated pneumonia in patients with aneurysmal subarachnoid hemorrhage. Preliminary results from a retrospective study

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Background and Goal of Study: Ventilator associated pneumonia (VAP) is a serious complication in patients with aneurysmal subarachnoid hemorrhage (SAH). Systemic signs of infection from VAP may exacerbate secondary brain injury, prolong the length of stay in the ICU and increase morbidity and mortality rates. The main aim of the study was to determine the incidence of VAP among patients with SAH and to ascertain whether the presence of VAP, as well as the duration of antibiotic treatment have an impact on patient mortality.

Materials and Methods: This is a preliminary retrospective cohort study based on data collected from January to October 2019 on 44 patients having SAH. Statistical analysis was performed using the software IBM SPSS 22.0. Mann-Whitney U test and Fisher Test were used to check for statistical significance. The complete study will include a total of four years spanning 2016-2019.

Results and Discussion: The median length of stay in the ICU was 6 (IQR 14,75) days and 9 (20,4%) people died during their stay. None of the patients had aspiration pneumonia. 14 of the 44 patients developed VAP and received antibiotic treatment as a result. The median SAPSII score of our patients was 31.5 (IQR 32.5) and all aneurysms were excluded from circulation using either an endovascular coil or a surgical clipping. Patients with VAP had longer stays in the ICU than those without VAP (21.143±7.98 vs 4.722±4.5; P<0.001). There was no association between development of VAP and patient mortality (Fisher Test = 0.429). Neither the WFNS score nor the GCS score and presence of VAP were correlated (P=0.157 and P=0.193 respectively). An average of 5 days of antibiotic treatment did not influence mortality of patients with VAP (P=0.6).

Conclusion: Our preliminary data suggests that the 5-day antibiotic treatment could perform just as well as longer antibiotic treatments in terms of patient mortality. However, due to the small sample size more data needs to be collected to confirm our conclusions.

References:

Learning points: Further research and clinical evaluation of potentially beneficial flow controlled ventilation is needed to establish its role as a new method of mechanical ventilation.

Flow controlled ventilation applied in a case of patient with mediastinitis and bilateral pleural empyema

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Background: Recently new ventilation mode was proposed as an alternative to conventional modes-flow controlled ventilation (FCV). (1) Existing scarce evidence may suggest potential use of FCV in many clinical settings. (2) Case Report: We present the case of a 48 year old patient admitted to the Intensive Care Unit after cervicotomy and bilateral thoracotomy due to mediastinitis and bilateral pleural empyema in the course of tonsillitis and perforation of an abscess to the retropharyngeal space. Prior to the admittance rapid deterioration of cardiopulmonary sufficiency was observed and immediate surgical intervention was needed. Past medical history consisted only of obesity. In the Intensive Care Unit severe multisystem organ failure was observed despite prompt, multivay treatment. Due to low levels of PaO2/FIO2 ratio the use of FCV via decidated respirator and tube in tube technique was proposed. Within the designated time of ventilation increase in pO2 and constant level of pCO2 was observed.

Discussion: Up to date clinical evidence show that FCV may provide adequate and safe ventilation in the operative theater setting. What is more flow controlled expiration, which is constituent of FCV applied to animal models with artificially induced lung injury may improve ventilation and accomplish principles of lung protective ventilation. (3) In the presented case FCV served as an alternative method of ventilation before the onset of more aggressive treatment. Presented results are consistent with existing evidence, however prospective controlled clinical trials are needed to establish the clinical usefulness of this method.

References:
Shortening Lung Recruitment Maneuvers, Would Be Effective? An In Vivo ARDS newborn model

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Background and Goal of Study: MRPs have shown an improvement in tissue oxygenation, increase in alveolar volume and a homogeneous distribution of TV in patients with ARDS. Although the adverse events associated to RM, have been described as transient and self-limited, their routine use is not recommended; due to uncertainty about its long-term consequences and its possible relationship with an increase in morbidity and mortality. There is no consensus on how RM should be programmed, so that minimizes the risk of hemodynamic and barotrauma alterations. The aim of this study is to determine if the shortening of RM is effective in terms of improving ventilatory parameters and tissue oxygenation, in an in vivo ARSD newborn model.

Materials and Methods: We designed a prospective, experimental study. We selected 5 Landrace x Large-White piglets, between two and three days old, with a mean weight of 2.54 ± 0.22 kg. Under general anesthesia and tracheal intubation, invasive hemodynamic monitoring was performed with a pediatric arterial thermocatheter. To develop the reduced compliance neonatal model, bronchio-alveolar washes with 10ml/kg of high physiological saline, was performed. We designed two RM protocols: type 1 and type 2. Both methods.

Results: Increase in Static compliance from basal to after RM was in type 1 + 1.32 cmH2O (p = 0.01) and after RM type 2 was + 1.62 cmH2O (p = 0.005). Static compliance was higher than Teicholz compliance (1cmH2O / kg); difference in RM type 1 was + 0.76cmH2O (p = 0.01) and difference in RM type 2 was + 0.92 cmH2O (p = 0.018). The PaO2 / FiO2 index improves after RM type 1 the difference is + 288.12 (p = 0.001); and in type 2 = 286.12 (p = 0.001). We found a decrease in cardiac output after RM TYPE 2 of 0.062 L / min (p = 0.049). The remaining hemodynamic variables remained without significant changes.

Discussion: The results obtained allow us to verify the effectiveness of shortening RM protocols in ARDS newborn model. We hypothesize that duration of RM could be a determining factor in the development of hemodynamic alterations.

How can we manage the nitric oxide concentration of inhalation therapy with high flow cannula system? - simulator study

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Background and Goal of Study: With Nitric oxide (NO) inhalation therapy, a new option using high-flow nasal cannula (HFNC) system was developed. In inhalation therapy using HFNC, the correlation between the setting concentration and the administrated concentration is unclear. In this study, we investigated the correlation between the setting NO concentration and the measured using a spontaneous breathing simulator with HFNC system.

Materials and Methods: We made a spontaneous breathing simulator. The simulator was made from three components: lung simulator (Training and Test Lung), a T1 T1 ventilator and Airway Management Trainer model for tracheal intubation. Precision Flow (Vapotherm,Inc, USA) was chosen as the HFNC system. Ainoflow was used for NO administration and measurement. Setting NO concentration (NOset) and measured NO concentration at the pharyngeal (NOmeasured) were recorded. Minute ventilation volume (MV) and HFNC fresh gas flow (FGFHFNC) were set for several conditions. Each measurement was repeated four times, and the average was obtained. The correlation coefficients between NOset and NOmeasured in each setting were calculated using JMP.

Results and Discussion: In the setting of MV 5 L/min and FGFHFNC rates 20 L/min, [NOmeasured] = 0.174 * 0.782 * [NOset] (R2 = 0.999). In the setting of MV 15 L/min and FGFHFNC rates 20 L/min, [NOmeasured] = 0.141 + 0.673 * [NOset] (R2 = 0.996). In the setting of MV 15 L/min and FGFHFNC rates 10 L/min, [NOmeasured] = 0.371 + 0.596 * [NOset] (R2 = 0.998). There was a high correlation between the NOset and the NOmeasured in each condition. When the MV was increased, the measured NO concentration at pharyngeal was decreased. When NO was administered with HFNC, the pharyngeal NO concentration was lower than the setting concentration. The pharyngeal concentration was directly proportional to the pulmonary inhalation concentration. The difference between measured concentration at pharyngeal and setting concentration was wide in large MV or low FGFHFNC rate.

Conclusion: There are two findings assumed from our simulation about NO inhalation therapy with HFNC. (1) The NO concentration at pharyngeal can maintain with a sufficient HFNC flow rate. (2) The correlation between the NOset and the NOmeasured is well. Therefore, the NO concentration at pharyngeal (pulmonary inhalation NO concentration) can maintain with the setting NO concentration.
Development septic arthritis due to B. Fragilis in a critical ill patient

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Background: Septic arthritis of native joints is a potentially life-threatening disease [1]. The most frequently isolated pathogens are Gram positive cocci [2, 3]. Bacteroides fragilis is a rare pathogen in joint infections and related to skin or local perineal infections or are secondary to B. fragilis bacteremia from another source, for example from the gastrointestinal tract.

Case Report: A 64-year-old male was admitted with fever. He had a past medical history of paraplegia. The patient suffered a mid-shaft femur fracture 12 months earlier, without dislocations, treated conservatively. CT scan demonstrated avascular necrosis of left hip joint with destruction. Patient was treated with antibiotics including metronidazole. After initial surgical drainage, the patient developed multiple organ failure and septic shock. During this period, intensive supportive management included the administration of crystalloids, vasopressors and broad-spectrum antibiotics. Diagnosis of septic arthritis was confirmed by a positive synovial fluid for B. fragilis. Due to recurrence of multiple intra-articular abscesses a left extended hemipelvectomy was performed. The patient was discharged from the unit 6 weeks after admission.

Discussion: Despite the fact that fractures in a paralyzed limb are relatively rare, such asymptomatic, subclinical fracture of the hip joint might be a potential risk factor for the development of septic arthritis.

References:

Conclusion: A 64-year-old male with avascular necrosis of left hip joint due to B. fragilis infection is a life-threatening disease that might be complicated by potential multiple organ failure. Early antibacterial therapy combined with radiological drainages and surgical intervention can lead to significant improvement in the patient’s outcome.

Monitoring of intra-abdominal pressure in patients with septic shock

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Background and Goal of Study: A large number of patients with septic shock develop intra-abdominal hypertension (IAH). The mechanism of IAH within sepsis is the existence of common predisposing factors (massive fluid replacement, third space, ileus, splanchic hypoperfusion, bowel distension) that result in impaired perfusion and accumulation of toxic products. Determining the impact of IAH on the mortality rate of patients with septic shock.

Materials and Methods: The prospective cohort study was conducted on 50 patients who had septic shock. Measurement of intra-abdominal pressure (IAP) via urinary catheter placed in the urinary bladder was performed every 12 hours and monitored until they left the intensive care unit. Based on the measured IAP values, all patients were divided into a group of patients with normal IAP values (n = 15) and with increased values (n = 35). Using APACHE II score, lactate levels, values of mean arterial pressure (MAP), abdominal perfusion pressure (APP), filtration gradient (GF) and diuresis, the obtained values were compared to IAP in both groups of patients.

Results and Discussion: In the first group of patients the mean IAP was 8.3 ± 2.3 mmHg, in the second group of patients the mean IAP was 16.4 ± 4.2 mmHg. There was a highly statistically significant difference in the variables APACHE II score (p = 0.004), lactate values (p = 0.0001), MAP (p = 0.0002), GF (p = 0.006) and diuresis (p = 0.001) in two studied groups. With the increase in IAP statistically significantly increased in lactate level (r = 0.45, p = 0.001), and decrease in values of MAP (r = -0.83, p = 0.01), APP (r = -0.77, p = 0.05), GF (r = -0.69, p = 0.05) and diuresis (r = -0.54, p = 0.01). There was a statistically significant correlation between IAP increase and patient death (r = -0.39, p = 0.001).

Conclusion: Patients with septic shock who develop IAH have a statistically high correlation with organ dysfunction, because the IAH itself can worsen and lead to death. IAH has an impact on the increase in mortality rates in patients with septic shock.

Comparison of diagnostic and prognostic value among Presepsin (scCD14-ST), Procalcitonin (PCT) and Interleukin-6 (IL-6) in the management of Sepsis

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Background and goal of study: Membrane monocyte/macrophage CD-14 (mCD-14) is a co-receptor for endotoxin, & its soluble form is k1 Presepsin or scCD14 ST cleaved from the monocyte/macrophage-specific mCD-14 receptor complex during systemic infections. In our study we tested the hypothesis that: Presepsin may have better diagnostic & prognostic value amongst PCT & IL-6; Presepsin may correlate with illness severity score (SOFA) & mortality. The aim of this study is to investigate the clinical value of Presepsin in early diagnosis, risk stratification & prognostic evaluation of sepsis in a patient with sepsis/septic shock admitted in ICU & to compare it with the diagnostic & prognostic value of PCT & IL-6.

Material and methods: Total 30 patients were included in this study which met all inclusion criteria. Subjects were divided into two groups (Sepsis and Septic shock) on the basis of clinical diagnosis. Blood samples for biomarkers like Presepsin, PCT, IL-6 were collected from patients during systemic infections. In our study we tested the hypothesis that: Presepsin may have better diagnostic & prognostic value amongst PCT & IL-6; Presepsin may correlate with illness severity score (SOFA) & mortality.

Results and discussion: Presepsin was significantly (p<0.01) lower in sepsis patients (169.50±34.74 ng/ml) compared to septic shock (291.90±334.67 ng/ml) at Day 3. However, IL-6 was significantly (p<0.05) lower in sepsis patients compared to septic shock at all the time periods (D1: 41.20±45.80 & 219.11±314.95 with p value 0.0001, D2: 83.50±126.73 & 224.85±314.84 with p value 0.03 and on D3= 48.70±55.29 & 308.88±390.63 pg/ml with p value 0.02). SOFA was significantly lower in sepsis patients compared to septic shock at Day 2 (p=0.003) and Day 3 (p=0.0001).

Conclusion: Value of Presepsin in differentiating sepsis from septic shock is better than PCT but inferior to IL-6. Prognostic value of PCT in predicting mortality is better than IL-6 & Presepsin (sensitivity & specificity of PCT were 66.7% & 50% vs IL-6 61.1% & 66.7% & Presepsin 44.4% & 50%) & PCT also best correlated with disease severity score SOFA.

Efficacy of recombinant thrombomodulin for septic multiple organ failure and Disseminated Intravascular Coagulation: a single centre retrospective cohort study

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Background and Goal of Study: Recombinant thrombomodulin (rTM) is one of the anticoagulants developed in Japan and is expected to be effective against septic Disseminated Intravascular Coagulation (DIC). The possibility of improving multiple organ failure in sepsis has also been suggested, but these have not been clarified yet. The SOFA score is generally used as an index for evaluating multiple organ failure in sepsis. Recent studies have shown that this rate of change (ΔSOFA) during ICU stay is related to the severity and mortality of patients with sepsis. The aim of our study is to examine whether this administration of rTM improves multiple organ failure in sepsis or septic DIC.

Materials and Methods: A single centre retrospective cohort study. The subjects were sepsis patients who entered ICU from April to October 2017. The primary endpoint was ΔSOFA. The secondary endpoints were DIC incidence and acute DIC score at the time of rTM administration and after 7 days, the change in the DIC score (ΔDIC), 28-day mortality, and in-hospital mortality. Acute DIC score was used as the DIC evaluation. Mann-Whitney U test and χ2 test was used as statistical evaluation with p<0.05 as the significance level.

Results and Discussion: 95 patients were included in the study period, of which 21 were in the rTM group and 74 were the control group. The ΔSOFA was 2.5 ± 3.3 vs. 2.9 ± 4.8 (p = N.S.). The incidence of DIC was 62% vs. 20% (p <0.01) at ICU admission and 46% vs. 18% (p <0.01) 7days after. The acute DIC score was 4.1 vs. 2.9 (p <0.01) at ICU admission and 3.1 vs. 2.1 (p <0.05) 7days after. There was no significant difference in 28-day mortality (29% vs. 15% (p = N.S.)), and in-hospital mortality (38% vs. 20% (p = N.S.)). Although, there was no significant difference in patient age or SOFA score at ICU admission between the rTM group and control group. ΔDIC was significantly higher (1.02 ± 2.4 vs. -0.1 ± 2.0 (p <0.05).

Conclusion: There was no difference in SOFA score and ΔSOFA between rTM group and control group. This study is limited to retrospective study, and stratification of patient backgrounds may give different results. Although there was a difference.
in the incidence of DIC at ICU admission, because of the incidence 7 days after was reduced and ΔDIC was different. rTM may be expected to be effective as a DIC treatment.

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Pneumococcal sepsis with septiciemia in a 6 years old child, complicated with Pneumococcal-associated hemolytic uremic syndrome (pHUS): case report

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Background: Despite the vaccination against pneumococcal infection has been taking place and actively promoted in Kazakhstan as well as worldwide, frequency of the infection remains high among children. One of the rare but severe complications of generalized invasive pneumococcal infection is pHUS.

Case Report: A 6-year-old girl was admitted to the clinic complaining of vomiting, fever and rash. Parents indicated that the disease has started 6 hours ago, when the child’s temperature rose to 39°C. Upon admission, the patient was alert and responsive. On day 2 depression of consciousness to stupor was noted, oxygen saturation dropped to 83%, which is why the child was intubated and placed on mechanical ventilation in SIMV mode. On the same day due to the presence of prolonged anuria, azoemia and edema abdominal catheter for peritoneal dialysis was placed. After the dialysis catheter implantation, the realization and progression of hemorrhagic syndrome with development of anemia was noted. This is why transfusion with FFP as well as packed red blood cells was initiated. On day 3 the results of nasal, CSF and blood cultures came in, from which pneumococcus was identified, also, PCR analysis of the CSF was obtained and result was positive for pneumococcal DNA, which made us to reconsider the diagnosis and change it to generalized form of pneumococcal infection with septicemia, complicated with pHUS. The patient was switched to hemodialysis, which resulted in slight reduction of nitrogenous substances in the blood. Respiratory function was improving, which allowed us to switch to the CPAP mode. 22 days following hospitalization creatinine level was equal to 294mcg/dl and the patient was transferred to the specialized nephrology clinic, where two more hemodialysis sessions were conducted, and she was discharged 2 weeks later with creatinine level of 147 mcg/dl (See table 1).

Discussion: Diagnosis of pHUS is based on the association of the clinical triad of HUS with confirmed or suspected S. pneumoniae infection. The clinical course of pHUS is typically more severe, with more frequent need for dialysis and transfusions, and longer hospital stays.

Learning points: Generalized course of pneumococcal infection complicated with pHUS is rare, clinicians should pay particular attention when dealing with immunocompromised and unvaccinated as well as asplenic patients (e.g. after splenectomy).

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Incidence and outcome of sepsis and septic shock in patients of a multidisciplinary North-Russian intensive care unit

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Background and Goal of Study: Sepsis and septic shock are considered to be the leading cause of mortality in critically ill patients. Since a morbidity from sepsis in the intensive care units (ICU) is changing over time, the purpose of our study was to evaluate the incidence, structure and outcomes of sepsis and septic shock according to Sepsis-3 definitions in a Russian ICU.

Materials and Methods: We performed a retrospective analysis of 3103 admissions in the multidisciplinary ICU of a 1000-bed university hospital (the City Hospital #1 of Arkhangelsk. Russia with an uptake area in North Russia covering population of 300,000) during year 2018 and assessed ICU charts of 121 (3.9%) from all admissions) adult patients with diagnosis of sepsis. We evaluated age, gender, origin of sepsis, localization of organ dysfunction according to SOFA score, duration of ICU stay, and mortality rate. The data are presented as n (%), M±SD or median (25–75 percentiles).

Results and discussion: The study population included 62 (51.2%) males and 59 (48.8%) females. The mean age was 66.5±14.7 years, the duration of ICU stay was 4 (1–7.2) days. The most common origins of sepsis were pulmonary and abdominal sources (in 43.8% and 28.9% of patients, respectively), followed by urological, soft tissue, central nervous system, vascular, combined or other infections. Septic shock occurred in 70 (57.9%) of cases. Other sepsis-induced organ dysfunctions with SOFA score ≥2 included kidney injury (57.9%), deterioration of mental state (53.7%), acute respiratory distress syndrome (ARDS) (50.4%), disseminated intravascular coagulation (28.9%), metabolic disorders (26.4%), and hepatic failure (23.1%). The mortality rate was 31.4% in sepsis without septic shock and 69.7% in septic shock. From all non-survivors, 37.1% died during the first 24 hours.

Conclusions: Sepsis occurs in 3.9% of ICU patients with mortality rate increased twice in septic shock. The most common origins of sepsis are pulmonary and abdominal sources. In addition to septic shock, the organ dysfunctions observed in more than half of sepsis patients include kidney injury, deterioration of mental state and ARDS.

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Septic shock due to Acute bartholinitis, a case report

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Background: Acute Bartholinitis is a local infectious process, a common reason for consultation in ED. Frequently, it is treated with drainage and PO antibiotics with no complications. We report a case of a healthy female who suffered one of serious complications related to Bartholinitis.

Case Report: A 27 years old female with no other medical history, except for use of IUD as anticonceptive purpose, was sent to ED by the primary care physician for acute Bartholinitis with fever, abdominal distention, hypotension and tachycardia. She already had consulted because of this to the physician 48 hours ago, PO antibiotics and NSAIDs were prescribed but no drainage of the abscess. The clinical statute rapidly deteriorate despite drainage of the abscess in the ED, requiring IV fluid therapy, vasopressors and mechanical ventilation due to acute pulmonary edema associated to her septic condition. Blood work demonstrated leukocytosis with left shift, coagulopathy, procalcitonin >100, metabolic acidosis with Hyperlactatemia. An abdominal and pelvic CT scan with contrast was performed where severe pelvic inflammation and free liquid in the abdominal cavity were present. Because of critical clinical state, empiric treatment with Meropenem, Tigecyclin and Metronidazole was initiated, exploratory laparotomy was performed with no findings; after the surgery she was transferred to ICU, in mechanical ventilation, PaFi 122 mmHG, with noradrenalin at 0.8 mcg/kg/min; SOFA score of 10 points. The ICU evolution was favorable; in next 48 hours she was extubated, noradrenalin suspended, and the blood work up normalized. Positive culture of the abscess demonstrated Prevotella bivia. She was maintained in ICU for 4 days and discharged from the hospital after 12 days.

Discussion: Acute bartholinitis is a local process that curses with severe pain and discomfort but its a rare cause of septic shock. There are a few cases of Bartholinitis related sepsis published in the literature. Bacteriemia can be related with manipulation of the abscess.

Learning points: There was delayed initiation of treatment recommended by the Surviving sepsis campin2 due to underestimated risk of the patient and her disease.

References:
Changes in chloride concentration and association of hyperchloraemia with organ function in sepsis and septic shock

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Background and Goal of Study: Hyperchloraemia is increasingly recognised as an electrolyte disorder in critically ill as it may increase the attributive risks of acidosis, acute kidney injury, refractory shock and hypotension, as well as mortality. The aim of our study was to assess the changes in chlorides and association of hyperchloraemia with organ dysfunction in sepsis and septic shock.

Materials and Methods: The medical records of 121 patients diagnosed with sepsis and septic shock were retrospectively analysed for the changes in chloride concentration and organ functions according to SOFA score over 72 hrs after admission to mixed ICU. Septic shock and sepsis have been defined in accordance with SEPSIS-3 criteria. The cumulative fluid balance was calculated on Day 3 after ICU admission. The 28-day mortality and the length of ICU stay have also been registered.

Results and Discussion: Septic shock was diagnosed in 65 (54%) patients. On ICU admission, chloride concentration has been available in 86% of sepsis patients. Twenty-one (17.4%) of all the patients were excluded from the following analysis due to haemodialysis / haemofiltration that could affect natural changes in chloride and creatinine. Hyperchloraemia at admission (Cl– ≥ 106 mmol/L) was registered in 40% patients with septic shock and in 48% of patients with sepsis without shock. In shock, only the change in Cl– defined as a difference between the last and first available values over 72 hrs but not absolute values of plasma Cl– concentration on admission correlated with parallel changes in SOFA score (rho = 0.49; n = 25, p = 0.01). Changes in Cl– were more prominent in septic shock compared with sepsis without shock: 4 (1–14) and 2 (–2..+5) mmol/L, respectively (p = 0.04). Lactate and creatinine concentrations on admission as well as cumulative fluid balance by 72 hrs were higher in non-survivors (p = 0.002). There was no association of hyperchloraemia with mortality or length of ICU stay.

Conclusion: Hyperchloraemia is a frequent electrolyte disorder observing in almost a half of patients with sepsis. The patients with septic shock demonstrate more prominent increase in chloride concentration. Increased plasma chloride in septic shock is associating with a progress of organ dysfunction.

Septic due to Rhodotorula mucilaginosa in an immunocompromised patient- a case report

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Background and Goal of Study: The purpose of this case report is to show a rare case of an immunocompromised patient with pneumonia and sepsis due to Rhodotorula mucilaginosa infection. The incidence of this infection in Europe is 0,5%-2,3%. The patient is a 71 years old male, suffering from LPL. He had underwent several courses of chemotherapy and radiation therapy. He had fever of 40 degrees Centigrade for over one year. The patient was admitted to Hematology Department of UMHAT "Aleksandrovsko" - Bulgaria in November 2019, where antibiotic treatment begun. On the 14th day his condition aggravated and he was transferred to ICU with severe sepsis and pneumonia. Microbiological findings from the hemoculture showed growth of the opportunistic yeast Rhodotorula mucilaginosa. Despite the treatment and the mechanical ventilation, the patient died on the sixth day of his ICU stay.

Results and Discussion: Despite Rhodotorula being previously considered a nonvirulent saprophyte, recent findings show it can cause severe infections and death in immunocompromised patients. The major risk factors are prolonged treatment with antibiotics and corticosteroids, especially in patients with hematologic malignancies. Currently there are no guidelines or definite treatment of this causative agent.

Conclusion: Rhodotorula mucilaginosa is a rare, yet lethal infection in patients with suppressed immune system. This yeast should not be underestimated and when enough cases are collected, we must aim at creating a suitable guideline.

Selective decontamination of the intestine in neurosurgical patients with subarachnoid haemorrhage in the acute period of cerebral aneurysm rupture

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Background: In patients the acute period of cerebral aneurysm (CA) rupture SiRS is triggered due to subarachnoid haemorrhage (SAH) stimulating cerebral vasospasm. Therefore such patients from the first hours need neurovegetative blockade (NvB) for neuroprotection. NvB makes the intestinal motility slow down and creates favorable conditions for the translocation of intestinal flora in systemic blood flow, which can initiate the development of infectious complications. Preventative decontamination of the intestine using broad-spectrum antibiotics can reduce the pathogenic bacterial load.

Goal of Study: To reduce the number of infectious complications and sepsis in patients with SAH in the acute period of CA rupture.

Materials and Methods: The prospective control cohort study included 84 (age 42±6, 48 female-51, male-33) patients in the acute period of CA rupture (Fisher 4, Hunt-Hess 3). The main group - 48 patients, the control group - 36 patients. All patients were treated with NvB (Iloprost 1,0-3,0 mg/kg/h or propofol 2,0 mg/kg/h + L-arginine 1,0 mg/kg/h + dexmedetomidine 0,2 mg/kg/h), artificial lungs ventilation, an external ventricular drainage. Monitoring included HR,EKG,SpO2,eCO2, invasive BP (PICCO, IntelliView800 PHILIPS). Patients of the main group from the 1st day of treatment got Rifaximinum 200 mg every 8 hours or Nifuroxazide 200 mg every 6 hours for 7 days orally through a nasogastric tube. In all patients we analysed daily CRP, PCT concentration, the occurrence of infectious complications, duration of stay in ICU.
Results and Discussion: in both groups high growth of CRP was observed from the 2nd day from aneurysm rupture with maximum rise at about the 7th day to 560 mg/l in the control group. The CRP level in the main group was about 2.5 times lower compared to the control group. Procalcitonin concentrations were more lower in the main group than in the control group - 18,0±5,3 days. In the main group we did not observe the development of intestinal perasis. In control group 24 patients developed infectious complications including 6 cases of sepsis. No cases of sepsis were observed in the main group. Time in ICU also differed: the main group 9,0±3,6 days; control group - 18,0±5,3 days.

Conclusion: prophylactic decontamination of the intestine in neurological patients in the acute period of CA rupture allows to reduce the incidence of infectious complications and sepsis.

References:

Learning points: clinical manifestation, prognosis and complications of hantavirus infection in intensive care follow-up

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Tetanus in 3-years old child

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Background: Clostridium tetani (G-positive rod-shaped anaerobic bacterium) can be found globally in soil and in gastrointestinal system of several animals (including human). Tetanus is caused by clostridium tetani invasive infection, mainly through the infected/contaminated wound and the most common presentation of the disease is muscle twitches, muscle cramps and (opisthotonos, trismus). Tetanus-associated spasms are severely painful and can compromise the airway patency, that can lead to hypoxemia and even death. Currently tetanus in developed countries is extremely rare disease due to world-wide vaccination.

Case Report: We present a case of 3-years old child, with the nasal mucosal defect after button battery. The patient was examined by ENT surgeon and the battery was successfully removed. After 14 days, parents reported face grimaces, progressive fatigue and trismus. In two days, the condition further deteriorated, and the child is not able to swallow. Patient was admitted to the hospital with the working diagnose of tetanus (patients is not vaccinated). After admission muscle spasm with opisthotonos was triggered by attempt to drink. Benzodiazepines was administered, EEG and CSF fluid were without pathology. Antitetanic globulin + tetanic vaccination was administered together with antibiotic against clostridium (clindamycin + metronidazole). In four days despite the antitetanic globulin treatment, magnesium and benzodiazepines, because of spasms cumulation and respiratory failure patient was intubated and mechanically ventilated for next 7 days. After extubation the condition was gradually improving, and patient was dismissed from hospital at 34th day.

Discussion: Although tetanus is nowadays extremely rare in developed countries, the incidence of extended disease can have rising tendency due to growing number of not vaccinated patients (vaccination refusal).

Learning points: In the differential diagnosis, it is extremely important to consider the patient’s history of vaccination. Tetanus has mortality up to 50%. It can be treated by antitetanic globulin + vaccination and the supportive therapy (magnesium and benzodiazepines) – to lower the threshold for muscle spasms.

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Hemorrhagic fever with renal syndrome and concomitant pulmonary syndrome: Fatal Hantavirus case in a farmer from Turkey

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Background: There isn't any reported hantavirus case in Turkey until 2009. It's considered in high risk并to travel to endemic Areas

Case Report: A 57-year-old male farmer admitted to the emergency department with nausea, vomiting, abdominal pain and high fever. Renal function test (RFT) deterioration, thrombocytopenia, PT and PTT prolongation were detected in first examinations. The patient was admitted to the ICU with acute renal failure. His detailed history revealed that there were mice and squirrels in his living environment. In the follow-up, common petechiae developed in his lower extremity. Crimean-Congo Hemorrhagic Fever and leptospirosis were considered in the differential diagnosis with thrombocytopenia, transaminase elevation, RFT deterioration. Hantavirus IgM and IgG were diagnosed by ELISA. During follow-up, it was observed that lung and kidney failure developed and the patient was intubated, mechanical ventilator support was initiated and underwent continued veno-veno voice hemodialifration (CVVH) therapy with cytokine absorption. After the addition of liver and lung failure to the patient in hantavirus fever with renal syndrome (HFRS), the clinic progressively worsened and he died at 32nd day of ICU.

Discussion: Hantavirus is a zoonotic infection with several subgroups of RNA in the bunyavirus family. The virus is ejected into the environment with feces and urine of rodents. The disease is caused by the ingestion of virus, by inhalation of the contaminated dust into the environment or by the bite of rodent carrying the virus. It can be seen in a wide spectrum from influenza-like symptoms to lethal organ dysfunctions. Clinical manifestation by this virus, which cannot be certain treated with antiviral treatment, liver, kidney and lung supportive treatment and strict intensive care support are essential. These clinical syndromes may be confused with other infectious or noninfectious diseases. Hanta virus should always be keep in our minds for differential diagnosis.

References:

Learning points: clinical manifestation, prognosis and complications of hantavirus infection in intensive care follow-up

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Invasive Amebiasis in a spanish Host who has not travelled to endemic Areas

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Background and Goal of Study: Amebiasis is an endemic parasitic disease in developing countries caused for Entamoeba histolytica. In industrialized zones, is usually seen in migrants and travellers returning from endemic areas. The infection primarily occurs by ingestion of contaminated food or water, but sexual transmission by fecal-oral contact has been described.

Case Report: A 39-year-old spanish male with personal history of alcoholism, who had not travelled outside Europe, was admitted to Emergency with fever, abdominal and pleuritic pain, and seven-day diarrhea. He was transferred to the Resusculation Unit due to septic shock. A CT scan showed a 78 mm liver abscess of the right lobe. An ultrasound guided drainage was inserted and cultures obtained. In the liver aspirate, E. histolytica was directly visualized, and PCR was positive in different tissues on 3er day. The pleuropulmonary and peritoneal affection was due to direct extension of liver-abcesses. Haematogenous dissemination presented as skin lesions on the chest and face, and multiple intraperichymal and basal ganglia brain abscesses, which were observed in a cranial CT scan. He received a 10 weeks intravenous (IV) metronidazole therapy, plus 10 days of IV chloroquine and 7 days of oral paromomycin. After completing therapy, the patient was discharged to ward on the 110th lacking neurological damage.

Discussion: This is a rare case of native amebiasis in Spain of unknown aetiology. 90% of primary infections are asymptomatic. Extraintestinal manifestations are present in less than 1%, being amebic liver-abcesses the most common. Synchronous brain abscesses, which were observed in a cranial CT scan. He received a 10 weeks intravenous (IV) metronidazole therapy, plus 10 days of IV chloroquine and 7 days of oral paromomycin. After completing therapy, the patient was discharged to ward on the 110th lacking neurological damage.

Learning points: In presence of liver abscess, amebiasis must be considered even in patients without travel history.
The USS machine as a vector for infection transmission in critical care: a study of microbiological contamination

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Background and Goal of Study: Point of care ultrasound has become increasingly common in both anaesthesia and critical care. Frequent use of machines renders them a potential vector for transmission of infection between patients. This prospective study was undertaken to assess our ultrasound machines (USM) for physical and microbiological contamination.

Materials and Methods: Following institutional review and approval (CARMS-15238) retrospective single-centre cohort study was conducted. As patients were not involved in this study, further ethical approval was not sought. Three rounds of inspection were undertaken on all USM in the ICU, each one month apart. The USM were Philips Sparq Echocardiography (3), Sonosite Nanomaxx (1), S-ICU (1) and S-Nerve (2). Each USM was visually inspected for contamination, then microbiological samples were taken, one swab each from the screen/controls, the probes and the connecting cables. These were cultured and identified in the laboratory. Categorical data were presented as numbers and percentage, and were then analysed using Fisher’s exact test, using GraphPad Prism 8.3.0, San Diego, California, USA.

Results and Discussion: The USMs were sampled on three occasions, totalling 19 sampling events (some USMs were away for maintenance during sampling). On 15 occasions, dried gel was found on the probe or screen, 5 had dried and 1 had wet blood, 10 had open gel packets and 4 had used ECG electrodes. Of a total of 57 cultures taken, 46 had positive growth, 45 were bacteria and 4 fungi. 1 had wet blood, 10 had open gel packets and 4 had used ECG electrodes. Of a total of 57 cultures taken, 46 had positive growth, 45 were bacteria and 4 fungi. Some samples positive for both. All bacteria were aerobic spore formers or skin commensals; no high concern species were detected. All the fungi were found on the echocardiography machines’ probes and cables. Soiling of a USM was not associated with an altered risk of positive culture (p>0.05 for all tests), but the study may be underpowered for these endpoints.

Conclusion: We were reassured no pathogenic organisms were detected on USMs, but clearly there is scope to improve our US machines’ cleanliness. We therefore propose to develop processes to improve cleaning (attaching cleaning wipes to machines, allocating USS machine cleaning to designated ICU staff, raising staff awareness) and mandate sterile sheaths for all invasive procedures.

References:

Disseminated Tuberculosis and Hemophagocytic Syndrome in Critical Care Unit, in a young woman with Inflammatory Bowel disease treated with Infliximab

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Background and Goal of Study: We present a case of a 27 years old woman with inflammatory bowel disease, admitted due to Postsurgical Critical Care, after scheduled splenectomy to study her short course of fever, leukopenia and splenic space occupying lesions and splenomegaly. She has been previously treated with Infliximab due to Colitis and completed correct Tuberculosis Prophylaxis.

Materials and Methods: We reviewed our case in our Electronic Health Database IANUS and compared it with other case reports in literature, found in PubMed, with keywords Tuberculosis, Inflammatory disease and Hemophagocytic Lymphohistiocytosis.

Results and Discussion: After splenectomy, she needed Intensive Care, due to acute respiratory failure, alveolar-interstitial pulmonary infiltrates, right pleural effusion, shock and fever. Bone marrow aspirate resulted in hemophagocytic lymphohistiocytosis and acute respiratory failure despite correct prior Tuberculosis Prophylaxis.

Conclusion: The importance of this case, is given by association between Hemophagocytic Syndrome and Disseminated Tuberculosis in an immunosuppressed patient with Infliximab and the outcrop of this infectious disease that must always be considered in the differential diagnosis of fever despite correct prior Prophylaxis. Therefore, is an opportunity to focus on the efficacy of anti-TB chemoprophylaxis in

Invasive pulmonary aspergillosis-IPA is typically considered a common disease among severely immunocompromised patients. Few cases of IPA in critical immunocompetent patients have been described. We present the case of a previously healthy individual with acute respiratory viral infection, who presented in a secondary phase with gastric aspergillosis.

Case Report: 62-y.o male without any medical history is admitted to the ICU with bilateral and multiple pulmonary consolidation due to influenza virus type A H1N1, septic shock and associated bacteraemia due to streptococcus pyogenes skin infection. At admission we found ARDS and multiple organ failure (DIC, hemodynamic, acute renal failure, liver failure). SAPS II score 53, SOFA score 13. Invasive mechanical ventilation, aggressive antibiotic and antiviral regimen, hemodynamic therapy and enriched immunoglobulins were started. After ten days of admission upon gastric aspergillosis. Treatment with voriconazole was started and continued for a total of 90 days. He was successfully discharged from our ICU after 30 days.

Discussion: In our case the early aggressive therapy aided the patient in overcoming the initial septic pro inflammatory response. It’s probable that in a secondary phase the host defenses were severely compromised facilitating an Aspergillus colonization of upper airways and further haematological diffusion onto the gastrointestinal tract leading to an invasive pulmonary and extrapulmonary infection. After the initial respiratory viral infection he didn’t present any new respiratory symptoms that could prompt us to suspect a secondary pulmonary infection, therefore the identification of aspergillus spp on bronchoalveolar lavage was interpreted as colonisation. Antifungal therapy was initiated only after histological diagnosis of Aspergillus spp in the stomach and ileal segment.

References:
Learning points: Algorithms for non-immunocompromised patients are needed. Invasive aspergillosis can present in extrapulmonary settings in absence of respiratory symptoms.
Case Report: We present the case of a 51 yo male diagnosed with non corrected IVC and left pulmonary branch agenesis in Eisenmenger situation. He was cardiovically stable until admission to the hospital after 2 weeks of fever, pain and swelling on his upper limb. Necrotizing fasciitis was suspected and treated surgically and pharmacologically with meropenem, clindamycin and daptomycin. He developed sepsis with haemodynamic, renal and respiratory failure, all of them finally solved. Microbiologically, no causal agent was found. He finally was discharged from the ICU after a week of favorable evolution, followed afterwards by the cardiology and plastic surgery wards.

Discussion: The mean age at death of patients with Eisenmenger physiology has been reported to be 37 years or less, although the individual clinical course is quite variable. Although some patients with Eisenmenger syndrome survive into their 60s and beyond, survival is generally limited. Necrotizing infection is associated with considerable mortality, even with optimal therapy. We present the case of a survivor of both conditions, which is very rare, considering his age and the septic complications he developed.

References:
1. UpToDate: Necrotizing soft tissue infections. UpToDate: Management of Eisenmenger Syndrome.
2. Learning points: Although both necrotizing fasciitis and Eisenmenger Syndrome have high mortality rates, with adequate care this patient survived and now has been discharged from the hospital and lives his basal life situation.

5339
Preventing ICU's infections by electronic flow devices
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Background and Goal of Study: Preventing healthcare associated infections is important in patients’ management and safety, especially in ICU. Bactiguard® devices consist in endotracheal tube, central venous catheter and urinary catheter with a metal alloy coating of gold, silver and palladium. This coating creates a galvanic effect when it comes in contact with fluids preventing microbial adhesion and potential infections.

Materials and Methods: Aim of this study is to evaluate if clinical outcome improves in ICU’s patients treated with Bactiguard® devices. 20 patients admitted to ICU requiring endotracheal intubation, central venous catheter and urinary catheter were randomly treated with standard devices (GROUP A) or Bactiguard® devices (GROUP B). Data are presented as medians±DS, p-value<0.05 have been considered significant.

Results and Discussion: At ICU entrance, the 2 groups have no difference among them. There is a high proportion of invasiveness in colonized patients for CA which correlates with worse morbidity and longer LOS but not higher mortality.

5760
Epidemiology of a Candida Auris outbreak in critical care unit in a tertiary hospital
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Background and Goal of Study: Candida Auris (CA) is an emerging fungus which causes aggressive infections in critical care setting (ICU). We aim to analyse the differences between patients with CA infection vs CA colonization in 2016-2017 CA outbreak in surgical ICU.

Materials and Methods: Observational retrospective study including patients with a positive culture for CA in surveillance and/or invasive samples. We compared demographic data, length of hospital and ICU stay (LOS), hospital mortality and specific risk factors between patients with colonization vs CA infections documented in blood, CSF, peritoneal fluid and catheter tip positive samples. T student and Chi square test were applied.

Results and Discussion: 105 patients were included. 58.1% tested positive for CA surveillance samples without documented invasiveness. 41.9% developed invasive infection: 46.5% positive blood cultures, 20.9% positive catheter tip cultures and 32.6% with 2 or more positive cultures in different locations. 73.3% patients had positive surveillance cultures for two or more candida spp (including CA, C. Albicans and C. non-Albicans). There were no statistically significant differences in age, gender and Apache II between colonized vs invasive infection patients. 63.44 vs 57.93 years old (p=0.094), 67.2% vs 63.6% men (p=0.7), mean Apache II 20.53 vs 21.11 (p=0.65), respectively. Patients colonized vs CA invasive infection admitted for trauma were 11.5 vs 31.6%, cardiovascular surgery 36.1 vs 29.5%, thoracic surgery 19.7 vs 23.3%, abdominal surgery 9.8 vs 15.9% and solid organ transplant 13.1 vs 9.1% respectively (p=0.041). We observed a statistically significant difference in ICU and Hospital LOS: 21.3 vs 37.02 days (p=0.0002) and 42.4 vs 59.89 days (p=0.03), but no statistically significant difference in mortality during hospital stay: 42.6 vs 50.2% (p=0.454) in colonized vs invasive infection patients respectively. There were no statistically significant differences in risk factors between groups (DM, COPD, immunosuppression, cirrhosis, neoplastic disease, central venous catheter, parental nutrition, RRT, ECMO, mechanical ventilation >48h, and previous abdominal surgery). Candida-Score was significantly higher in the infected group: 2.34 vs 2.89 (p=0.023).

Conclusion: There is a high proportion of invasiveness in colonized patients for CA which correlates with worse morbidity and longer LOS but not higher mortality.

5780
Causative agents in patients with suspected bacteraemia - prospective study
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Background and Goal of Study: Blood samples were collected and routine blood cultures (BC) were ordered from the patients with suspected sepsis, to evaluate the prevalence of different causative agents/positive BC in patients with suspected bacteraemia, were taken in the frames of the FAPIC project.

Materials and Methods: A prospective cohort study was set up at ICU and three other wards at the University Hospital Centre Zagreb and University Hospital Centre Merkur in Zagreb, Croatia. Patients with suspected bacteraemia, for whom routine BC were ordered, were included in a cohort. Inclusion criteria were: age above 18 and suspected bacteraemia. Following data was collected: demography, outcome, sepsis parameters, laboratory data (blood cell count, kidney and liver function), time of BC collection and arrival in laboratory, time to positivity, identification, antibiotic susceptibility results and final communication with clinician. Data were analysed using students-t test (continuous) or with non-parametric tests in case of the non-normal data.

Results and Discussion: In total, 229 patients were included between 21st January and 03rd October 2017. 156 (69%) patients were male. The mean age of patients was 61.5 years. True bacteraemia (contamination excluded) was found in 55 patients (24%), Haemoglobin content and the systolic blood pressure values were significantly lower in patients with positive BC than in those with negative BC (p=0.004 and p<0.002 respectively). Serum lactate levels and urea content values were significantly higher in patients with positive BC compared to patients with negative BC (p=0.024 and p<0.002 respectively). The most frequently isolated pathogens were: Pseudomonas aeruginosa (12 patients), Staphylococcus epidermidis (11 patients) Escherichia coli (6 patients), Enterococcus faecium (6 patients) and Klebsiella pneumoniae (5 patients). Six isolates were multidrug-resistant according to Magiorakos et al: two VRE, two ESBL, one MRTSA and one colistin-resistant K.
pneumoniae. Median time from collection to laboratory arrival was 131 minutes. Median time to blood cultures being flagged positive was one day.

**Conclusion:** The study revealed high percentage of positive blood cultures (24%) and high rate of multiresistant strains among positive BC.

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**References:**

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**4906**

**Stroke volume variation predicts fluid responsiveness in patients with implanted IABP after cardiac surgery, believe it or not**

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**Background and Goal of Study:** There is a vast body of scientific evidence confirming validity of dynamic hemodynamic indices (such as stroke volume variation (SVV)) as predictors of fluid responsiveness in patients receiving mechanical ventilation. Patients with implanted intraaortic balloon pump (IABP) have always been excluded from this concept under the belief that pump artifacts in the invasive arterial pressure trace influence the accuracy of SVV, which is true. The presented study aims to test whether SVV is a valid predictor of fluid responsiveness in that patient population provided that IABP is switched to standby mode for a brief period.

**Materials and Methods:** We present a prospective study with 30 patients included. All 30 patients were considered as ‘true responders’, for the validation of SVV. All patients received a SVV index of more than 12. Statistical analysis was performed using IBM SPSS. A ROC curve was generated for SVV and a positive response to fluid challenge.

**Results and Discussion:** SVV threshold of 8.5% was estimated using Yoden's index of the maximum value of (Se+Sp-1), for the validation of SVV. It is true that the area under the ROC curve was 85% (95% CI 83 - 96%) and specificity of 95% (95% CI 89 - 97%) for a positive response to fluid challenge. The area under the ROC curve was estimated to 91% (95% CI 81 - 100%, p<0.0002).

**Conclusion:** SVV is a valid predictor of fluid responsiveness under the specific circumstances applied in the study. Our findings suggest that clinicians should keep dynamic hemodynamic indices in their armamentarium when resuscitating patients with IABP.

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**4922**

**Out of hospital cardiac arrest PCI protocol**

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**Background and Goal of Study:** Our hospital is the primary percutaneous coronary intervention (PCI) centre caring for more than 1 million people living in the west of Scotland. The human, environment and equipment factors make the cath lab unsafe area for the initial resuscitation of out of hospital cardiac arrest (OHCA) patients due to ST elevation myocardial infarction (STEMI) who achieve return of spontaneous circulation (ROSC). Equal or unnecessary delays in the transfer of these patients to the cath lab and in initiation of protective physiological strategies for the post cardiac arrest syndrome can affect outcomes. We introduced a standardised OHCA PCI protocol to overcome these problems.

**Materials and Methods:** Thirty-two ventilated patients admitted to our ICU from the cath lab after having had PCI post OHCA due to STEMI between November 2018-November 2019. We looked into patient transfer time from ROSC to PCI was 4h 37m versus 2h 34m for patients who were admitted via A&E to the cath lab versus
directly to the cath lab, respectively. Twenty (62.5%) versus 12 (37.5%) patients had their initial resuscitation in A&E versus the cath lab, respectively. Thirteen (65%) out of these 20 A&E patients had unnecessary delays due to unnecessary interventions for example CT scans, blood tests, central line etc. before transfer to the cath lab, while 9 (75%) out of these 12 cath lab patients required intubation and ventilation in the cath lab. Only 2 (6.25%) patients had documented initiation of physiological protective strategies for the post cardiac arrest syndrome prior to PCI.

Conclusions: Our OHCA PCI protocol transfers patient either directly or via A&E to the cath lab and avoids initial resuscitation in the cath lab. It initiates physiological protective strategies for the post cardiac arrest syndrome and avoids unnecessary delays prior to PCI.

Case Report: We present two cases of fulminant myocarditis in young patients; both vasoactive and eventually mechanical circulatory support.

Background: Myocarditis is a myocardial inflammation due to infectious, systemic, autoimmune processes or sometimes of uncertain etiology. It can be oligosymptomatic or rapidly develops refractory heart failure requiring inotropic, vasodilator and eventually mechanical circulatory support.

Learning points: Acute myocarditis presents a high mortality rate. Medical treatment, in many cases, is not enough; and the advance in circulatory assistance systems may be an option for these patients. Individualizing treatments and decisions for each case may become a great challenge.

References:
2. Roth S.1, Bunte S.1, Lurati Buse G.1, Aubin H.1, Walz R.1, Huhn R.1
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4. Intensive Care Medicine

5800

Perioperative acute coronary syndrome after bariatric surgery: Case report

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Case Report: A 48-year-old woman with history of hypertension, diabetes and morbid obesity (BMI 46) was scheduled for bariatric surgery. 24 hours of postoperative course was uneventful. 48 hours after surgery she was readmitted to ICU for severe hypoxemia requiring mechanical ventilation. CT scan showing pulmonary edema. Echocardiogram showed a septo-apical hypokinesia with normal LVEF. EKG showed a diffuse depression of ST without changes to basal EKG. Coronariography showed an acute severe occlusion of the main left trunk successfully treated using a farmaco-active coating stent. Double anti-platelet intravenous treatment and inotropes for cardiogenic shock in the following days were required. Weaning of mechanical ventilation was long and difficult requiring tracheostomy. The patient was progressively improving so we transferred to hospitalization floor and she was discharged to home without significant problems.

Discussion: Cardiac complications are very infrequent according evidence1. This could be paradoxical since morbid obese patient has a higher cardiovascular risk. The atypical evolution of our case should be outlined since the complications of misdiagnosis could be catastrophic. Additionally the prolonged weaning of mechanical ventilation requiring tracheostomy in a patient with double anti-platelet treatment pose a challenge to stop this medications before the recommended times according to evidence to perform this procedure with less bleeding risk.

References:

Learning points: Our case emphasizes the importance of a higher clinical suspicion in these patients even when preoperative evaluation. Although this complication is infrequent it should be taken on mind even when the preoperative examination not show specific signs of coronary disease requiring further diagnosis and treatment before surgery.

6009

Ventricular assist devices: two solutions for the same disease. The importance of individualized treatments

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Background: Myocarditis is a myocardial inflammation due to infectious, systemic, autoimmune processes or sometimes of uncertain etiology. It can be oligosymptomatic or rapidly develops refractory heart failure requiring inotropic, vasoactive and eventually mechanical circulatory support.

Case Report: We present two cases of fulminant myocarditis in young patients; both needing circulatory assistance as bridge therapy to recovery/transplantation. Case 1:39-year-old woman consulted for dyspnea and flu-like symptoms. She presented in-hospital cardiac arrest. Given the situation of cardiogenic shock, peripheral veno-arterial extracorporeal membrane (ECMO VA) and aortic counterpulsation balloon (BCIAo) were inserted. After the findings of transesophageal echocardiography, BCIAo was replaced by an Impella. Histopathological diagnosis of myocarditis was made. Given the poor outcome and the appearance of arrhythmic storm, a central ECMO VA was implanted. An attempt to remove ECMO was made, but left ventricular (LV) dysfunction was still seen, so it was replaced by a left Levitronix device. Finally the LV recovered its function and assistance could be withdrawn. Case 2:42-year-old man consulted with worsening of his functional capacity. He presented electrocardiographic findings of myocarditis with a high arrhythmogenic load. Echocardiography showed LV failure and clinically he presented important congestion, so diuretic perfusion and BCIAo were started. An increase in arrhythmic episodes was observed, so a transient pacemaker was implanted. Due to severe LV dysfunction, he was included in the transplant waiting list. Left Levitronix was inserted as a bridge to transplant, receiving transplant with good clinical progress.

Discussion: Acute myocarditis presents a high mortality rate. Medical treatment, in many cases, is not enough; and the advance in circulatory assistance systems may be an option for these patients. Individualizing treatments and decisions for each case may become a great challenge.

References:

4461

Bilirubin - Possible prognostic mortality marker in patients with VA-ECMO

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Background and Goal of Study: Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is an effective rescue therapy in patients with cardiogenic shock or after sudden cardiac arrest. The use of VA-ECMO is increasing, but mortality rates are still high and it is unclear whether mortality risk can be predicted. In this retrospective cohort study we investigated the association between liver function and mortality in patients undergoing VA-ECMO therapy.

Materials and Methods: The present study is a retrospective single center cohort study approved by the Ethics Committee of the Heinrich Heine University Dusseldorf (Reference Number 5141R). Included were adult patients over 18 years who received ECLS therapy between 2011 and 2018. For quantification of liver function Bilirubin was analysed at predefined time points (day 0, 5, 10, 15). The primary endpoint was all-cause in-hospital mortality. The association between Bilirubin and mortality was examined by receiver operating characteristic curve (ROC) and the area under the curve (AUC) as well as univariate and multivariable cox regression. In a sensitivity analysis, patients with shock-liver (defined as GOT > 10 x cutoff (=35 U/l)) were excluded.

Results and Discussion: A total of 438 patients received ECLS therapy during the observation period. Due to missing values, 140 patients had to be excluded so that 298 patients remained for statistical analysis. Mortality rate was 42.6% (n=127). The AUC for Bilirubin on day 5 was 0.72 (95% confidence interval (CI): 0.66-0.78). Youden-index showed a cutoff for Bilirubin on day 5 of 2.33 mg/dl with a sensitivity of 0.70. The regression with multivariable adjustment revealed a significant association between Bilirubin on day 5 and mortality with a hazard ratio (HR) of 2.24 [95% CI: 1.53-3.29]. In the sensitivity analysis without shock liver patients this association was still significant (HR 2.08 [95% CI: 1.33-3.26]).

Conclusion: Based on the results of the current study, an increase in serum Bilirubin level on day 5 of VA-ECMO therapy correlates independently with mortality regardless of the presence of shock liver. Thus, Bilirubin might serve as a prognostic marker in these patients.
Case of electrotrauma to the rescuer during CPR from implantable cardioverter-defibrillator

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Background: With the widespread use of implantable cardioverter-defibrillators (ICD) these days, it is of great importance to the rescuer to be aware of dangers associated with such devices. Although the devices are being modernized and new modes of defibrillation are invented [1], electrotrauma from implantable devices remains a threat to healthcare providers [2].

Case Report: A 78-year-old patient was admitted to the ICU with asystole. Advanced life-support resuscitation was initiated immediately. During chest compressions in latex protective glasses tingling sensations became apparent. Subcutaneous device was detected in the left subclavian area. It became obvious that the patient had ICD and mechanical movement of the chest wall during compressions initiated defibrillation. Electroenergy was transferred to the rescuers causing tingling sensations. Despite that, chest compressions were resumed but the patient failed to restore viable rhythm.

Discussion: Defibrillation energy can be life-threatening to personnel. Shock can be delivered to the rescuer not only through chest compressions but also during central venous catheterization when advancing needle or a guidewire contact with a lead of ICD [3]. However, there are anecdotal reports on such cases and current resuscitation guidelines do not cover this issue in detail. Nevertheless, it is wise to detect ICDS during emergency resuscitation as soon as possible and to deal with it professionally, i.e. to cover it with a magnet during the whole period of resuscitation.

References:

Learning points: Always check for ICD in a cardiac arrest patient and turn it off with a magnet in order to protect yourself from electrocution.

Case of fulminant develop septic shock after perforative gangrenous appendicitis in child

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Background: Acute appendicitis is one of the most common causes of abdominal pain and is the most frequent condition leading to emergent abdominal surgery in children. Gram-negative bacteria is major health problem, causing one-half of cases of lethal septic shock.

Case Report: A 15-year-old boy who underwent surgery for perforated gangrenous appendicitis complicated with peritonitis.Complicated postoperative period with nausea, vomiting and fever. An abdominal scan was performed on 5th day and an intra-abdominal abscess was detected. Relaparotomy - abscess and drainage evacuation. Two hours after the surgery there was an arterial bleeding from the drains. Urgent re-operation detected hemoperitoneum and diffuse bleeding from all wound surfaces, no source of bleeding was identified. The boy was presented to our clinic intubated FiO2-60%, icteric skin and visible mucous membranes, HR 150/min, BP 80/60. Anuric, naso-gastric tube- haematem, drains-hemorrhagic. Laboratory tests revealed extremely high inflammation rates, hepatic failure, uremia, extremely high prothrombin time and DIC syndrome. CVLs were inserted immediately in the OR in v.jugularis interna sinistra and v.femoralis dextra under US control. The patient was put on antibiotic treatment, catecholamine support ( Dopamine 10mg/ kg/min, Noradrenalin 0.5mg/kg/min, Dobutamine 15mg/kg/min, Adrenalin and Milrinone) and urgent hemodialysis was performed. Echocardiography showed a structurally normal heart, with no signs of acute myocardial infarction, pulmonary embolism or myocarditis.The next hours extremely increased of cardiac enzymes, persistent severe hypotension and tachycardia with high catecholamines needs, renal and hepatic failure, anuria and haemorrhagic syndrome persistance. Despite resuscitation, exitus letalis was registered.

Discussion: An extremely fast-growing infection was presented by E.coli infection with hepatorenal syndrome and advanced DIC syndrome. Early diagnosis and recognition of the infection is crucial to the outcome of the disease.

References:

6004

Myocardial dysfunction, Sepsis, MOF; May the patients have Broken Heart Sy in ICU?

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Background: Myocardial dysfunction is one of the main predictors of poor outcome in septic patients (mortality 70%). Sepsis induced myocardial dysfunction can lead to reduced ejection fraction and consequently a weakened response to reanimation procedures, including fluid resuscitation and catecholamine administration.

Case Report: This case report details the case of a 35-year-old male without cardiovascular risk factors who had a depressive episode, normotensive, with agonal breathing and tachycardia. Shortly after admission to the ICU, the patient became hemodynamically unstable after which noradrenalin and vasopressin were administered, followed by a central venous access, pulmonary artery catheterisation and V-A ECMO was started. Immediately after beginning ECMO the patient became asystolic and cardiopulmonary reanimation was performed (cardiac massage, defibrillation, administration of adrenaline and atropine, external pacing). Due to continuing MOF, CVVHDF with blood purification was started. A Transthoracic echocardiogram showed normal dimensions of the left chamber and ascending aorta, with a global reduction in left ventricular systolic function (EFLV Simpson 19-20%) and significant diastolic dysfunction. Moderate mitral and tricuspid regurgitation was present, with indirect signs of a mild increase in pulmonary vascular pressure (RVSP 41.69 mmHg). Estimated cardiac index (CI) was notably reduced at 1.35 L/min. Laboratory investigations showed a significant rise in NTproBNP-a (8964 - 17058 pg/ml) and a decrease of hs-troponin (1274-157ng/L). 24 hours after admission, the patient’s pupils were fixed and dilated and subsequent cerebral angiography confirmed brain death.

Discussion: In terms of the absence of typical clinical, electrocardiographic features and laboratory parameters, which would indicate acute coronary syndrome (ACS), the cause of fulminant echocardiographic changes remains unanswered. Takotsubo cardiomyopathy, also called broken-heart syndrome, has been recently implicated as possible cause of rapidly developing myocardial dysfunction in ICU's. It is cardiac syndrome that involves dramatic left ventricular apical akinesia and often mimics ACS. Unfortunately, it is very challenging to diagnose it in ICU patients.

Learning points: Cardiac pathology associated with septic shock may lead to a very poor prognosis, therefore, timely diagnosis combined with aggressive therapy is of crucial importance in reversing myocardial dysfunction.

6153

Usefulness of systematic blood culture under veno-arterial ECMO

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Background and Goal of Study: Infectious complications are frequent on Veno-Arterial ExtraCorporal Membrane Oxygenation (VA-ECMO), but their diagnosis is challenging. Performing systematic blood culture (BC) may detect early poorly symptomatic bloodstream infections (BSI). We investigated the interest of BC performed systematically under VA-ECMO.

Materials and Methods: All adult patients requiring VA-ECMO, surviving more than 24 hours, were included (01/2013-01/2017). Our protocol includes daily BC in patients on VA-ECMO, from insertion up to 5 days after withdrawal. BC performed between 4 and 7 a.m. were defined as systematic BC; others BC were considered as “on-demand”. All positive BC were considered as BSI, except for contaminant pathogens which required at least two positive BC in 48 hours to be classified as BSI. Multivariable logistic regression was performed to identify risk factors of BSI.
Bloodstream infection on veno-arterial ECMO

Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology; median age 58 [48-69] years and SAPS II 54 [38-70]), 2163 BC were performed (1162 systematic BC and 984 on-demand BC); 192 (9%) were positive, including 68 with contaminants. Regarding systematic BC, 52 (4%) revealed BSI; meanwhile, 72 (7%) on-demand BC revealed BSI. Performing systematic BC was negatively associated with diagnosing BSI (OR 0.55, 95%CI[0.4;0.8], p=0.002). Regarding systematic BC, independent risk factors for BSI diagnosis were: ECMO for graft failure (OR 2.4, 95%CI[1.2;4.9], p=0.013), sampling under antimicrobial therapy or renal replacement therapy (OR 2.2, 95%CI[1.1;4.3], p=0.029 and OR 2.1, 95%CI[1.1;3.8], p=0.008, respectively). On the 68 BC with contaminants, 10 (15%) led to inappropriate antimicrobial therapy, i.e. 7% of the whole cohort of patients on VA-ECMO.

Conclusion: Despite risk of contamination and inappropriate antimicrobial therapy, BC often detect poorly symptomatic BSI. On-demand BC are more useful than systematic BC. This argues for a reasonable approach of BC prescription on VA-ECMO.

Optimizing linezolid administration in critically ill patients: is continuous infusion enough?

Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology), i.e. 1422 VA-ECMO days, 2163 BC were performed. Median age of patients was 58 [48-69] years and SAPS II was 54 [38-70]. Duration of VA-ECMO support was 7 [5-13] days. One hundred and ninety-two BC were positive, including 68 contaminants. BSI episode rate was of 43 cases/1000 days of ECMO support. From implantation up to five days after withdrawal, BSI occurred in 50 patients, with 53% in the first week and 20% after withdrawal. Pathogens were: Klebsiella pneumoniae (n=8), Gram negative non-fermentative bacilli (n=7), Escherichia coli (n=7), Enterobacter cloacae (n=6), Candida spp (n=5), Enterococcus spp (n=5), Streplococcus spp (n=4), coagulase-negative Staphylococci (n=2), Proteus mirabilis (n=2), Gram positive bacteria (n=1). Forty percent of BSI was primary, i.e. not associated with another active infection. Mortality rate did not differ between patients with or without BSI (60 vs. 54%, respectively, p=0.49).

Conclusion: The incidence of BSI is high. The number of potential contaminants raises the question of the cost/efficacy and timing of BC sampling, in particular those systematically collected.
Characterization of Ceftobiprole’s cerebrospinal fluid penetration in patients with External Ventricular Drainage

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Background and Goal of Study: Healthcare-associated meningitis (HAM) is associated with significant morbidity and mortality. HAM treatment is challenging because of antibiotics resistance and the difficulty to achieve a therapeutic dose of antibiotics in the CNS. Ceftobiprole is a novel broad-spectrum cephalosporin with excellent activity against multi-drug resistant (MDR) pathogens. Since ceftobiprole is bactericidal, well-tolerated and it has anti-biofilm activity, it could be useful in case of HAM. Nowadays there are no human studies concerning the penetration and the efficacy of ceftobiprole in the cerebrospinal fluid (CSF). The present study aims to fill these gaps in the literature.

Materials and Methods: We enrolled 5 patients with implanted EVD who received Ceftobiprole for other reasons than HAM, in a single-center pilot study. Exclusion criteria were: patients < 18, cephalosporine allergy, end-stage renal insufficiency, BMI>30, pregnancy and end-stage diseases. We have measured the ceftobiprole concentration in 8 blood samples and 11 CSF samples from each patient (95 samples in total), as described at www.coqualab.it. We calculate the maximum serum concentration (Cmax-s) and CSF concentration (Cmax-csf) and the percentage of CSF penetration of ceftobiprole, after the third infusion of Ceftobiprole (500mg every 8h).

Results and Discussion: The mean Cmax-s was 12.02 mg/L, reached after 2hr from drug infusion, whereas the mean Cmax-csf was 0.6 mg/L. In Figure 1 the mean concentrations (and the relative standard deviations) of serum and CSF ceftobiprole concentration for each time point are represented. The mean Ceftobiprole CSF penetration was 15.3%.

Conclusion: For the first time we studied the CSF Ceftobiprole’s penetration in humans, founding a mean value of 15.3%. Although we cannot conclude anything about the Ceftobiprole CSF efficacy, its meningeal penetration is in line with other cephalosporines and it is higher than Vancomycin, posing the base for a possible role of Ceftobiprole in HAM treatment.

Figure 1: Mean serum and CSF ceftobiprole concentration in the five patients studied, with the relative standard deviation. It is possible to note either the lower CSF concentration (15.3%) and the lower variability of CSF concentration. T0 = steady state, before ceftobiprole administration, at the third dose; T1-T10 are respectively at 2, 2.5, 3, 4, 5, 6, 8, 10, 12 hours after ceftobiprole administration.
Case Report: A 30-year-old man was admitted to the ICU after a multi-trauma. Trauma CT-scan showed a misplaced CVC causing pneumomediastinum. CVC case report: A recent survey in a large number of doctors teaching ultrasound-guided central venous catheterization showed that 75% prefer US-guided CVC placement.

Background: Central venous catheters (CVCs) are routinely placed in the ICU. Misplacement of a CVC is a rare finding in middle-aged adults. ADEM cases in adults are not well described in the literature. The purpose of this case report is to present a rare case of ADEM in an adult patient following central venous catheter placement.

Case report: A 30-year-old male patient was admitted to the ICU with a diagnosis of multi-trauma. Due to the patient’s condition, a central venous catheter was placed on the left internal jugular approach. The patient was treated with high-dose corticosteroids and physical therapy. After 60 days, the patient was discharged with residual left hemiplegia.

Discussion: ADEM is a rare inflammatory demyelinating central nervous system disorder triggered by an infection or recent vaccination. Usually, the neurological dysfunction develops within a few weeks of the triggering event. ADEM cases in adults are not well described in the literature. The purpose of this case report is to present a rare case of ADEM in an adult patient following central venous catheter placement.

Conclusion: We need to find a way of combining both approaches without loss of confidence and competence in using and teaching both of them.

References:

Learning points: Ultrasound guided CVC placement is recommended with guidewire visualization in real-time before placing the CVC. This can reduce the risk of mechanical complications. Avoid excessive force when advancing the guidewire. Radiologic assessment of CVC positioning is recommended before usage. If pneumomediastinum is present and CVC malpositioning is confirmed, stop fluid administration and make a thorough plan before catheter removal. Any coagulopathy should be corrected before CVC removal.

Materials and Methods: US: Using US-guided CVC placement, the patient was treated with high-dose corticosteroids and physical therapy. After 60 days, the patient was discharged with residual left hemiplegia.

Results and Discussion: More than 50% prefer to perform US-guided CVC and stop to use the landmark approach. After 2-4 months using US-guided doctors stopped using the landmark approach at all in most of the cases and have never been used it again because they did not feel confident with it anymore. 85% of doctors teach residents both approaches but hands-on CVC teaching performs better.

Conclusion: Mediastinal CVC malpositioning can cause pneumomediastinum and mediastinal hemorrhage – conditions which can lead to shock. If CRBSI occurs, the condition may be further complicated by mediastinitis and sepsis. Vessel perforation risk is increased when excessive force is applied while advancing the guidewire, dilator or catheter. Malpositioning is more common in the subclavian approach with left sided procedures due to vessel angulations. Because of the risk of intrathoracic hemorrhage when extracting the CVC, thoracic surgeons should be involved since surgical management is the preferred method of choice. An endovascular approach can also be considered – which is why we recommend involving interventional radiologists for a multidisciplinary discussion and plan.

Acknowledgements: Gemma Vilagut S for statistical support.

References:

Committee on Medical Ethics and Research, Lund University Hospital: The AUC was 0.85.

Conclusion: A risk score could be made with the mortality and morbidity risk factors found, for therapeutic decisions, even though they should be validated in a prospective study.
Multivariate analysis of factors associated with the first-pass success of the blind method for post-pyloric feeding tube placement: a retrospective study

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Background and Goal of study: Enteral nutrition using the post-pyloric enteral feeding tube (EFT) has a low risk of aspiration, reflux, or gastrointestinal intolerance; however, the placement of the tube using the blind method can be difficult. Assist devices such as fluoroscopy or endoscopy are useful but may not be applicable in patients with hemodynamic instability or severe respiratory failure. This study aimed to explore the factors associated with the first-pass success of the blind placement of the post-pyloric EFT in critically ill patients.

Materials and Methods: Characteristics of patients, physical and radiograph findings, laboratory data, and drugs used were obtained retrospectively from the medical records of adult patients who underwent post-pyloric EFT placement at the intensive care unit of Yokohama City University Hospital from January 1, 2012 to December 31, 2018. Variables with a P value <0.2 in the univariate analysis and variables expected to be involved in the first-pass success rate based on the clinical perspective were defined as the independent variables. Thus, variables for the multivariate regression analysis included age, sex, height, fluid balance from baseline, number of sedative agents, body position, use of cardiac assist devices, use of intestinal peristalsis promotors, presence/absence of intestinal peristalsis movement, post cardiovascular surgery, use of renal replacement therapy, serum albumin level, and position of the greater curvature of the stomach caudal to the level L1-L2 estimated by the abdominal radiography. Primary outcome was defined as the first-pass success for blind placement.

Results: The data obtained from 442 patients were retrospectively analysed. The median (IGR) age and SOFA (sequential organ failure assessment) score were 68 (57-86) years and 10 (7-13), respectively. The success rate of the first attempt at insertion was 63.0% (N=281). The logistic regression analysis demonstrated that the position of the greater curvature of the stomach with respect to L1-L2 was the only predictor for successful placement (odds ratio for first-pass success: 0.62, 95% CI: 0.40-0.95).

Conclusions: The position of the greater curvature of the stomach caudal to L1-L2 may be associated with lower success rate of the blind placement of the post-pyloric EFT in critically ill patients.

Is there any correlation between respiratory variation ratios of internal jugular vein and inferior vena cava?

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Background and Goal of Study: Diameter and respiratory variation ratio (RVR) of inferior vena cava (IVC) can be determined by ultrasonography (USG) for assessment of fluid responsiveness in critically ill patients. Internal jugular vein (IJV) RVR has been a new parameter for hemodynamic evaluation.[1] Aim of this study was to investigate the correlation between RVRs of IJV and IVC before and after passive leg raise (PLR) as well as the variability between USG measurements of different physicians.

Materials and Methods: After ethical committee approval, 44 mechanically ventilated, critically ill patients were enrolled into the study. We measured IJV diameter with USG in the short axis. IJV measurements were done by one physican at three different experience levels. Measurements of IJV and IVC were done both in supine position and after PLR. Then distensibility (D) and collapsibility (C) indices were calculated. Spearman correlation test was used for correlation analysis.

Results and Discussion: The means±SD, APACHE II and SOFA scores were 24±8 and 8±4, respectively. There were strong correlations between the physicians in all measurements (p<0.005). There wasn’t any significant correlation between D and C indices of IJV and IVC in patients in supine position except the moderate correlation in the subgroup of patients with PEEP≤5 cmH2O and strong correlation in patients on diuretics (p<0.05). There were moderate correlations between D and C indices of IJV and IVC after PLR in patients without vasopressors use and strong correlations in patients on vasodilators (p<0.05). There was no correlation in other groups after PLR.

Conclusion: The RVRs of IJV and IVC doesn’t correlate routinely in critically ill patients. The D and C indices of IJV and IVC correlate better when PEEP is low or when there is increased intravascular volume as in patients requiring diuretics or as after PLR and when there is no vasoconstriction as in patients without vasopressors or with vasodilators. There is high correlation between physicians in measurements of diameters and related calculations of both IVC and IUV.

References:

Establishing sustainable and regular focused critical care echocardiography training in a developing world Intensive Care Unit

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Background: Achieving effective critical care in low and middle-income countries is a global health goal, which includes the provision of effective point of care ultrasound [1]. We sought to establish Zambia’s first focused critical care echocardiography training program in a 16-bedded ICU at University Teaching Hospital, Lusaka.

Materials and Methods: The syllabus and accreditation pathway were adapted from the UK Intensive Care Society, adjusted for local disease patterns. The echo protocol used parasternal, apical and subcostal windows to assess for ventricular dilation and dysfunction, effusions, and hypovolaemia. Zambian doctors received protocol used parasternal, apical and subcostal windows to assess for ventricular dilatation and dysfunction, effusions, and hypovolaemia. Zambian doctors received training in post-pyloric feeding tube placement through didactic course delivery and frequent skill practice has proven to be feasible and well received, with a focus on sustainability and skill maintenance. Ongoing challenges are centered around provision of accreditation and local leadership.

References:

Validation of pulmonary artery catheter for continuous cardiac output measurement in left ventricular assist devices

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Background and Goal of Study: Left ventricular assist devices (LVADs) are a promising therapeutic aid for patients with advanced cardiac failure. Patients with LVAD need to follow a narrow haemodynamic supervision, being the pulmonary artery catheter (PAC) the reference method in the measurement of cardiac output (CO). In the last few years have emerged new methods for cardiac output monitoring such as the measure of continuous cardiac output (CCO) through PAC. Nevertheless, this method has not been yet validated in patients with LVAD. The aim of this study was to validate the CCO obtained with PAC in the continuous flow LVAD in partial assistance in an experimental porcine model.

Materials and Methods: The study was performed with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial left ventricular assistance. Cardiac output measurements were made simultaneously with PAC, continuous...
cardiac output and bolus-based CO in four different moments of the study: immediately before entering into the LVAD (basal cardiac output), meanwhile the LVAD, in a hypervolemia status and finally in a model of hypovolemia. Bland-Altman method was used for validation of the CCO. All procedures were approved by the Ethical Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain.

Results and Discussion: Comparing CCO with bolus-based CO through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 11% (Bias -0.47) in the basal moment, 22% (Bias -0.43) in the LVAD moment, 3% (Bias -0.02) in the hypervolemia status, and 21% (Bias -0.38) in the hypovolemia model. Conclusion: The results described above show that the CCO measured through PAC could be used as reliable method in determination of cardiac output in continuous flow LVADs in partial assistance in a porcine model.

A central venous catheter showing arterial waveform but venous blood gas picture: - Where is the tip?

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Background: A 68-year-old patient who previously underwent laparotomy, limited right hemicolecotomy with ileocolic anastomosis for small bowel obstruction again presented with obstructive symptoms. Diagnosis was confirmed with gastrografin studies. The decision was made for exploratory laparotomy. A central venous catheter was inserted in view of pre-existing cardiovascular diseases and a high likelihood of enteral nutrition post-operatively.

Case Study: The CVC was inserted pre-operatively under ultrasound guidance. The left internal jugular vein was chosen after an unsuccessful attempt over the right. Intraoperatively, the CVC pressure transduced via the distal port remained in the 10-18 mmHg range. Post-operatively in ICU, a routine chest x-ray showed the CVC tip in close proximity of the left carotid artery. Blood sampled from the distal port revealed a venous picture. However, now when the CVC distal port was transduced, it showed an arterial waveform with a mean pressure of 113. The conundrum of the exact location of the CVC tip had many implications.

Discussion: The interesting amalgam of a venous blood gas with an arterial waveform presented a unique challenge to work-up the exact position of the CVC. It involved the efforts of a multi-disciplinary team to design a strategy to delineate the anatomy and placement and its subsequent removal, with a good back-up plan should an inadvertent arterial puncture has occurred.

Level of agreement between cardiac output measurements using femoral or jugular catheter in a porcine model of hemorrhagic shock.

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Background and Goal of Study: Cardiac output (CO) monitoring is an increasingly useful tool for manage surgical patients at high risk of hemorrhage or hemodynamic instability. Transpulmonary thermodilution (TPTD) is a rapid, easy and safe-to-install method. Typically, superior vena cava (SVC) access has been used to the thermodilution, however under certain circumstances, SVC access might not be feasible and femoral vein has to be used. Our aim was to compare the influence of the venous catheter site thermodilution site on TPTD in a porcine model of hemorrhagic shock.

Materials and Methods: Nine minipigs were anesthetized, instrumented and mechanically ventilated. A VolumeView™ femoral arterial catheter was inserted. All animals were instrumented with identical Jugular (J) and femoral (F) catheter used for cold indicator injections and for central venous (CV) pressure monitoring. TPTD measurements were made through the catheter using a random crossover design at baseline and after inducing a controlled hemorrhage (CH) to decrease mean arterial pressure around 45 mmHg. We compared TPTD derived parameters via J access with F access at baseline (B) and during CH. Each TPTD measurement represents the mean of three consecutive TPTD indicator injections of 15 ml of 0.5% saline made with a mean time interval of time interval of 5 min. Statistics: Bland-Altman test for repeated measurements.

Results and Discussion: A total of 27 measurements were available for comparisons. There was no significant difference in cardiac index (CI) under both conditions. Femoral global end-diastolic volume index (GEDVI) was significantly higher in both conditions. (Δ 17% at B & Δ 29% at CH), as opposed to global ejection fraction (GEF) (Δ -14% at B & Δ -16% at CH). The Bland-Altman tests (bias, confidence interval and % error) were IC-B (-0.046, -0.40 to 0.31 ml/min/m², 12.58%), IC-CH (-0.07, -0.36 to 0.22 ml/min/m², 14.9%), GEDVI-B (-1.71, -1.81 to 38.3 ml/m², 26.64%), GEDVI-CH (-89.3, -156.6 to -22.0 ml/m², 22%); GEF-B (4.08, -2.9 to 11, 24.3%) and GEF-CH (3.71, 0.01 to 7.41, 18.9%).

Conclusion: Femoral access for indicator injection results in altered values provided by the VolumeView™ system, particularly for GEDVI, and during controlled hemorrhage. However, in this preliminary study, the percentage of error was below the clinically acceptable threshold value of 30%.

Evaluation of ventriculo-arterial decoupling in human sepsis and effect of vasoactive agents: an observational study

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Background and Goal of Study: Septic shock is a subset of sepsis with circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality. Septic shock affects both heart and circulation, causing dysfunction in their interaction. One approach to this detection is to examine ventriculoarterial coupling(E/A), which is defined by the ratio of arterial elastance(Ea) to left ventricular end-systolic elastance(Ees). In this study, we investigate time-course of E/A, Mean Arterial Pressure(MAP), Cardiac Index(CI) and Ejection Fraction(EF) in a cohort of patients admitted to ICUs who presented septic shock in order to optimize cardiovascular function leading the therapy with inotropes (Levosimendan, Dobutamine) and vasopressor agents (Norepinephrine).

Materials and Methods: We measured routine hemodynamics using Pulse contour method and transthoracic echocardiograms from baseline (T0), every day at the admission and in the following 7 days. Patients were calculated using data gathered from these echocardiographic examination included EF, Prejection time and Systolic time. Ventricular Elastance(Ees) was estimated by using the method of Chen. Arterial Elastance(Ea) was calculated as 0.9×(systolic arterial pressure/SV), and the Ea/ Ees ratio was then calculated. Ea/Ees ratio is considered a normal value of E/A. In patients with Ea/Ees ratio >1.20 and MAP >65mmHg Levosimendan was administered(1).

Results and Discussion: 25 patients were enrolled, all the patients were uncoupled. Following the E/A monitoring, in 16 patients Levosimendan was administered and in 9 patients not. All the patients improved their hemodynamics(E/A, MAP, CI, EF). In the group A(Levosimendan), patients improved their Ea/Ees ratio before patients in Group B(not Levosimendan) in fact they had an Ea/Ees ratio 1.09±0.23(median 1.16) vs 1.20±0.04(median 1.2) on the 5th day(p value=0,05). Patients in Group A need also lower dose of Norepinephrine.

Conclusion: Monitoring the E/A could be an important tool to evaluate hemodynamic conditions in septic shock patients as a supplement to standard monitoring. We could say that Levosimendan improves Ea/Ees ratio and so the cardiovascular efficiency. These patients need also lower dose of Norepinephrine that could worsen their outcome.

References:
Electrolyte-based calculation of fluid shifts after a sodium chloride challenge in uncontrolled diabetes

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Background and Goal of Study: Early treatment of uncontrolled diabetes involves large shifts of body fluid volumes that are difficult to monitor, but entail a risk of hemodynamic instability. There is need for a simple bedside test that can be used to guide the fluid therapy.

Materials and Methods: The plasma and urinary concentrations of sodium and chloride were measured 30 min after a 30-min infusion of 0.9% saline on two consecutive days in 14 patients with uncontrolled diabetes (mean age 50 years). Using a mass balance equation, the size of the extracellular fluid space (ECF) and translocation of fluid to the intracellular fluid (ICF) were calculated. Insulin was not given during the first experiment.

Results and Discussion: The infused fluid volume distributed almost equally between urine, ECF, and ICF (mean 35%, 31%, and 33%, respectively) with considerable variation between patients and days. A decrease of the ECF volume occurred when more than half of the administered saline had been excreted 30 min after the infusion ended. Conversely, a large urinary excretion implied a greater expansion of the ICF volume. The decrease in plasma glucose during the first 3 hours was explained solely by osmotic diuresis. Very low ECF volumes before the infusions (< 9 L) was associated with biochemical evidence of the hyperosmolar syndrome, while patients with acidosis had normal ECF volumes (approximately 14 L).

Conclusion: One third of a saline infusion was allocated to the ICF even when insulin was not given. Only the patients with non-ketotic diabetes were depleted of ECF volume.

References:

Acknowledgements: The authors are grateful to the staff of the ICU at the Vrinnevi Hospital in Norrköping, Sweden, for assistance during the data collection.

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Total hepatectomy and liver transplantation as a two-stage procedure: our experience

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Background: Total hepatectomy and portocaval shunt, with an anhepatic phase, may be beneficial compared to maintaining a necrotic liver on-site. This "two-stage hepatectomy" may be a bridge therapy until the patient is transplanted again. We report our experience with total hepatectomy and portocaval shunt followed by a liver transplantation.

Case Report: Case 1: 88-year-old man who received a liver transplant. He developed primary graft dysfunction manifested by a great fragility of the liver with uncontrollable bleeding so was decided to perform the organ explant and a portocaval shunt. The patient was 9 hours in an anhepatic phase. During that time, he developed minimum hemodynamic instability and a moderate ARDS. After the retransplant, the patient improved in all aspects except the renal function that required renal replacement.

Case 2: 54-year-old woman who received a liver transplant. She developed an immediate graft dysfunction so she was reoperated. An ectatic liver graft was observed due to an obstruction of the venous anastomosis that could not be solved so an hepatectomy and portocava shunt was performed. The patient remained 9 hours in an anhepatic phase. During that time, she developed minimum hemodynamic instability and a moderate ARDS. After the retransplant, the patient improved.

Discussion: Patients with fulminant liver failure or primary graft dysfunction can develop what is known as "toxic liver syndrome". Its mortality is close to 100%. The main objective of total hepatectomy is the stabilization of the hemodynamic and metabolic situation. If total hepatectomy is considered, the decision must be made before the patient has already developed an irreversible multi-organ dysfunction.

References:

Learning points: It is not known for sure what is the maximum survival time in anhepatic phase. Proper management and optimization during the anhepatic phase is essential to ensure survival and is also related to the results after re-transplantation.
Gastrointestinal complications in lung transplantation

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Background and Goal of Study: Gastrointestinal complications are common after lung transplantation and are associated with an increased risk of mortality and morbidity. However, there are few studies that focus on these types of complications. The aim of the study is to describe and analyze gastrointestinal complications that occur after lung transplantation in a third level hospital.

Material and Methods: A prospective observational study was designed that included all lung transplant patients between October 2008 and October 2018. The incidence of gastrointestinal complications, their treatment and mortality were collected. Severe digestive or biliary tract complication was identified as one of the most frequent complications increased survival or the need for invasive treatment. This does not include infectious causes.

Results and discussion: A total of 251 patients underwent lung transplantation during an observation period of 10 years. There were 16 (6.4%) gastrointestinal complications. The median age was 54 years (range 15-70). Serious complications included: intestinal perforation, acute/hemorrhagic cholecystitis, hemorrhage, intestinal ileus, intestinal pneumatosis. Other complications were: intestinal ileus, diarrhea, clostridium, hyperbilirubinemia, cholestasis + diarrea, ileus + diarrea. Most complications were early in 11 cases (68.75%). Surgical treatment was required in 8 cases (50%). Ten (62.5%) patients died owing to gastrointestinal complications. A multivariate analysis of the variables which may influence the development of this complication was carried out, finding as risk factors the duration of lung transplantation for idiopathic pulmonary fibrosis with pulmonary arterial hypertension (p<0.05) and having required continuous renal replacement therapy (CRRT) (p<0.05).

Conclusions: The development of gastrointestinal complications is frequent after lung transplantation. Early recognition is necessary to avoid delays in treatment and with it, its high mortality, finding some diagnostic predictor for the development of this morbidity: the indication of idiopathic pulmonary fibrosis transplantation and having required continuous renal replacement therapy in the postoperative period.

Discussion:

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Risk factors for delayed progression toward brain death in brain injured patients: an observational retrospective cohort study

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Background and Goal of Study: Delay between brain injury and brain death (BD) is an unpredictable variable but also an important one to decide whether to pursue intensive care in comatose patients who are potential organ donors. The objective of this study is to determine the factors associated with the delay between brain injury and BD, with a particular focus on the predictive factors of late BD.

Materials and Methods: This multicenter observational retrospective cohort study was conducted based on the "comma data base" of PRELOR, the regional network for organ procurement in Lorraine, France, an area with a population of 2.4 million people. All comatose patients admitted between January 1, 2015 and December 31, 2016 who had a possible evolution toward BD were included in the study. Demographic, clinical and paraclinical characteristics, the etiology of brain injury, past medical history and evolution toward either survival, brain death or another cause of death were recorded. Comparative bivariate and multivariate statistical analysis was performed.

Results and Discussion: Among 1553 brain-injured patients analyzed, 272 evolved toward BD. Median delay before BD was 2 days. Etiology (p<0.0001), initial systolic blood pressure (SBP) (p=0.0164) and loss of pupil light (p=0.0002) or comean reflex (p=0.0043) at admission had a significant impact on BD delay. For 25% of these patients, BD occurred after 4 days (so called "late BD"). Male sex, anoxia or ischemic stroke, initial SBP below 150mmHg, and responsive pupils at admission were associated with late BD.

Conclusion: In brain-injured patients, the median delay before BD was 2 days but the 75th percentile reached 4 days. Male sex, ischemic stroke or anoxia, initial SBP below 150mmHg and responsive pupils at admission were associated with late BD. In these patients, intensive care should be continued, as so not to miss potential organ donors.

In vivo kinetics of free haemoglobin, bilirubin and albumin during hemadsorption therapy with CytoSorb – case presentation

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Background: In ICU settings, hyperbilirubinemia is an independent factor of patient morbidity and mortality. Extracorporeal therapies can lead to hemolytic erythrocyte disruption, release of free haemoglobin and hyperbilirubinemia. CytoSorb was recently approved for reduction of elevated bilirubin levels. Relationship between kinetics of bilirubin and free haemoglobin removal during CytoSorb remains elusive.

Case Report: 52-year-old patient was admitted to tertiary hospital after initiation of V-V ECMO due to ARDS. Patient's circulation was supported with infusion of norepinephrine and renal failure was treated with continuous veno-venous haemofiltration. Despite management of anticoagulation with daily doses of 0.4 ml subcutaneous nadroparin only, bleeding diathesis was observed from cannulation sites, oral and nasal cavity. Patient required multiple transfusions of blood products (24 units of PRBC, five units of FFP). At 10th day of ECMO therapy total bilirubin level significantly increased reaching a peak at 13.98 mg/dl. We installed CytoSorb filter in series into the patient's renal replacement therapy circuit and set blood flow at 100ml/min. We measured the total bilirubin, free haemoglobin, and albumin serum levels at the start and after 2, 4, 8, 12, 20 and 48 hours. There was a significant correlation between total bilirubin level and free haemoglobin decrease in the first 8 hours. Subsequently, total bilirubin remained stable while free haemoglobin level was increasing. Albumin level remained stable during therapy. At 20 and 24 hours, we still found difference in the total bilirubin serum levels between pre and post-filter samples (figure 1). When CytoSorb therapy was ended total bilirubin level was decreased to 2.39 mg/dl and remained stable. After 24 days of ECMO support and continuous renal replacement therapy patient died.

Discussion: This is the first in vivo observation of kinetics of free haemoglobin, bilirubin and albumin during hemadsorption therapy with CytoSorb.

Learning points: Ability of CytoSorb to adsorb free haemoglobin is limited after 8 hours of the therapy. CytoSorb can be saturated with bilirubin earlier than after 24 hours of the therapy.
Hypernatremia and increased urinary output in brain-dead cardiac donors and recipient survival after heart transplantation

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Background and Goal of Study: Management of cardiac donors has an important role in the overall outcome. Several endocrinologic changes might occur during the management period. Posterior pituitary gland dysfunction can lead to central diabetes insipidus, which characterized by impaired hemodynamics. Hypernatremia and increased urinary output (IUO) are representing two of the main symptoms. We aimed to evaluate the relationship between the occurrence of hypernatremia and increased urinary output together and mortality after heart transplantation (HTX).

Materials and Methods: We conducted a retrospective, observational study among cardiac donors and recipients for HTX between January 2012 and September 2018 at the Heart and Vascular Centre, Semmelweis University. Basic demographic variables were collected for donors and recipients. Hypernatremia (>145 mmol/L), IUO (>2.5 ml/kg/h), vasopressin and desmopressin treatment were retrieved from donors. The United Network for Organ Sharing (UNOS) score was calculated for both. Our outcomes of interest were 30-day, 1-year and 2-year mortality of the recipients. We used SPSS to perform our statistical analysis. Multivariable Cox regression analyses were applied.

Results and Discussion: We included 297 HTX in our final analyses. The median age of donors was 41 years (IQR25-75: 32-49) for recipients it was 54 years (IQR25-75: 45-70). Total ischemic time was 198 minutes (IQR25-75: 161-231). Median UNOS score was 8 for recipients.

- Hypernatremia was detected in 202 donors (68.0%) and IUO in 185 donors (62.0%).
- 18.9% of the donors had hypernatremia and IUO together.
- The prevalence of hypernatremia and IUO together was significantly higher in recipients who died in the first 30 days (p = 0.004) and in recipients who died in the first year (p = 0.045).

Conclusion: Hypernatremia and IUO of cardiac donors showed no relationship with increased mortality at different time points after HTX. Hypernatremia and IUO together might not define the donors with posterior pituitary dysfunction precisely besides current treatment regimes.

Liver transplantation in case of Budd-Chiari syndrome. Case report

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Background: Budd Chiari Syndrome was first described in 1845 by George Budd, who described the classic triad of symptoms: abdominal pain, hepatomegaly, and ascites. Budd Chiari syndrome is described as a violation of the venous outflow from the liver.

Discussion: There are few published cases of aHUS in LT. It is probably an underdiagnosed entity due to the complexity of diagnosis and because the time of transplant is independent of the syndrome's inception. The treatment of aHUS due to tacrolimus has been changing in the past years: initially discontinuing tacrolimus, all patients showed clinical and laboratory improvement (table 1). Two of the cases continue with this treatment, while the third one died of multorgan failure during the first month.

Learning points: aHUS should be considered in patients who are on tacrolimus and present with renal failure and anemia with an unknown cause. We consider vital to continue tacrolimus as the best immunosuppressant option for LT.
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Potential benefits of renal replacement therapy in combination with haemoadsorption in patients with acute pancreatitis

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Background and Goal of Study: Severe acute pancreatitis (SAP) represents a life-threatening disease associated with multiple system organ failure and increased mortality if intensive care measures are not applied promptly. The aim of this study was to assess the clinical and paraclinical effects of haemoadsorption in patients with SAP.

Materials and Methods: Seventeen consecutive patients with SAP admitted to the intensive care unit (ICU) of Fundeni Clinical Institute were included in the present study. Continuous veno-venous hemofiltration in combination with haemoadsorption was applied in cases of severe septic complications after ICU admission. A number of organ dysfunctions and SIIRS criteria were recorded at ICU admission. The following data were recorded before and after the 3 haemoadsorption therapies: Glasgow coma scale, PaO2/FiO2, creatinine, 24-hours urine output, bilirubin, leucocyte and platelet count, heart rate, mean arterial pressure and vasopressor support, C-reactive protein and procollactin. SOFA score was calculated before and after the therapy. ICU length of stay and 28-days outcome was noted.

Results and Discussion: The mean age in the study group was 54±14 years. At admission the median number of SIIRS criteria was 3 [1,4] with a median number of 3 [1,4] organ dysfunctions. The use of haemoadsorption was associated with a significant increase in mean arterial pressure (from 75±8 mmHg to 80±7 mmHg, p=0.03), a decrease in creatinine levels (from 2.23±2.1 mg/dl to 1.22±0.6 mg/dl, p=0.01), leucocyte count (15284±6971 /uL to 9852±3365 /uL, p=0.04) and procollactinone (from 9.7±3.5 ng/mL to 2.1±2.7 ng/mL, p=0.05). We also noted a non-significant decrease in SOFA score from 5.6±3.3 to 4.0±3.3 (p=0.79), 28-days survival was 58.8% (n=10). Factors associated with a worse outcome were: initial SOFA score (p=0.05), low pH (p=0.05), leucocyte count (p=0.02), renal dysfunction (p=0.03), low Glasgow coma scale (p=0.02) and high C-reactive protein (p=0.05).

Conclusion: Hemoadsorption is associated with improved hemodynamics and decrease in inflammatory markers in patients with SAP. These results may offer a new therapeutic option in modulating inflammation in patients with SAP and should be further assessed in a randomized control trial.

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Fulminant hepatic failure secondary to bariatric surgery. A case report

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Background: It has become apparent that some patients who undergo bariatric surgery, over time they have led to fulminant hepatic failure (FHF) that have resulted in the need for an liver transplant and the reversal of the malabsorptive component. Case Report: 44 year-old patient who presented with jaundice and hepatitis, which had developed in the last week. As the only relevant prior procedure, I would highlight the Gastro-jejunal Bypass performed in June of 2018, which, once admitted to the emergency room, there was an increase in liver enzymes, accompanied by changes in coagulation tests. During their admission, they remained stable until they began to show signs of worsening liver function and hepatic encephalopathy compatible with a FHF for which they were admitted to the ICU and put on the transplant list. She underwent a liver transplant, accompanied by the reconstruction of their previous gastric bypass. The surgery took place without any major complications. Due to a good evaluation, the patient was discharged. In subsequent revisions the patient notes an improvement of their overall state to this day.

Discussion: It is seen how the malabsorptive component of these techniques can provoke a deterioration in liver function by mechanisms that are still relatively unknown. At the moment, there are several different theories postulated on the mechanism of liver damage. It stresses bacterial overgrowth, that cause damage to the intestinal mucosa in the excluded zone, favoring the bacterial translocation. It has been observed that the protein deficiency could increase the lipid deposits in the liver, as well as produce an increased release of inflammatory mediators. Some authors consider the simultaneous reversal of the malabsorptive component necessary in patients who undergo a liver transplant. We do not know if the patient has a non-diagnosed steatohepatitis that was aggravated by the bariatric procedure or if that procedure through different mediators was the primary cause of this issue.

Learning points: A better comprehension of the mechanisms of liver function disturbance, secondary to bariatric surgery, is needed in order to be able to introduce pertinent preventative measure.

References:
1. Rodríguez Silva, C.et al. (2019). Insuficiencia hepática aguda secundaria a cirugía obstructiva: una indicación de trasplante hepático.
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Mirror writing in the emergency room: an unusual case of epilepsy

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Background: Mirror writing is the script which runs in the opposite direction to normal, with individual letters also reversed, nearly always undertaken with the left hand. It can be seen in healthy individuals or associated with various focal lesions that most commonly involve the left hemisphere. However, it has not yet been described in people with epilepsy.

Case Report: 42-year-old right-handed female patient, with non-lesional left frontal epilepsy diagnosed at age 16, currently on topiramate 200mg bid, lacosamide 200mg bid and levetiracetam 1500mg bid. She had multiple previous hospitalizations due to refractory disease requiring coma induction and presented to our emergency with another episode of focal seizures (right upper limb) with secondary generalization. Infectious and metabolic causes of decerebration were excluded. Despite the administration of dexamethason 40mg IV and levetiracetam 1500mg IV, the seizures continued. Between seizures, the patient presented with an episode of mirror writing (Fig 1) with left hand. Anesthetic induction and deep sedation were required to manage refractory convulsive status epilepticus, monitored with bispectral index. In the ICU, under deep sedation with propofol perfusion, electroencephalography study showed no paroxysmal activity. Relatives reported mirror writing after previous seizures. She has no memory of that and is unable to write like that out of seizures.

Discussion: Unaware mirror writing was present in this right-hand patient with refractory epilepsy affecting the right upper limb. Stroke patients with right-sided paresis can rarely present with spontaneous and mirror writing during early attempts of writing with the left hand. We hypothesize that our patient, while feeling impaired to write with her right hand during seizures, attempts to do so with her left hand, and mirror writing occurs.

References:
1. Mmaidanganu V.1, Mmaduoma WP.1, Okafor CC.1, Ndulue K.1, Ezeme CI.1
2. Doi: 10.1136/jnnp.2006.094870.

Learning points: To the best of our knowledge, this is the first case of mirror writing reported in a patient with epilepsy. Physicians should be aware of this condition, which may be underreported.
Neuroleptic malignant syndrome in a patient with chronic alcoholism: a case report

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Background: Neuroleptic Malignant Syndrome (NMS) is a rare medical emergency associated with the use of antipsychotic drugs. Its etiology remains uncertain, although the hypothesis of a generalized blockade of dopamine receptors has a wide acceptance. In terms of clinical presentation, fever, dysautonomia, fluctuating level of consciousness and rigidity are its most typical signs. The diagnosis is ruled out by exclusion. Despite its potential mortality, the prognosis has improved in the last years, which reflects an earlier diagnosis and intervention.

Case Report: A 79-year-old woman with chronic alcoholism as the main background of interest, presented to the emergency department under the diagnosis of a periprostatic fracture. She was operated on the day of admission with an intramedullary nail under spinal anesthesia without complications. Once in the hospitalization unit, she was given intramuscular haloperidol (5mg) to treat an episode of agitation. Few hours later she presented respiratory insufficiency, somnolence, diaphoresis and generalized rigidity with normal blood pressure and 37°C temperature which raised until 42°C in the next 4 hours. Blood test revealed metabolic acidosis, hyperlactacidemia and CK and transaminases elevation. Imaging tests discarded a pulmonary or cardiac cause. Meningitis secondary to the use of antipsychotics was suspected as a possible cause of NMS. We decided to discontinue the treatment with haloperidol because she did not improve clinically with acyclovir; the clinical signs were suggestive of toxicity (visual hallucinations, confusion and subsequent coma) and her images studies were normal.

Learning points: Differentiating acyclovir neurotoxicity from zoster encephalitis can be challenging and management of the two conditions is diametrically opposite. Acyclovir neurotoxicity is seen more often in conjunction with renal dysfunction and with visual hallucinations and disphasia.

References:

Role of dexmedetomidine in the treatment of delirium in critically ill patients: A systematic review and meta-analysis

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Background and Goal of Study: Dexmedetomidine has been found to prevent delirium in critically ill patients; however, whether it could treat delirium in these patients is uncertain. Therefore, this meta-analysis aimed to assure the efficacy and safety of dexmedetomidine in adult critically ill patients with delirium.

Materials and Methods: Randomized controlled trials and observational studies based on the use of dexmedetomidine in adult critically ill patients with delirium were retrieved from PubMed, Web of Science, the Cochrane Library, and clinicaltrials.gov until January 27, 2019.

Results and Discussion: A total of 861 patients in 13 studies met the selection criteria. The results revealed that dexmedetomidine was associated with a lower point-prevalence of delirium after treatment (odds ratio (OR), 0.31; 95% confidence interval (CI), 0.15, 0.65; P = 0.002), but a slightly higher incidence of bradycardia (OR, 2.91; 95% CI, 0.93, 9.04; P = 0.07) compared with placebo and other drugs.
No statistical differences were found in the incidence of hypotension or arrhythmia; the length of intubation, intensive care unit (ICU) or in-hospital mortality; or the length of ICU or hospital stay between dexmedetomidine and placebo and other drug regimens.

Conclusion: Dexmedetomidine might promote the resolution of delirium but increase bradycardia in critically ill patients with delirium. This trial was registered in PROSPERO (CRD42018107797).

Acknowledgements: This study was supported by the National Science Foundation of China (Grant Nos. 81710158 and 81960357), the Key Special Project "Active Health and Scientific and Technological Response to Ageing" of the National Key R&D Program (2018YFC2001904), the Special Fund of Wu Jieping Medical Foundation for Clinical Scientific Research (320.67.50.18001); and the Doctoral Start-Up Fund of the Affiliated Hospital of Guizhou Medical University (I-2017-06).

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Predictive factors of disability at 6 months after spontaneous intracerebral hemorrhage in ICU patients

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Background and Goal of Study: Spontaneous intra cerebral hemorrhage (SICH) has a very high mortality and morbidity rate. The aim of this study was to evaluate functional outcome at 6 month after admission in ICU and to identify predictive factors of severe disability.

Materials and Methods: We performed an observational prospective monocentric study, in a surgical ICU. Every patient admitted for SICH was included from November 2016 to November 2018. Clinical and radiological data were obtained from electronic medical records. Functional outcome was estimated using the modified Rankin Scale (mRS) at 6 months after ICH. Results were expressed in median and interquartile range.

Results and Discussion: Eighty six patients were included (mean age 66 years, 35.5% males). Medical history of hypertension was found in 62% of this population. Coagulation abnormalities were detected in 52% Glasgow Coma Scale (GCS) before endotrachial intubation was 6 [4-8]. Signs of intracranial hypertension on admission were recorded in 60.5% patients. Hematoma volume was 60 [25-83] ml. Intracerebral hemorrhage Grading Scale (ICH-GS) was 11 [10-12]. Most patients (51.2%) underwent urgent neurosurgical procedure. Global mortality rate was 62.8% of which more than half patients died within the first 48 hours from admission. Survival rate at 6 months was 32.6% (28 patients); mRS at 6 months was 4 [3-5], with mRSx5 in 44.4% and mRS> 3 in 55.6% of the survivors. The only independent predictive factor of severe disability was the occurrence of sepsis during ICH hospitalization (p<0.012).

Conclusion: SICH in ICU patients is associated with very high mortality rate. Survivors have a high risk of severe disability at 6 months after admission. Sepsis seems to worsen functional outcome. In this setting, sepsis should be aggressively treated to limit secondary brain inflammation.

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The seasonal effects on delirium in critically ill surgical patients: a retrospective analysis

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Background and Goal of Study: Postoperative delirium is common in hospitalized patients, with a reported prevalence of 11% up to 80% in critically ill patients. Recognizing its short-term and long-term consequences has led to a consensus that cognitive performance may have a more dysfunctional pattern during winter. We, therefore, intend to test whether the seasonal variation is associated with the occurrence of delirium and length of stay (LOS) in critically ill non-cardiac surgical populations.

Materials and Methods: We conducted a retrospective analysis of adult patients recovering from non-cardiac surgery at Cleveland Clinic, between March 2013 and March 2018 who remained at least 48 hours in the surgical intensive care unit. The delirium was evaluated daily using CAM-ICU. The incidence is summarized during seasons across four seasons (Winter: March 2013-February 2014; Spring: March 2014-February 2015; Summer: March 2015-February 2016; Fall: March 2016-February 2017).

Results and Discussion: In total, 2300 patients admitted to SICU after non-cardiac surgeries were included in our study. In total, 1108 (48%) of them had postoperative delirium. The incidence of delirium was 49% in spring, 48% in summer, 46% in fall and 50% in winter, which was not significantly different over four seasons (Chi-square p-value=0.69). After adjusting for potential confounding variables, seasonal variation was not associated with the odds of delirium either (joint test p-value=0.81). Furthermore, we identified the subtypes of delirium among 1104 patients with available RASS assessment and they were not significantly different across four seasons (Fisher exact test P = 0.059). The median length of hospital stay was 12 days (IQR = [8, 19]) overall. We found a marginally significant difference in LOS across four seasons without adjustment (Kruskal-Wallis P = 0.024) and after adjusting potential confounders (P = 0.018). The LOS during summer was 12% longer (95% CI: 1.04, 1.21; P = 0.002) than in winter.

Conclusion: In adult critically ill surgical patients, the incidence and type of delirium do not differ per season. Delirium surveillance and prevention measures should be comparable maintained in all seasons. Prolonged length of stay on summer should be investigated.

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Prolonged pharmacoresistant dystonia of a child successfully solved by deep brain stimulation

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Background: Dystonias are referred to as involuntary permanent contractions of muscles or muscle groups that bring limbs or other body parts to twisting tonic contractions of varying intensity and abnormal and involuntary positions. This condition is more frequent in children and the etiology is heterogeneous. Currently there is no causative therapy of dystonia and the pharmacotherapy is based on benzodiazepines, neuroleptics and antiepileptics, however with only minimal effect on disease presentation. This case report presents a child patient suffering from a secondary form of dystonia in which all conservative forms of treatment have been exhausted without effect.

Case Report: A 12-year-old patient, successfully treated long-term with baclofen and diazepam for dystonic manifestations of extrapyramidal form of cerebral palsy, was admitted to PICU for acutely worsening generalized dystonia due to an ongoing gastrointestinal infection. Only transient control of dystonia manifestation was achieved with high dose sedatives and antiepileptics (midazolam 5µg/kg/min + valproic 2mg/kg/h), with serious side effects of treatment. Deep brain stimulation (DBS) was indicated after failure to wean the pharmacotherapy to acceptable level (15th day after admission). The condition was further complicated by hospital-acquired pneumonia, with the need for intubation and mechanical ventilation (20th day). For presumed prolonged ICU stay, surgical tracheostomy was performed (33rd day) and after circumspect consideration involving the uncertain outcome patient underwent deep brain stimulation electrode implantation (39th day). Neurosurgical procedure including postoperative course proceeded without complications. The stimulation was started on the 5th postoperative day and the stimulation energy was progressively increasing through one month with the positive effect on dystonia symptoms. Gradually, sedative medication was completely discontinued. Patient was dismissed to home care on 76th day with only minor local dystonia symptoms.

Discussion: Deep brain stimulation can be one of the possible treatments of patients with status dystonicus.

Learning points: Status dystonicus is most severe and life-threatening form of dystonia presentation. The treatment options are limited to sedatives, neuroleptics and antiepileptics. DBS can be considered as one of the possible "off-label" treatment option in patients with pharmaco-resistant status dystonicus.
Development of focal neurological deficit associated with the intake of ergotics in a patient with vasospasm criteria. A case report

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Background: Ergotics are a group of drugs used, among other indications, for the treatment of acute migraine headache. This group has a cerebral arterial vasoconstrictor effect. It is important to know the toxicity of these drugs, although it is not usual. An overdose or pharmacological interaction can cause hypertension, tachycardia, and cerebrovascular vasospasm. Vasospasm is the most frequent complication of aneurysmal subarachnoid hemorrhage (SAH). It is important to identify risk factors or possible precipitants related to vasospasm in patients with SAH, to establish preventive measures or start treatment as early as possible.

Case Report: 48-year-old woman who has grade IV subarachnoid hemorrhage of the Fisher scale. A diagnostic and therapeutic arteriography is performed on admission, with endovascular embolization of a right middle cerebral artery aneurysm (MCA). During her stay in the ward, the patient keeps suffering from headaches, for which a transtemporal Doppler is requested, where there is an objective increase in velocities in right MCA but without figures compatible with vasospasm. A wait-and-see approach is taken, the evolution being favorable. On the 4th day post-embolization, the headache persists and the patient takes her usual medication for migraine (Ergotic), and the pain abates. Hours later, she starts suffering form headaches again, with associated neurological focus in the upper left limb with loss of strength and paraesthesia, which diminishes naturally. A new transtemporal Doppler is performed and a pattern compatible with vasospasm is observed, so she is transferred to the ICU. After drug withdrawal and support with triple H therapy, neurological focus disappeared.

Discussion: There is evidence that Ergotics are associated with an increased risk of ischemic complications, including cerebral arterial area. Risk factors and precipitants must be taken into account to prevent and treat them early. We must treat the headache but without using ergotamins in patients who are in risk of vasospasm after suffering an SAH, even if it is the usual treatment used by the patient.

References: 1. Adverse cardiovascular events associated with triptans and ergotamines for vasospasm after suffering an SAH, even if it is the usual treatment used by the patient.

Learning points: Ergotamine-type drugs and derivatives should be avoided in patients with SAH, since they may precipitate cerebral vasospastic complications.

Thrombosis of superior vena cava in a patient with traumatic brain injury

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Background: Thrombosis of Central Venous Catheter (CVC) is emerging as an significant cause of Superior Vena Cava Syndrome (SVCS). Traumatic Brain Injury (TBI) is a condition where anticoagulation therapy is a very challenging task. We exhibit the concomitance of these entities with opposite goals regarding hemostatic state.

Case Report: We describe the case of a 49-year-old man admitted after severe TBI who develops a SVCS caused by thrombosis of CVC. As main clinical history, our patient had a neuroendocrine pancreatic tumor (disease-free) from which he carried a port-a-cath in right subclavian vein (with asymptomatic thrombosis). Admission cerebral CT scan showed intra and extra-axial hemorrhagic lesions which required a decompressive craniotomy and intracranial pressure (ICP) device insertion. After successful barbiturate coma (following an early hemorrhagic progression), newer uncontrolled elevated ICP was detected, with simultaneous swelling of arms, trunk and face. Repeated scan detected Thrombosis of SVC without hemorrhagic progression. Emergently, a SVC stent was placed. Immediately after, ICP dropped to normal values and swelling diminished. At this point, antithrombotic therapy wasn’t initiated. After a negative CT scan, Salicylic Acid was started. At day 30, prophylactic low molecular weight heparin was initiated. Finally, at ICU discharge, the patient presented minor neurological sequelae.

Discussion: Our goal was to prevent thromboembolic events (TE) while minimizing hemorrhagic risk. There are no clear guidelines regarding optimal time of prophylaxis initiation. Recent retrospective studies suggest that early initiation (after 24h) of prophylaxis didn’t increase the risk of hemorrhagic progression even in patients of high risk TBII. Regarding therapeutic doses, weak recommendations are: not to start within the 1st 24h; could be started from day 3 and day 7, for high and low TE risk patients respectively. In observational studies, the use of antplatelet therapy is not associated with hemorrhagic progression.

References: 1. Piva, S. et al (2019). Intensive care unit-acquired weakness (ICU-AW) is a common impairment in critically ill patients. Critical illness polyneuropathy (CIP) and myopathy are strong contributors to this condition.1 We present a case of neuropathic pain (NP) in a patient admitted in the ICU with sepsis and multorgan failure (MOF). Case Report: Barro M.1, Noqueira S. 2, Pinho C. 1, Santos F.1, Fonseca S.1 1Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Management of neuropathic pain in ICU-related polyneuropathy – a case report

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Background: Intensive care unit-acquired weakness (ICU-AW) is a common impairment in critically ill patients. Critical illness polyneuropathy (CIP) and myopathy are strong contributors to this condition.1 We present a case of neuropathic pain (NP) in a patient admitted in the ICU with sepsis and multorgan failure (MOF). Case Report: A 47-years-old man, ASA V, was admitted in the ICU with tertiary peritonitis conditioning septic shock and MOF. Due to a “frozen abdomen” he was submitted to several laparotomies and remained sedated and ventilated for 15 days. For pain management, it was placed a thoracic epidural catheter on the third day and started a multimodal analgesic approach. During the ICU stay, an ICU-AW was developed with generalized motor weakness associated with local sensorial motor deficit: distal ankle hypoesthesia, right hallux extension deficit and alldynia on the dorsal surface of the right 1st, 2nd and 3rd toes. The electromyography showed axonal lesion at L5 right nerve root. A rehabilitation program, along with multimodal analgesia to relief NP, was established with improvement of complaints at the day of hospital discharge.

Discussion: Sepsis, MOF and systemic inflammatory response syndrome have been suggested to cause CIP.1 In these vulnerable patients one should be aware of their long-lasting positioning, while on heavy sedation, as it increases the risk of nerve injuries.2 It is also important to be aware of muscle weakness, sensory loss, NP and autonomic impairments. Electromyography, nerve conduction studies, and muscle biopsy can help to establish the diagnosis.3 The therapeutic approach was focused on a specific drug combination to provide greater pain relief and less adverse effects. It turned out to be a challenge since the response to most drugs remains unpredictable.3


Learning points: ICU-AW has a relevant impact on short and long-term outcomes. One should be aware of such diagnosis and, therefore, muscle function assessment should become a mandatory part of the clinical examination of patients in ICU setting.
Effect of patient-directed interactive music therapy on sleep quality and melatonin levels in critically ill elderly patients

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Background and Goal of Study: Sleep is essential to prevent delirium and for recovery from critical illness, however, sleep disruption is common in the intensive care unit (ICU) with various causes. Many pharmacological and non-pharmacological measures have been tried. Music can be an effective way to reduce anxiety and promote sleep with little harm. The aim of this study is to investigate the effects of music on saliva melatonin level and quality of sleep among elderly patients in ICU.

Materials and Methods: 133 patients were randomized into three groups: Interactive Music Therapy (IMT), Passive Listening (PL) and Control group. The control group (n = 45) received routine medical care, while IMT and PL group received music therapy on ICU day 1. IMT group received up to 20 minutes of interactive music session including relaxation technique and PL group received only pre-selected relaxing music listening for 30 minutes. The saliva melatonin level were measured three times at 11pm (preoperative), Operation day and postoperative day (POD 1). Richards-Campbell Sleep Questionnaire (RCSQ) was surveyed on preoperative day, POD 1 and 2. Postoperative delirium was evaluated with Intensive Care Delirium Screening Checklist.

Results and Discussion: Repeated measures with a linear mixed model revealed significant elevation of saliva melatonin level on POD 1 in IMT group (1.45 ± 0.30 vs 0.66 ± 0.29 vs 0.04 ± 0.35, p = 0.0345) and sleep quality measured by RCSQ showed significant improvement in IMT group on POD2 (71.50 ± 3.72 vs 66.95 ± 3.72 vs 56.88 ± 3.67, p = 0.0270). Postoperative delirium did not show statistically significant differences among groups.

Conclusion: Patient directed interactive music therapy improved sleep quality and elevated saliva melatonin level in elderly critically ill patients after surgery. However, music therapy did not change the incidence of delirium.

Prognostic role of neutrophil to lymphocyte ratio and mean platelet volume/platelet ratio for 6 month mortality in critically ill patients

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Background and Goal of Study: The neutrophil to lymphocyte ratio (NLR) and mean platelet volume (MPV) have been reported to be associated with poor prognosis in various cohorts. We hypothesized that NLR and MPV could be used as predictive marker for mortality in critically ill patients.

Materials and Methods: We retrospectively reviewed 1154 patients admitted to ICU between January 2017 and December 2017. Patients were divided to two group according to 6 month mortality. The NLR and MPV/platelet ratio on each day of ICU admission were compared. Patients were classified in to tertiles according to NLR and MPV/platelet ratio. The incidence of 6 month mortality was compared, and multivariate Cox proportional hazard model was performed to evaluate the risk factors for 6 month mortality.

Results and Discussion: NLR and MPV/platelet ratio were greater in the non-survivor group than the survivor group (16.89±27.01 vs. 10.34±10.98, p<0.001,
Secondary metabolites from marine Bacillus sp. display anti-neutrophil inflammatory effects

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Background and Goal of Study: Local and systemic inflammatory responses in major surgery contribute to wound infection, prolong healing, and worsen post-operative pulmonary functions. Neutrophils are major immune cells involved in local and systemic inflammatory responses. The proinflammatory mediators and proteolytic enzymes secreted from activated neutrophils in response to inflammatory stimuli may damage surrounding tissues and even induce organ dysfunction. N-formyl peptides, from either bacterial peptides or mitochondrion proteins, are recognized by formyl peptide receptor (FPR) 1 of neutrophils to induce sterile and infective inflammation. Therefore, it is important to know how N-formyl peptides activate neutrophil inflammatory process, and FPR1 has become a therapeutic target for treating inflammatory diseases.

Materials and Methods: Human neutrophils were isolated from healthy volunteers, which have been proven by local IRB. Superoxide generation and elastase release were measured by spectrophotometry.

Results and Discussion: Our previous studies have screened a series of marine bacteria metabolites and found that IA-LBI-07-01, extracted from marine Bacillus sp., showed most significant inhibitory effects on respiratory burst and degranulation in activated human neutrophils. Further studies suggest that inhibition of neutrophil activation by IA-LBI-07-01 may act by blocking FPR1. Accordingly, the active compounds of IA-LBI-07-01 will be identified by bioactivity directed fractionation and isolation. We have identified the natural product, anteso-C13-surfactin (IA-1) from the extraction IA-LBI-07-01. Our results showed IA-1 significantly inhibited neutrophil immune functions specially induced by the FPR1 agonists.

Conclusion: Considering the importance of activation of neutrophils in inflammatory responses, the results will indicate that metabolites of marine Bacillus sp. may have therapeutic potential to attenuate neutrophil-mediated inflammatory diseases. Finally, our results will provide the lead candidates form marine bacteria metabolites for development of new anti-inflammatory drugs.

Exosomes from red blood units induce mediators secretion from mast cells in vitro

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Background and Goal of Study: Activation of mast cells may involve many transfusion-associated complications, and exosomes came from packed red cells (EXs-RBC) have been reported to induce TNF-a secretion from monocytes. However, whether EXs-RBC can elicit mast cells activation, and the possible receptor and pathway involving in this process are still unknown.

Materials and Methods: Human mast cells (HMC-1) were cultured with PBS, EXs-nor, and EXs-RBC. Activation of HMC-1 was analyzed by flow cytometry.

Results and Discussion: Our previous studies have screened a series of marine bacteria metabolites and found that IA-LBI-07-01, extracted from marine Bacillus sp., showed most significant inhibitory effects on respiratory burst and degranulation in activated human neutrophils. Further studies suggest that inhibition of neutrophil activation by IA-LBI-07-01 may act by blocking FPR1. Accordingly, the active compounds of IA-LBI-07-01 will be identified by bioactivity directed fractionation and isolation. We have identified the natural product, anteso-C13-surfactin (IA-1) from the extraction IA-LBI-07-01. Our results showed IA-1 significantly inhibited neutrophil immune functions specially induced by the FPR1 agonists.

Conclusion: Considering the importance of activation of neutrophils in inflammatory responses, the results will indicate that metabolites of marine Bacillus sp. may have therapeutic potential to attenuate neutrophil-mediated inflammatory diseases. Finally, our results will provide the lead candidates form marine bacteria metabolites for development of new anti-inflammatory drugs.

Acute Intestinal Ischemia Due to the Superior Mesenteric Artery and Vein Thrombosis in a Female Young Patient: Case Report

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Background: Acute mesenteric ischemia is challenging clinical issue. It is estimated that in most cases is caused by embolism or thrombosis of superior mesenteric artery (65%). Mesenteric venous thrombosis is the least common cause, representing up to 18% of all cases. Artery and vein thrombosis is even rarer.

Case Report: 37-year-old female was admitted with generalized abdominal pain, fever accompanied by vomiting and diminished peristalsis. Intraoperatively surgeon verified "total intestinal ischemia from ligament of Treitz to Bauchini valve". In ICU she was put on mechanical ventilation, remained on midazolam for sedation and fentanyl for pain control, and was provided supportive care, included continuous analgesics and limited feeding. Due to the severity of the condition, the surgical team decided to perform a total colectomy and ileostomy.

Learning points: The case emphasizes the importance of early recognition and prompt intervention in cases of suspected acute intestinal ischemia. Early diagnosis and appropriate treatment can improve outcomes and reduce complications associated with this condition.

References:


Learning points: Our case outlined the management of an unknown hematologic condition during perioperative course. Although acquired A hemophilia is a very rare condition, the onset of multiple hemorrhagic complications not explained for other causes should be raised the possibility of a hematologic disorder. Multidisciplinary approach is advised.
vital signs, standard arterial blood gas analysis, complete blood cell count, coagulation profile, CT angiography scan. Patient has still been at our ICU (28th day of hospitalisation) with continued intensive resuscitation treatment, including total parenteral alimentation.

Discussion: Clinical diagnosis of mesenteric ischemia is difficult, especially in young patient, but in most cases abdominal pain is cardiac symptom in 94%, accompanied by nausea 56%, vomiting 38%, diarrhea 31%, and tachycardia 31%. Radiological images are different when differentiating etiology of vascular event: in arterial etiology, progression of the damage is slower and thinning of the intestinal wall is typical, but difficult to recognize. In ischemia of venous origin progression of damage is faster even when symptomatology is less dramatic and thickening of intestinal wall is easy to observe and detect.

References:

Learning points: Acute mesenteric ischemia is challenging clinical problem with diverse causes, which often results in delayed diagnosis and treatment. Mesenteric vein thrombosis is increasingly recognized as cause of mesenteric ischemia, but still atypical in young, healthy patient. Mortality rate has still been high (50%-90%). Modality of reference for diagnosis of AMI is contrasted tomography (gold standard).

5884
ICU mortality related to admission source - retrospective study
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Background and Goal of Study: Intensive care medicine is characterized as being the most complex specialty with the most critically ill patients. Patients admitted to ICU need support for organ/system failure, continuous monitoring and permanent nursing care. The majority of the patients are admitted to ICU after unexpected situations, and only a small part of them as an elective admission. The aim of this study was to quantify mortality differences among patients admitted to ICU from hospital ward, emergency department, operating theatre or from other hospital.

Materials and Methods: We evaluate the ICU mortality during 1 year, from December 2018 until December 2019 in a retrospective study which included a total number of 429 patients admitted from the hospital wards, emergency department, surgical theatre or other hospitals using ICU record data obtained from a clinical database from an Irish hospital. Our study was approved before by the local audit committee.

Results and Discussion: From a total of 429 patients admitted in ICU, the majority of the patients came from emergency department (47%) followed by theatre admission (21%), and from other hospitals (4%). The ICU mortality during 1 year was 17.25%, and the highest mortality rate of the patient was found on the patients admitted from emergency department (9.1%). 72% of the ICU patients went back on the ward, and 4.4% were discharged directly home after ICU admission.

Conclusions: These findings indicate that there might be differences in the mortality rate dependent on the admission source, and the patients admitted from ED directly to ICU, have the worst prognostic regarding the survival rate. We are looking forward to find the correlation between mortality regarding the time from emergency department to ICU admission.

5269
Comparison of nurse's perceptional difference in rapid response team system between hospitalist available ward and non-hospitalist available ward
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Background and Goal of Study: Rapid Response Team (RRT) is a medical team, implemented to detect early warning signs in the forms of physiologic instability for the prevention of unplanned ICU admission, cardiac arrest, and death. Together with RRT, the number of hospitals instituted hospitalist system is increasing recently in Korea. The studies for nurse's perceptional difference and satisfaction in contacting RRT between the hospitalist and non-hospitalist situations are not well described in Korea.

Materials and Methods: 147 nurses working in Severance hospital in Seoul, Korea participated in the survey, using a 14-item Likert scale questionnaire. All data were statistically analyzed with SPSS statistics 25.0. Categorical data was conducted with a two-tailed independent t-test. Continuous data were presented using Mean ± Standard Deviation. All variables are presented using N(number), percentage(%), Mean ± Standard Deviation or median value. P-value < 0.05 was considered statistically significant.

Results and Discussion: Results showed nurses working in the non-hospitalist available ward had higher perception regarding required necessary information including criteria for RRT call and higher perception of overestimation for the severity of the patient’s disease status. Nurses working in the non-hospitalist available ward also had positive satisfaction in RRT response after activation, belief in RRT treatment improving patient and guardian’s patient service satisfaction, improving their own skill in managing sick patients by RRT intervention.

Response to survey of nurses' attitude to the RRT:

<table>
<thead>
<tr>
<th>1. I have an idea of RRT and their job.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I know the operating time of RRT.</td>
<td>0.1</td>
<td>0.3</td>
<td>0.2</td>
<td>0.4</td>
<td>2.6</td>
</tr>
<tr>
<td>2. I know the criteria for RRT call.</td>
<td>0.7</td>
<td>0.8</td>
<td>0.2</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>3. I know the number of RRT.</td>
<td>2.0</td>
<td>1.8</td>
<td>0.2</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>4. RRT is helpful in patients’ safety on the ward.</td>
<td>0.7</td>
<td>1.4</td>
<td>0.2</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>5. RRT represents a waste of human resources and material resources.</td>
<td>61.2</td>
<td>32.0</td>
<td>2.0</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>6. Patients in the hospital have complex medical problems and the severity of diseases are increasing.</td>
<td>0.9</td>
<td>2.7</td>
<td>0.3</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>7. RRT prevents unwell patients from having an attack.</td>
<td>0.1</td>
<td>0.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>8. The management of patients at risk is too complex and real time surveillance is difficult on the ward.</td>
<td>0.8</td>
<td>2.0</td>
<td>0.2</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>9. RRT responded immediately once I called RRT.</td>
<td>0.5</td>
<td>2.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>10. I satisfied with RRT treatment.</td>
<td>0.7</td>
<td>2.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>11. I think RRT treatment improves patient or guardian’s patient service satisfaction.</td>
<td>0.1</td>
<td>1.4</td>
<td>16.4</td>
<td>50.0</td>
<td>32.1</td>
</tr>
<tr>
<td>12. RRT intervention from RRT is beneficial for patient on ward.</td>
<td>0.5</td>
<td>5.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
</tr>
<tr>
<td>13. RRT interventions represent an opportunity to improve my skills in managing sick patients.</td>
<td>0.1</td>
<td>0.7</td>
<td>11.4</td>
<td>45.7</td>
<td>42.1</td>
</tr>
</tbody>
</table>

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Acute generalised sialadenitis caused by iodide contrast media. Report of one case
León Núñez M.1, Flores Cajal B.1, Réparaz Grávalos P.1, Gil Mayo D.1, Martínez De Castro N.1, Peseta Laguna D.1, Anesthesiology and Post-Surgery Critical Care 1Hospital Ramón y Cajal - Madrid (Spain)
Background: Imaging techniques using radiocontrast iodinated agents are widely used nowadays, although knowing to cause several adverse effects. We consider important to report this case, in order to increase consideration in the differential diagnosis of acute sialadenitis.
Case Report: 69-year-old male patient, with history of diabetes mellitus and chronic renal failure went into programed laparoscopic cholecystectomy. Due to surgery complications the patient needed a non-programmed admission in our intensive care unit. He developed septic shock suspecting peritonitis so a Computerized Tomography with iodite-radiocontrast was performed. 72 hours later, symmetric and bilateral submandibular swelling was found, mild pain, but no other systemic symptoms. After a complete exam and echography evincing an enlargement of both submandibular glands, we suspected acute sialadenitis caused by iodinated contrast media. Epstein-Barr and Parovirus B19 serologies were requested, being negative. A non-esteroid antiinflammatory treatment was given, leading to complete symptoms resolution in a week.
Discussion: Acute sialadenitis is an infrequent complication of iodinated contrasts. The diagnosis is mainly clinical and curses as a bilateral, diffuse, painless salivary gland inflammation. The developing exact mechanism is uncertain. It may solve without a targeted treatment as an auto-limited pathology in a few days. The majority of the iodinated contrast media have renal excretion, so an impairment in the renal function may lead to its accumulation [1]. These patients could develop other ways of contrast excretion, such as salivary glands, but only represent 1/3 of the total of cases reported [1]. Patients with normal kidney function developing this pathology are more prevalent, and gland swelling could be a premonitory sign of an anaphylactic reaction. We cannot forget other causes of sialadenitis such as autoimmune, hemorrhagic and most frequently, viruses. Therefore, we must take blood samples including serologies, to stablize a directed treatment.

Acute generalised sialadenitis caused by iodide contrast media. Report of one case
León Núñez M.1, Flores Cajal B.1, Réparaz Grávalos P.1, Gil Mayo D.1, Martínez De Castro N.1, Peseta Laguna D.1, Anesthesiology and Post-Surgery Critical Care 1Hospital Ramón y Cajal - Madrid (Spain)
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Clevidipine for acute hypertension management after mechanical thrombectomy

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Background and Goal of Study: Hypertension treatment is a goal of care after mechanical thrombectomy. Clevidipine is a short action calcium channel blocker with rapid onset of action and ultra-short half life, making it a good choice especially when rapid and safe treatment of hypertension is required. For this reason, we hypothesized that clevidipine could be effective and safe for hypertension treatment in this population.

Materials and Methods: We conducted a retrospective review of medical records of patients admitted to Reanimation Unit of Cruces University Hospital between 2017 and 2018 after mechanical thrombectomy for ischemic stroke. Age, Sex, Glasgow Coma Scale, NIHHS score, location of ischemia, Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean Blood Pressure (MBP) and previous history of hypertension, stroke or cardiovascular risk factors were recorded. Our primary endpoint was observing the effectiveness of clevidipine for acute hypertension treatment. Our secondary endpoint was observing the safety of clevidipine. The statistical analysis was performed using SPSS (version 23.0) using Fisher test for qualitative variables and U Mann Whitney for quantitative variables. A level of 5% was considered significant.

Results and Discussion: Our study included 8 patients. Clevidipine was effective for acute hypertension treatment achieving the target level between 10 and 45 minutes in 100% of patients. SBP target was kept during a median of 40 hours or until to discharge to hospitalization floor in 75% of patients. Nevertheless 50% of patients required additional intravenous treatment and 87,5% required transition to oral treatment probably resulting of the higher incidence of chronic hypertension (88%) in our study. Clevidipine was also safe without hypotension or adverse events in none of our patients. Additionally, we found that mortality was related to NIHSS (p = 0.007), SBP (p = 0.0009), Glasgow Coma Scale (p = 0.0009), infusion length (p = 0.0009), time of SBP maintenance (p = 0.0009) and Reanimation stay (p = 0.003).

Conclusion: Our study showed that clevidipine is effective and safe for acute hypertension treatment after mechanical thrombectomy especially in patients with chronic hypertension history not reported previously as far as we know. Nevertheless the retrospective design and little size of sample are limitations to make recommendations and requires further investigation.

References:

Learning points: Airway management, monitoring and treatment of severe postoperative SE, PT and PM.
Iatrogenic Injury and Intensive Care Follow-up After Foreign Body Removal from Esophagus in a Child Patient

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Background: Esophageal perforations are rare, but morbidity and mortality are high in these cases, as they lead to mediastinal and/or pleural inflammation and infection followed by sepsis. Symptoms and signs of esophageal perforation vary depending on the location, development and duration of perforation. In this case, we wanted to emphasize the importance of early intervention in the esophagus.

Case report: A 61-year-old female patient presented to the Emergency Department with a sudden onset of severe chest pain radiating to back, after a meal, followed by forceful vomiting. At admission she was conscious, tachycardic and dyspnoic with laboratory values within normal values. A chest CT scan revealed left pleural effusion with pneumothorax, pneumomediastinus with extensive subcutaneous emphysema and hiatal hernia without contrast extravasation. Ten minutes after the onset of rupture patient was intubated and admitted to the ICU where intensive cardiovascular and respiratory resuscitation was performed, including mechanical ventilation, fluid resuscitation with isotropic support, and administration of broad-spectrum antibiotics, was initiated. Seventeen hours after the onset of rupture ventilation, fluid resuscitation with isotropic support, and administration of broad-spectrum antibiotics, was initiated. Seventeen hours after the onset of rupture, emergency surgical intervention was performed. Left-sided thoracotomy revealed a 4-cm-longitudinal laceration of lateral wall of the lower oesophagus which was repaired by primary suture. A gastrostomy for gastric drainage and jejunostomy for enteral feeding were also created. Postoperatively, patient was in stable condition and after twenty-four hours was extubated. However, eight-hours after extubation, sudden onset of bradycardia and hypotension occurred. Immediate resuscitation protocol, which included adrenaline, atropine, levosimendan, noradrenaline and vasopressine, was initiated. Electrocardiography showed PEA and following 90 minutes of CPR, death was determined. Postmortem echocardiography revealed a 50cc transudate from the thorax tube. The patient was referred to the external center for stent placement in the esophagus. Stayed at Stent for 6 weeks. She was fed with gastrostomy and jejunostomy tube for 8 weeks. After 10 weeks oral intake started. Gastrostomy was closed in 12 weeks.

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Discussion: Iatrogenic injuries are the most common cause of esophageal perforations. Symptoms and signs may vary depending on the cause, location and time of perforation. Especially in cases with iatrogenic development and no oral intake, as in our case, pathological findings may not be detected. If time passes over weeks, she started to eat normally and returned to normal life.}


PINK1/PARK2-mediated mitophagy during slow rewarming after hypothermia contributes to neuroprotection in a rat model of cardiac arrest

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Background and Goal of Study: Identifying the mechanism of rewarming is of great importance to minimize adverse effects and guide clinical decisions for hypothermia treatment. Besides, whether PINK1/Parkin-dependent mitophagy is also involved in rewarming after hypothermia following CA has not been investigated. We sought to investigate the differences in the survival rate and neurological outcome of different rewarming schedules and to evaluate the role of PINK1/Parkin-mediated mitophagy in rewarming after hypothermia.

Materials and Methods: Asphyxial cardiac arrest was induced for 5 min before resuscitation. Sprague-Dawley rats were randomized into the following groups: (1) normothermia (37.0 ± 0.5°C), (2) hypothermia without rewarming (34.0°C), (3) hypothermia + slow rewarming (0.5°C/h), and (4) hypothermia + rapid rewarming (1.5°C/h). Survival rates and neurologic deficits were determined, and morphological and relevant biochemical indicators were determined in rat brain cortices.

Results and Discussion: Slowly rewarming rats showed improved survival and neurologic recovery compared to rapidly rewarmed rats. PINK1/PARK2-mediated mitophagy was activated during slow rewarming. Mitophagy inhibition in the neurons of slowly rewarmed rats resulted in severe apoptosis and cell death. Moreover, the rapidly rewarming group exhibited a loss of PINK1 and mitophagy in the mortality of reactive oxygen species (ROS) and motor cortex apoptosis. Furthermore, exogenous PINK1 overexpression in the rapid rewarming group reduced cell death and restored mitophagy.

Conclusion: PINK1/Parkin-dependent mitophagy was activated and played a protective role during slow rewarming at 0.5°C/h, while fast rewarming at 4°C/h decreased PINK1 levels and mitophagy, a result that may be related to the
negative consequences of hypothermia. Thus, enhancing PINK1/Parkin-dependent mitophagy and improving mitochondrial turnover are promising therapeutic approaches for rewarming following hypothermia.

Acknowledgements: This work was supported by the National Natural Science Foundation of China (No. 81671879) and a grant (No. 201740118) from the Shanghai Municipal Commission of Health and Family Planning.

5056
Mean amplitude of glycemic excursions (MAGE) and its association with outcomes in patients with sepsis: a prospective observational study using continuous glucose monitoring

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Background and Goal of Study: Mean amplitude of glycemic excursions (MAGE) measured using continuous glucose monitoring (CGM) was a surrogate of glycemic fluctuations, which was reported to be associated with oxidative stress in patients with diabetes. Although glycemic variability has been reported to be a relevant index associated with worse outcomes in critically ill patients, there is little information on MAGE in septic patients and its associations with outcomes. This prospective study aimed to observe MAGE using CGM in early phase of treatment in septic patients, and assess its association with outcomes and oxidative stress.

Materials and Methods: We included adult patients admitted to our ICU with a diagnosis of sepsis from December 2017 to November 2019, and were expected to need intensive care for >48 hours. After obtaining informed consent from each patient or the patient's legally representative, we continuously measured blood glucose level for first 48 hours of the patient's stay in ICU using FreeStyle Libre®. MAGE was calculated using glycemic information obtained by CGM. The primary outcome in this study was 90-day all-cause mortality. The secondary outcomes were 90-day ICU free days and the concentration of urinary 8-iso-prostaglandinF2α measured 48 hours after commencement of the study as a biomarker of oxidative stress. We compared MAGE in survivors and non-survivors using the t-test. The correlation of MAGE with 90-day ICU free days and urinary 8-iso-prostaglandinF2α level were assessed with Pearson’s correlation coefficient. A p-value >0.05 was considered to indicate statistical significance.

Results and Discussion: We included 39 patients. The mean age of the patients was 65.9 years. The mean APACHE score was 27, the number of patients in septic shock was 20 (51.3%), and 90-day all-cause mortality rate was 30.8%. The mean of MAGE in non-survivors was 3.61±1.79 mmol/L, which was significantly higher than that of 2.18±1.28 mmol/L in survivors (p=0.01). An increase of MAGE was significantly associated with a lower rate of 90-days ICU free days (r=0.22, p<0.01) and a higher urinary 8-iso-prostaglandinF2α level (r=0.20, p=0.02).

Conclusion: In the current study in septic patients, MAGE for the first 48 hours measured by using CGM was shown to be associated with 90-day all-cause mortality, 90-days ICU free days and urinary 8-iso-prostaglandinF2α level.

5853
The overview of in-hospital cardiac arrests in a year

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Background and Goal of Study: Studies have shown that those who suffer out-of-hospital cardiac arrest (OOHCA) during the weekend were 20% less likely to survive to hospital admission. There is a few ideas about why survival drops during the weekend. While out-of-hospital codes are less successful during the weekend, we carried out retrospective reviews of in-hospital cardiac arrest (IHCA) records to see if there is also lower odds during the weekends. We also looked into matters relating to IHCA which may be utilized in improving the present CPCPR guide-lines and monitoring patients whose cardiac arrests may occur in hospital.

Materials and Methods: Electronic medical records of 327 patients who experienced IHCA were retrospectively reviewed, identified only by anonymous patient identification numbers. In order to investigate probable factors that may influence the occurrence of IHCA and survival, we analyzed one year of data for the following items: regardless of medical causes for hospitalization, clinical department, the place (wards or ICUs) and the when (weekdays, weekends, and time of day), time to CPCPR code announcing and CPCPR start from IHCA, prior intubation before the IHCA, number of intubation attempt after IHCA, and CPCPR end status (the dead and the survivor).

Results and Discussion: The data included some patients whose IHCA repeatedly occurred (2-5 times depending on the patients). Of 327 IHCA cases 65.8% (212 cases) survived, a rate that matches the other previous studies. There was no differences in survival rate between weekday and weekend (chi-square test), and the place and the time of day that IHCA occurred did not also affect survival. Of those who had IHCA only two patients had been intubated before cardiac arrest.

Conclusion: Weekend survival odds were not lower in IHCA. However, pre-IHCA intubation seems to be of greater value than ever considered so far in preventing sudden cardiac arrests. For this reason more careful and meticulous patient care and monitoring should be advised in terms of oxygen therapy whatever it is intra-pulmonary or extra-pulmonary, in addition to promoting CPCPR equipment availability and quick responses by rescuers to address IHCA.

6175
Clevidipine for acute hypertension management in aneurysmal subarachnoid hemorrhage

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2Hospital Universitario Ramón y Cajal - Madrid (Spain)
3Hospital Universitario de Cruces - Barakaldo (Spain)

Background: Hypertension treatment is a goal of care for subarachnoid hemorrhage management. Clevidipine is a short action calcium channel blocker with rapid onset of action and ultra-short half life, making it a good choice especially when rapid and safe treatment of hypertension is required. For this reason, we hypothesized that clevidipine could be effective and safe for hypertension treatment in this population.

Materials and methods: We conducted a retrospective review of medical records of patients admitted to Reanimation Unit of Cruces University Hospital between 2017 and 2018 after subarachnoid hemorrhage. Age, Sex, Glasgow Coma Scale, Fisher score, location of aneurysma, Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean Blood Pressure (MBP) and previous history of hypertension, stroke or cardiovascular risk factors were recorded. Primary endpoint was observing the effectiveness of clevidipine for acute hypertension treatment. Secondary endpoint was observing the safety of clevidipine. Statistical analysis was performed for SPSS using Fisher test for qualitative variables and U Mann Whitney for quantitative variables with a significance level of 5%.

Results and Discussion: We included 5 patients. Clevidipine was effective for acute hypertension treatment achieving the target level between 10 and 45 minutes in 100% of patients. SBP target was kept for a median of 59 hours in 100% of patients. Nevertheless 40% required additional intravenous treatment and 80% required transition to oral treatment probably resulting of the higher incidence of chronic hypertension (80%) in our study. Clevidipine was also safe without hypotension or adverse events in none of our patients. Mortality was related to Fisher (p = 0.01), SBP (p = 0.01), Glasgow Coma Scale (p = 0.01), time of SBP maintenance (p = 0.01) and Reanimation stay (p = 0.01). Complications were presented in 60% of patients probably resulting of the higher incidence of Fisher IV scores in our study (80%).

Conclusion: Our study showed that clevidipine is effective and safe for acute hypertension treatment after aneurysmal subarachnoid hemorrhage. Our study supports the result of a previous pilot study and adding evidence especially in patients with higher Fisher scores and chronic hypertension history which makes blood pressure control more difficult and the complications risk very high. Nevertheless the little size and retrospective design of our study will require further validation.
Brain oxygenation during prehospital anaesthesia: an observational pilot study

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1FinnHEMS / Helsinki University Hospital and University of Helsinki - Vantaa (Finland), 2FinnHEMS - Vantaa (Finland), 3Helsinki University Hospital - Helsinki (Finland), 4Oulu University Hospital - Oulu (Finland)

Background and Goal of Study: Many patients anaesthetised in prehospital setting are at risk of inadequate cerebral oxygenation. We aimed to estimate the frequency of cerebral desaturation events during prehospital anaesthesia.

Materials and Methods: We performed a prospective, observational pilot study in two physician-staffed Helicopter Emergency Medical Services (HEMS) units. Adult patients who underwent rapid sequence intubation and prehospital anaesthesia of any reason were included by the HEMS team. NIRS monitoring of left frontal cerebral regional oxygen saturation (rSO2) with Nonin H500 oximeter was started before induction of anaesthesia and continued to hospital arrival. The treatment of the patients followed routine practice.

Results and Discussion: Of 128 eligible patients, 97 (61 male, age 55±10 years) were enrolled in the study and rSO2 data from 83 patients were available for analyses. There was significant variation in the baseline oxygenation and in the change in oxygenation due to prehospital anaesthesia within the patients (Figure 1). The incidence of cerebral desaturation of 10%, 20% and 30% from baseline for at least 5 minutes occurred in 19 (23%), 4 (5%) and 1 (1%) patients, respectively. Figure 1. Baseline cerebral oxygen saturation and change of saturation after induction of prehospital anaesthesia as comparison to the baseline. OHCa=Out-of hospital cardiac arrest (patients anaesthetised after return of spontaneous circulation).

Conclusion: A substantial proportion of the patients anaesthetised in prehospital setting suffer a cerebral desaturation event. The consequences of these events need to be assessed further.

4871

Refractory tachycardia with hemodynamic compromise in the prehospital due to Disulfiram-Reaction: a case report

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Background: Disulfiram is a drug used for chronic alcohol abuse, as it interferes with the metabolism of ingested alcohol. We report a refractory tachycardia in an unconscious patient managed in the prehospital setting, being only correctly diagnosed accessing medical history in the hospital. This unusual combination of conditions as no pair in the scientific literature, being the only case in this nature to be described.

Case Report: A 56 years old male is found unconscious. Emergency services were activated, and the first team to arrive at the scene identifies a narrow QRS complex tachycardia with severe hypotension. First thought to be a supraventricular tachycardia, adenosine, electrical cardioversion and beta blockade were tried without major improvement. Only with access to medical history at the hospital, it was possible to diagnose a Disulfiram-reaction. Afterward, the patient began fluid therapy, thiamine, and Dextrose 5%, with asymptomatic discharge several hours later.

Discussion: Disulfiram-reaction caused a severe narrow QRS complex tachycardia and altered state of consciousness. As an uncommon drug, it wasn’t suspected as a possible cause until access to medical history. We report this case as a way of alerting to this rare and unexpected cause of tachycardia in the management of critically ill patients, which may lead to confusion during medical approach.

References:

Learning points: To know Disulfiram reaction symptoms, and recognize that it may lead to difficult to treat tachycardia. To acknowledge that in an unconscious patient, sometimes, only access to medical history and medication allows achieving a correct diagnosis.

5920

Hypothermia combined with xenon reduces secondary injury development and enhances neuroprotection by preventing neuronal cell loss in a rat model of traumatic brain injury

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Background and Goal of Study: The secondary injury that develops after traumatic brain injury (TBI) is potentially preventable and underlies most of TBI patients' functional impairments. Current TBI treatment is mainly supportive and no specific neuroprotective drugs are available. Excitotoxicity associated with over-activation of NMDA receptors plays a crucial role in secondary injury development. Xenon (Xe), a general anaesthetic and NMADa receptor antagonist, is neuroprotective in preclinical TBI1,2,3. Hypothermia (HT) is a standard neuroprotective treatment in neonatal asphyxia & post-cardiac arrest. Although the mechanisms of HT neuroprotection are not fully understood, HT is believed to reduce excitotoxicity. Current evidence on HT neuroprotection after TBI is still conflicting. The aim of this study was to evaluate the neuroprotective efficacy of HT combined with Xe using the reproducible & well-established controlled cortical impact model of blunt TBI.

Materials and Methods: Young adult Sprague-Dawley male rats (n=24) were intubated & mechanically ventilated (with propofol & buprenorphine anaesthesia) while undergoing right parietal cortical impact and during treatment. Animals were randomly assigned to control (30%O2 balanced N2; 38°C), HT (30%O2 balanced N2; 34°C), Xe (50%Xe:30%O2 balanced N2; 38°C) or HT-Xe (50%Xe:30%O2 balanced N2; 34°C). Physiological outcomes were obtained: core body temperature, peripheral O2 saturation, heart rate, invasive blood pressure and arterial blood gases. Histological outcomes were measured at 30 min (contusion volume, CV), and 24 hr (CV, neuronal cell count) by researchers blinded to treatment. Statistical significance was assessed using Kruskal Wallis test with Benjamini, Krieger, Yekutieli correction.

Results and Discussion: Both HT combined with Xe and Xe alone significantly (p<0.01) reduced secondary injury (total CV at 24 hrs minus CV at 30 min). A significant reduction (p<0.05) of neuronal cell loss in the ipsilateral hippocampal CA1 area was achieved using both HT combined with Xe and Xe alone. Interestingly, in the contralateral retrosplenial cortex a significant reduction (p<0.05) in neuronal cell loss was achieved with HT.
loss was achieved only when HT was combined with Xe. 

Conclusion: We show for the first time that HT combined with Xe is neuroprotective in clinically relevant pericontusional areas after TBI using a translationally-focused in vivo rat model with mechanical ventilation and clinically relevant monitoring.

6251

Alveolar ventilation and the risk of hypoventilation - transport ventilators in a Thiel's cadaver study of simulated cardio-pulmonary resuscitation

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Background: Previous studies have posed that hyperventilation occurs commonly in cardio-pulmonary resuscitation (CPR) mainly due to excessive frequencies, especially when a manual valve bag is used [1]. Although hyperventilation is widely perceived as a common occurrence in CPR, actual tidal volumes (VT) have just been measured rarely. We sought to investigate whether common portable ventilators are able to provide meaningful alveolar ventilation during continuous chest compressions.

Materials and Methods: A three-period crossover study with three common transport ventilators in a cadaver model of CPR was conducted. The three ventilators MEDUMAT Standard², Oxylog 3000 plus and Monnal T60 resembled three different treatments providing volume controlled continuous mandatory ventilation (VCV-CMV) via an endotracheal tube with 6 ml/kg IBW. Proximal airflow was measured by a mass flow meter. For each respiratory cycle net VT was derived, deviation to predetermined VT was calculated and analysed. Several mixed linear models were calculated with the cadaver as random factor and a combination of ventilator, height, gender, crossover period and number of breath in period as covariate.

Results and Discussion: We found all tested transport ventilators to be able to provide alveolar ventilation in a human cadaver model of CPR even though tidal volumes were considerably decreased by chest compressions. Overall observed net VT (n=715) was in median −21.2% (IQR: 19.6, Range: [−87.9%, 25.6%]) less than the predetermined volume. In a mixed linear model ventilator, crossover period and height were significant factors for decreased VT. We found significant differences between the ventilator models. The estimated effects for each ventilator were −14.5 [95% CI: −22.5, −6.5] (p=0.0004) for Monnal T60, −30.6 [95% CI: −38.6, −22.6] (p<0.0001) for Oxylog 3000 plus and −31.0 [95% CI: −38.5, −23.0] (p<0.0001) Medumat Standard². 

Conclusions: Our results support the concept of using ventilators to avoid excessive ventilatory rates in CPR. If doing so, healthcare professionals should carefully review actual tidal volumes to recognise the occurrence of hypoventilation. Future CPR studies should examine VT during CPR in vivo.


Acknowledgements: We thank Mr. Hobisch BSc, Mr. Fellinger and Dr. Honnef for their contributions to this study.

6176

Effects of Intrathoracic Pressure Regulation on Respiratory Function and Mechanics in Hypovolemic Mechanically Ventilated Pigs – A Pilot Study

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Background and Goal of Study: Intrathoracic pressure regulation (IPR) with sub-atmospheric end-expiratory pressure improves hemodynamics during hypovolemic hypotension, but its effects on the respiratory system are elusive. We aimed to describe the effects of IPR on lung function and mechanics during hypovolemia.

Materials and Methods: After approval by the local animal welfare committee (DJD24.1-5131/474/22), six pigs (45.4±3 kg) received anesthesia and volume-controlled ventilation (VCV) with tidal volume (VT) of 8 ml/kg and positive end-expiratory pressure (PEEP) of 5 cmH2O. Hypovolemia was obtained by drawing 30% of the calculated total blood volume. Animals were randomly assigned to one of two groups (n=3/group): 1) VCV with PEEP, or 2) IPR of -5, -8, and -12 cmH2O (ZOLL, USA; 60-120 min each, 4 h total), followed by 30 min VCV+PEEP. Respiratory and hemodynamic variables were recorded, including distribution of ventilation and continuous cardiac output. Computed tomography (CT) was used to quantify lung aeration at end-expiration. Postmortem, lung wet/dry ratio (W/D) was determined. Statistics included repeated measurements ANOVA with baseline values as covariate and linear modeling.

Results and Discussion: VT, respiratory rate, peak and plateau airway pressure, as well as gas exchange and arterial pH did not differ between groups. While heart rate and mean arterial pressure did not differ significantly, IPR reduced the central venous pressure (P=0.048), also, IPR increased cardiac output (P=0.018) as well as global end-diastolic (P=0.045), intrathoracic blood (P=0.043), and stroke volumes (P=0.042). IPR was associated with non-aerated and poorly aerated lung tissue mass (slope=1.89 %/cmH2O, P<0.001, and 0.80 %/cmH2O, P=0.046, respectively), as well as normally and hyper-aerated compartments (slope=-2.7 %/cmH2O, P=0.001, and slope=0.01 %/cmH2O, P=0.002, respectively). In addition, IPR shifted the center of ventilation towards non-dependent regions (P=0.001). VCV+PEEP reverted these effects. Extravascular lung water was significantly increased under IPR (P=0.007), but W/D did not differ between groups.

Conclusion: In hypovolemic pigs, IPR improved global blood flow without impairment of the respiratory function. The decrease in aerated lung tissue by IPR could be promptly reversed by VCV+PEEP.

Acknowledgements: We’d like to thank I. Wittig and L. Höller for operating the CT scans.

6036

Chest pain and myocardial infarction type 2 after propofol sedation: how echocardiography saved the day

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Background: Modern dialysis still struggles to set the optimal target weight for end-stage renal disease (ESRD) patients, who may suffer from volume overload or a fall in weight after dialysis. Therefore, peroperatively it is pivotal to assess the volume status resulting from preoperative dialysis1. However, clinical signs commonly employed, namely blood pressure (BP) and heart rate, are poor predictors of volume status1. Transthoracic echocardiography (TTE) is a particularly helpful technology, growingly used by the patient bedside that should definitely be considered in this regard. We describe herein an intra-operative emergency on an ESRD patient where TTE was paramount to understand the cause of patient decompensation.

Case Report: A 61-year-old, female, ASA III patient with ESRD on a regular hemodialysis program, with ischaemic cardiomyopathy, severe concentric LV hypertrophy and arterial hypertension was submitted to re-anastomosis of graft on her arm under local anesthesia. Initial BP was 180/90 mmHg. A moderate sedation with propofol infusion was performed, titrated to effect (maximum 75 µg/kg/min). The procedure lasted 48 minutes and was uneventful, with minor blood loss. However, as it ended, the patient developed malaise, severe hypotension (<70/40 mmHg), chest pain and dyspnea. A 12-lead ECG showed sinus tachycardia without repolarization changes. A TTE was then performed showing signs of severe hypovolemia, namely a collapsed inferior vena cava throughout the respiratory cycle, an empty, hyperkinetic LV with “kissing walls” and an intraventricular telesystolic gradient of 36 mmHg. Hypovolemia was identified as the culprit, presumably due to excessive fluid removal in the preoperative diaalysis and likely worsened by the vasodilatory effects of propofol. Trendelenburg position and aggressive fluid reposition were adopted, with excellent evolution. BGa confirmed the low perfusion state with lactate levels of 4.7 mmol/L and there was a rise in troponin levels (baseline levels 139 ng/L; peak 273 ng/L). A type 2 myocardial infarction was assumed.

Discussion: This clinical case raises awareness to the risks associated with dehydration after preoperative dialysis and highlights the fragility of BP to predict it. Aggressive fluid reposition is usually avoided in ESRD patients, however some of them actually need it. TTE can be a life-saving and non-invasive method to identify them.

**5133**

Rapid ascent to 4559 m leads to vascular endothelial glycocalyx damage, that's extend is associated with altitude-induced pulmonary hypertension and the severity of acute mountain sickness

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**Background/Goal of Study:** Vascular endothelial glycocalyx is a layer of extracellular matrix that regulates the permeability of blood vessels. Rapid ascent to high altitude can lead to vascular endothelial glycocalyx damage, which can affect pulmonary hypertension and the severity of acute mountain sickness.

**Methods:** After ethical approval, 16 healthy subjects rapidly (<22h) ascended from low altitude to 4559m. The study measured the concentration of glycocalyx components in subjects with and without altitude-induced pulmonary hypertension.

**Results:** Plasma concentration of heparan sulfate was significantly increased in subjects with altitude-induced pulmonary hypertension. The severity of acute mountain sickness and the increased costs of care and hospitalization were also associated with higher concentrations of glycocalyx components.

**Discussion:** The results suggest that rapid ascent to high altitude may cause significant damage to the vascular endothelial glycocalyx, leading to pulmonary hypertension and increased risk of acute mountain sickness.

**Conclusion:** Rapid ascent to high altitude should be approached with caution to prevent vascular endothelial glycocalyx damage and related complications.

**5490**

Bi-Level ventilation mitigates neuroinflammation and pulmonary shunt in a cardiopulmonary resuscitation model

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**Background and Goal of Study:** Optimal ventilation strategies during cardiopulmonary resuscitation are still heavily debated. Bi-level ventilation was evaluated for its potential to mitigate neuroinflammation and pulmonary shunt.

**Methods:** An in vitro model was used to assess the effects of bi-level ventilation on neuroinflammation and pulmonary shunt. Ventricular fibrillation was induced in the model, and advanced ventilation maneuvers were performed to evaluate the effectiveness of bi-level ventilation.

**Results:** Bi-level ventilation was found to significantly reduce neuroinflammation and pulmonary shunt compared to guideline-based ventilation. The reduction in neuroinflammation correlated with improved outcomes in the experimental model.

**Discussion:** Bi-level ventilation may represent a potential strategy to mitigate neuroinflammation and pulmonary shunt during cardiopulmonary resuscitation.

**Conclusion:** Bi-level ventilation should be considered as a potential alternative to standard ventilation strategies to improve outcomes during cardiopulmonary resuscitation.

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**4729**

Hippocampus role in predictive assessment of sepsis development in patients with head injury

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**Background and Goal of Study:** Central nervous system injury in patients with sepsis is a critical issue. The role of hippocampal damage in the prediction of sepsis development was investigated.

**Methods:** Sepsis diagnosis was made on the base of CRP, PCT levels, infectious focus and organ dysfunction. The hippocampus role in predictive assessment of sepsis was evaluated using magnetic resonance imaging (MRI).

**Results:** The hippocampus role in predictive assessment of sepsis development was investigated. The results showed that hippocampal damage correlates with the development of septic shock and organ dysfunction.

**Discussion:** The findings suggest that hippocampal damage can be used as a predictor of sepsis development in patients with head injury.

**Conclusion:** Hippocampal damage can be a potential biomarker for the early detection of sepsis development in patients with head injury.
determined in all 24 patients as edema, venous hemostasia and ischemia because of traumatic dislocation syndrome from the first day after TBI (Fig.1;2; yellow cursor). SIRS started from the 2d postoperative day and was transformed to sepsis on the 5th-7th postoperative day independently of surgery factor (p<0.05).

Conclusion: Hippocampus and parahippocampus gyrus injury as blood circulation disturbances in consequence of dislocation syndrome in patients with TBI can be predictive factor of sepsis development in acute period of traumatic disease.

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4. Raviolo M.

5546

Implementation of a critical response team in a Romanian Tertiary University Hospital – Conceptualization of an American model.

Impact on major outcomes

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Background and Goal of Study: Following a 3 weeks experience at North Shore Medical Center, Salem, US, a critical response team (CRT) project was implemented on the Neurosurgery (NSG) department of our hospital with the aim of bringing critical care expertise and optimizing standards of care to patients on the ward. The goal of the study was to evaluate the impact of CRT on major outcomes.

Materials and Methods: Prospective, observational, non-randomized study carried out at the Emergency County Hospital Timisoara, Romania. We created 2 study groups, pre-CRT (October 2018-March 2019) and CRT (April-September 2019). We evaluated the impact of CRT on the following outcomes: the number of cardiorespiratory arrests on the NSG ward, the ICU readmission rate, the mortality among readmitted patients to ICU and the global mortality. The results were analyzed for statistical significance.

Results: 136 patients were included to pre-CRT and 153 patients to CRT. There were no significant differences regarding demographics or clinical pathologies between groups. Cardiorespiratory arrest incidence was decreased in CRT vs pre-CRT (1.84% vs. 4.92%; p=0.0437, 95%CI 1.45% to 55.21%, difference 32%). Global mortality on the NSG ward was reduced in CRT but this reduction was not statistically significant.

4804

Anesthesiological experience at field hospital after disaster in Mozambique

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Background and goal of the study: A disaster is defined as a sudden event causing an imbalance between needs and available resources.1 In March 2019 a tropical cyclone hit Mozambique requiring international medical support. Aim of the study is to report the anesthesiological experience at the level 2 Italian Emergency Medical Team.

Materials and Methods: In our descriptive cross-sectional study we collected all patients underwent the operating room in the field hospital from March 30th to April 26th 2019 in Mozambique. We became operative within 7 days. Main end point is to describe the anesthesiological experience in this emergency. Data collected: age (years), male gender, triage score (immediate, delayed, minimal, expectant), unscheduled admission, if cyclone-related event, cause of surgery (post-traumatic, visceral, gynecological, other), if available preoperative exams, type of anesthesia (regional anesthesia, general anesthesia with or without intubation), complications occurred during anesthesia, mortality rate. Statistic: numerical data summarized as mean ± standard deviation (SD) while ordinal data as percentage. Windows Excel® was used.

Results and discussion: 1171 admitted patients; 65 surgical treatment realized (5.5% of all activity). Age: 33±21 years, 46.2% male. 10% immediate, 59% delayed, 29% minimal and 2% expectant. 66.2% unscheduled interventions. 36.9% cyclone-related events. 48.4% post-traumatic, 26.6% gynecological, 9.4% visceral, 15.6% other. 9.2% of patients had preoperative exams. Regional anesthesia was applied in 72.4%, general anesthesia without intubation in 21.5% and with intubation in 6.1%. 3.1% severe hypotension. 1 case (1.5%) died due to hemorrhagic shock. Firstly we describe a less severe picture than other reports2 (lower traumatic patients, 48.4% vs. 80%) due to type of disaster (flood vs. earthquake) and time required for the endorsement. Secondly in our experience regional anesthesia was more frequently used than other teams (72.4% vs. 46%) due to skilled anesthesiologists and available resources (ultrasound device).

Conclusions: the anesthesiological preparedness for different scenarios of disaster is a great challenge. It depends on type of disaster, delay in responding and human and technical available resources.

References:

Figure 1. The percentage of cardiac arrests on the NSG ward.

Figure 2. % Mortality rates among NSG patients readmitted to ICU.

CRT is a process improvement project that has led to a decrease of cardiorespiratory arrests on the NSG ward and a decrease in mortality rates among patients readmitted to ICU from NSG department.
An Italian prehospital blood program for remote damage control resuscitation

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Background and Goal of Study: Haemorrhagic shock is the most frequent cause of medically preventable deaths after injury and these deaths occur predominantly in the prehospital phase of resuscitation. Prehospital blood transfusions have been adopted by many civilian helicopter emergency medical service (HEMS) agencies across Europe, early outcomes show that this practice is feasible and safe. The Lombardy Regional EMS Trust (AREU) operates five HEMS bases in the most populated Italian region with nearly 10 million inhabitants (2% of the European Union population). The aim of the present study is to detail the development and implementation of an Italian “Blood on Board” programme for remote damage control resuscitation.

Materials and Methods: The HEMS base in Bergamo is located at the center of Lombardy and next to Papa Giovanni XXIII Hospital. Close cooperation and good relations with the local transfusion medicine department is of paramount relevance. A portable temperature controlled bag (4 liters capacity Crēdo ProMed, Peli BioThermal) will be tested by qualified personnel of the blood bank to determine the best standardized method for packing and storage of 2 units of packed red blood cells (group 0 Rh negative) and 2 units of thawed plasma (group AB) at 4±2°C. A fluid warmer device (‘MEGU warm ser system’, ‘MEGU Denmark’) will be used for blood warming. Traumairschämie (Tisch)-first resuscitation is encouraged based on available evidence from a randomized clinical trial 3.

Results and Discussion: Our work started in January 2019. Together with Papa Giovanni XXIII Hospital Department of Immunohaematology and Transfusion Medicine we have approved a prehospital blood components transfusion protocol in adherence to National standards. We are completing equipment supply and we are planning to start in March 2020.

Conclusion: We have described the process to set up the first Italian civilian prehospital blood transfusion programme. Stewardship processes will minimise wastage of blood components while keeping them immediately employable to provide haemostatic resuscitation for bleeding patients in remote and austere environments.

References:

Acknowledgements: Dr Rachel Hawes and Andy Mawson, Great North Air Ambulance (UK) and the Transfusion Team at Royal Victoria Infirmary, Newcastle (UK).

6011

Time from injury to arrival in the trauma centre in patients undergoing secondary transfer

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Background and Goal of Study: Trauma patients may require secondary transfer to definitive care after initial assessment and resuscitation at a primary facility. Prolonged time to transfer may be detrimental and may worsen outcome. A study from 2006 found that trauma patients spent a median time of 150 minutes in a local hospital and 48 minutes on transportation before arrival in the trauma centre. The aim of this study was to determine time from injury to arrival in trauma patients undergoing secondary transfer to the Level I trauma centre at Copenhagen University hospital, Rigshospitalet, in Copenhagen, Denmark. We considered that an adequate level of quality would correspond to a maximum of 10 % of the patients arriving later than 6 hours after time of injury.

Materials and Methods: Data was collected from our local trauma registry. We included patients admitted to the trauma centre with a full trauma team activation in a 3-year period between November 1st, 2016 and November 1st, 2019. Data are presented as median values with interquartile range (IQR).

Results and Discussion: In the study period 250 patients underwent secondary transfer to our trauma centre. The median age was 47 years (IQR 26-65), 15 % were <18 years and 31 % were women. A total of 111 (44.4 %) patients had an Injury Severity Score >15 and 30-day mortality was 6 % (n = 15). The median time from injury to arrival in the trauma centre was 255 minutes (IQR 192-371); median time spent at the primary care facility was 157 minutes (IQR 115-222) and median time spent on transportation was 32 minutes (IQR 18-47). We found that 67 patients (27 %; CI 21.7-32.6) arrived in our trauma centre later than 6 hours from time of injury. Patients arriving after and before 6 hours spent a median of 305 minutes (IQR 219-444) and 136 (IQR 89-222) respectively. The patients arriving after 6 hours were significantly older (P = 0.004) but there was no significant difference in 30-day mortality (OR: 0.99; CI 0.3-3.2).

Conclusion: Time from injury to arrival in our facility exceeded 6 hours for 67 patients (27 %) who were significantly older.

4871

Shock treatment of acute hand ischemia

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Background: The World Health Organization estimates for 2014 that there are globally around 16 million people who use injectable drugs, which leads to a high incidence of accidental or intentional intraarterial injection in drug abuse. The therapeutic management consisted of restoring the arterial circulation at the ischaemic segment to prevent the propagation of thromboembolic complications by using of i.v. heparine and to preserve the function of the hand by preventing delayed ischaemia and compartment syndrome followed by necrosis.

Case Report: A 31 years old man exintravenous drug abuser who for the past 6 years has been treated with Methadone (3-6 pills/day). The patient came to the emergency department 6 hours after injecting himself into the radial artery with a suspension composed of 10 pills of Methadone (2.5 mg) and 4 pills of Alprazolam (Xanax 1 mg). The diagnosis of acute right hand ischaemia was established after a Doppler ultrasound of the radial, ulnar and arterial arches of the hand. The medical treatment included: continuous anticoagulation therapy for 14 days, antispasmodic and anti-inflammatory drugs, as well as psychiatric drugs. Unfortunately, the necrosis started and continued until it reached the distal metacarpal level, resulting in amputation of all fingers of the right hand.

Discussion: Intra-arterial injection among drug addicts becomes frequent when there are no more viable veins left for them to insert a needle. Even more dramatic is their attempts to inject crushed pills in peripheral arteries. The result may be reversible ischaemia, distal to the site of injection or, as in this case, necrosis and loss of body parts. The particularity of the case consists in the presence of microemboli that cause ischaemia of the microcirculation from the level of the digital collateral arteries and the arteries for the intrinsic muscles of the hand, resulting in a high level of necrosis. In this case repeated excisions were performed, which latter allowed graft adherence.

Learning points: The progression of the ischaemia depends on the physiological reaction, which varies according to the vascular spasm, thrombosis and emboli derived from the non-solvable drugs. The case described the successful thrombolytic medical management of an ischémic hand using the continuously anticoagulation therapy for 14 days, antispasmodic and anti-inflammatory drugs therapy.

4975

First pass success in prehospital intubation in resuscitations performed by a non-physician based emergency medical system

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Background and Goal of Study: Endotracheal intubation (ETI) is the gold standard in maintaining the airway. First pass advanced airway insertion is associated with fewer adverse effects. Jarvis et al. 2019 described a first pass intubation success (FPS) in adult patients during resuscitation of 72.7% performed by emergency system (EMS) personnel. Bernhard et al. 2019 entitled a comparable FPS in the resuscitation room performed by physicians in German emergency departments. The aim of this study was to evaluate the first pass intubation success of prehospital endotracheal intubations (ETI) in patients undergoing advanced life support (ALS) in a non-physician based emergency system (EMS). The secondary aim is to determine the additional value of videolaryngoscopy (VL) in this setting using a questionnaire.

Materials and Methods: Data from all resuscitations performed by a non-physician ambulance professional between December 2017 until March 2018
in the region North Limburg were collected. Data consisted of patient file report and a questionnaire. Patients younger than 18 years were excluded. Due to the Netherlands ambulance guidelines, an attempt to intubate during resuscitation is indicated if EMV score is 3. The number of intubation attempts per patient were reported. The Cormack-Lehane score (C-IL) was used for evaluation of the laryngoscopy. The involved non-physicians ambulance professionals were asked to complete the questionnaire regarding the additional value of VL.

Results and Discussion: Inclusion criteria were met by 120 patients, 89 patients had an indication for endotracheal intubation. FPS succeeded in 70 cases (78.6%) whereas 19 cases (21.3%) demanded a second attempt and in one case a third attempt. The average number of endotracheal intubation attempts was 1.22 per patient. Airway conditions were graded by the Cormack and Lehane scale: in 35 cases the score was grade I (30.3%), in 31 cases grade II (34.8%), in 13 cases grade III (14.6%), in 9 cases grade IV (10.1%) and in one unknown. All non-physician ambulance professionals completed the questionnaire, additional value of VL was seen by 64 (55.6%) whereas 51 (44.6%) did not.

Conclusion: The first pass success of endotracheal intubation in the prehospital setting performed by non-physician ambulance professionals is 78.6% and comparable to the FPS if intubation performed by EMS personal described in recent literature.

5072

ECMO Mobile and Organ Donation in Donor Cardiac Death

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Background and Goal of Study: Scarcity of potential dead brain donors and the persistent mismatch between supply and demand of organs for transplantation has led the transplant community to reconsider donation after circulatory death (DCD) as a strategy to increase the donor pool. Normothermic regional perfusion (nRP) by extracorporeal membrane oxygenation (ECMO) may be the most effective method for preserving abdominal organs in DCD, especially in liver transplantation. A pitfall of this method is its complexity and the unavailability of this resource in some hospitals, especially in regional hospitals, where potential DCD donors may exist. Aim of this study is to report the use of Mobile ECMO team in controlled DCD.

Materials and Methods: From June 2018 to October 2019 our group has worked as a mobile ECMO team for cDCD outside our center. Portable equipment included cannulation material and the ECMO device. The transplant team consisted of 1 transplant coordinator (anesthesiologist-intensivist, ECMO operator and organ extraction supervisor), 1 cardiac surgeon (cannulation), 1 interventional radiologist (cannulation) and one cardiovascular perfusionist (ECMO operator).

Results and Discussion: Twenty-four cDCD donations were performed. Characteristics of donors and organs retrieved are summarized in Figure 1. From 24 cDCD, 16 livers, 4 lungs, 43 kidneys were obtained. The evolution of grafts and receptors was favorable at day 30 post-transplant.

Acknowledgements: Organ donors and their relatives.

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Damage Control Surgery in a Regional Trauma Centre – Defining the Population: A Pilot Study

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Background and Goal of Study: Trauma has a major disease burden, causing death and morbidity through physiological disruption.1 Damage Control Surgery (DCS) minimises physiological disruption.2 At present, the demographics of patients who undergo DCS within our institution are unknown. This study aims to characterise our DCS cohort and potential for prospective study.

Materials and Methods: Our hospital has developed a DCS protocol3 and ORSOS data capture paperwork. This ensures the appropriate patients are safely transferred to an adequately prepared operating theatre in a timely manner. All available DCS protocol and corresponding ORSOS data were captured from Nov 2017 - Sep 2019. Data was reviewed and patient demographics analysed.

Results and Discussion: The DCS protocol was put on standby 42 times and activated in 21 cases. Patient data was held for 38 cases, 30 male and 8 female, median age 37 years (IQR 22-64). Data deficits were identified for future process refinement. Median Injury Severity Score was 29 (IQR 0-36) with patients sustaining injuries from RTC (37%), falls (26%), unknown mechanism (21%), and other (11%). 28% of DCS patients remained in ICU for a median of 12 days (IQR 7-26.5), with a 29% 30-day mortality. Together this shows that despite prompt surgical intervention, DCS in a young patient cohort carries a significant mortality.

Conclusion: We have established the demographics of those who trigger DCS protocol use in a regional trauma centre. The resultant database will enable prospective data collection for future DCS patients. Data deficiencies were identified and future mitigation strategies implemented. Such data will afford our region a greater understanding of the DCS population.

References:

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Successful VA-ECMO resuscitation after 191 minutes of cardiac arrest due to severe accidental hypothermia

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Background: In Spain, there are up to 23.7 deaths per year due to accidental hypothermia.1 Patients under cardiac arrest induced by severe hypothermia improve their survival if extracorporeal life support (ELS) is performed 2,3.

Case Report: A 34- years old female admitted under cardiac arrest due to a severe accidental hypothermia for VA-ECMO placement. Initially, the rescue team transferred the patient to a primary hospital where they secured the airway, they started CPR 38 minutes after witness cardiac arrest and they measured 18ºC of tympanic temperature. The patient was transferred to our hospital by helicopter. The first arterial gases showed pH 7.47, K 4.61 mEq/L, glucose 246 mEq/L, lactate 1.5 mmol/L. A peripheral femoro-femoral VA-ECMO was placed at the operating room after 153 minutes of CPR (a total transfer time of 273 minutes since the emergency call). The central temperature was 19.7°C with maintained ventricular fibrillation. ECMO management during initial phase was based in slow rewarming and progressive correction of hemodynamic and metabolic parameters. Defibrillation was performed at core temperature of 30°C, recovering sinus rhythm. The ECMO could be withdrawn after 44 hours with a previous EEG without any signs of neurological damage.

Discussion: Deciding which are the most suitable candidates for ELS is challenging. ECMO has been an update in the management of accidental hypothermia, allowing both progressive rewarming and hemodynamic support. Resuscitation objectives have to be based on the hypothermia pathophysiology and prognostic factors (metabolic biomarkers and withdraw cardiac arrest). Patients with neither trauma nor primary hypoxia have successful outcomes if ELS is performed even though CPR starting is delayed.2,3

References:

Learning points: The long-time of CPR or transfer to a reference hospital cannot be the decision making points for not starting the ELS in patients without primary hypoxia neither trauma associated. ECMO management must be based in hypothermia pathophysiology.
Concomitant traumatic atlantooccipital dissociation and atlantoaxial rotatory subluxation. A case report

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Background: Craniovertebral junction (CVJ) injuries were once believed to uniformly lead to death at the scene where the injury occurred due to its highly unstable nature and proximity to critical neurologic and vascular structures. Nevertheless, these lesions are increasingly found in the emergency department as a consequence of a better prehospital care and cervical immobilization(1).

Case Report: 45-year-old female, victim of a car accident (lateral impact). She is initially found by emergency services with GCS 9 but recovers fully awareness in a few minutes. Once at the emergency department she explains dyspnea, dysphagia, diplopia and hypoacusia. Neurological examination identifies a bilateral sixth nerve palsy and a right peripheral facial nerve palsy. The cranial and neck CT scan showed an atlantooccipital dissociation (AOD), a retropharyngeal hematoma with mass effect and a right vertebral artery dissection. Given the potential airway compromise added to the impossibility of neck hyperextension we performed an awake fibroscopy-guided intubation. The posterior cervical MRI showed the AOD as well as an unstable atlantoaxial rotatory subluxation (AAS), so she underwent an occipital-C2 arthrodesis and a tracheostomy. Sixteen days later a neck CT scan informed of the resolution of the hematoma so the patient was successfully decannulated. A month later no improvement is still seen in the neurological exploration.

Discussion: This is a case of a patient with an AOD and an AAS. Both are relatively rare injuries but the association of both in the same patient is extremely unusual. The early diagnosis and stabilization surgery were crucial for the survival of the patient, as well as the rapid airway protection. Furthermore, the initial neurological exploration could not be explained neither with the findings on the CT nor the MRI so it led us to believe that the injury of several cranial nerves was due to a nerve traction because of the trauma(2).

References:

Learning points: The management of the craniovertebral junction injuries that arrive to the hospital, the role of the prehospital emergency services and the importance of an early diagnosis and surgical stabilization.

References:

Trauma in “the very old age”: experience at a spanish level I trauma center

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Introduction: The number of elderly people will increase during the next few decades. More importantly, the number of people aged 80 or above are projected to increase 100% in developed countries. In Spain, people over age 80 were 4.68% of the population in 2009, and this will increase to 6.19% in 2019. That has implications in the health services and in the management of trauma patients.

Material and methods: We did a retrospective cohort analysis of trauma patients ≥ 80 y.o. admitted to our Level I Trauma Center during the time-period of 2009-2019. Demographic data, ICU care, and mortality were assessed.

Results: 109 trauma patients ≥ 80 y.o. were admitted during that period. This is a 200% increase compared with the number of patients admitted during the previous decade (1999-2009). Mean age was 84.8±2.4 years, and median New Injury Severity Score (NISS) was 17 (interquartile range 13 to 27). 46% were male. The mechanism of injury was 50% falls, and 47% pedestrian runovers. 48 patients were admitted to ICU, with median NISS of 25 and mortality rate of 38%. Among severely injured trauma patients (NISS ≥35) the hospital mortality rate of those ≥80 years was 90%, much higher than in the age group of 65-79 years (40%), with a significant difference (<0.05). No differences mortality rates between 65-79 years and younger was the same NISS.

Conclusion: The geriatric trauma patient population is on the rise worldwide. This should be taken into account in our trauma centres in order to be able to adapt and try to improve trauma care in these patients.

References:
Laryngeal mask facilitated bronchoscopic intubation in a case of scleroderma

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Background: Scleroderma is a connective tissue disorder. Its name depicts the primary sign, which is hard (sclero-) skin (dermis- in Greek). Characterized by an excessive production of collagen, results in tissue fibrosis and thickening. There are two main types of scleroderma, localized and systemic. In the latter, heart, digestive track, lung and renal involvement may present. Head and neck region is involved in approximately 70% of cases. Characteristic orofacial features comprise a mask- or mouse-like face due to the pinched nose, atrophy of the nas ala, thin and rigid lips and loss of normal for age facial wrinkles or sagging. Other features are inability for wide mouth opening, reduced inter incisor gap, tongue rigidity and xerostomia. All above represent an anaesthetic challenge, when intubation is considered.

Case Report: A 60y old woman, with a 6-years history of scleroderma, controlled arterial hypertension and dyslipidaemia, presented for scheduled laparoscopic cholecystectomy. As expected, the patient had a difficult airway (Mallampati III) with an thyromental distance below 4cm. Anaesthesia was induced with propofol, fentanyl and rocuronium. Laryngeal mask (#4 i-gel®, Intersurgical, UK) was successfully inserted and a 7cm I.D. endotracheal tube was passed through the mask, guided and confirmed over a single use flexible videoscope (AMBU® a Scope, Denmark). Nasogastric tube was also inserted through the i-gel mask, since the operation track, lung and renal involvement may present. Head and neck region is involved in approximately 70% of cases. Characteristic orofacial features comprise a mask- or mouse-like face due to the pinched nose, atrophy of the nas ala, thin and rigid lips and loss of normal for age facial wrinkles or sagging. Other features are inability for wide mouth opening, reduced inter incisor gap, tongue rigidity and xerostomia. All above represent an anaesthetic challenge, when intubation is considered.

Results and Discussion: The study was terminated early because the success rate of 70% was not achievable. 73 patients were screened for inclusion, 18 patients met exclusion criteria and 14 patients agreed to participation. Ventilation using the i-gel was successful in 13 patients (93%, 95%CI: 79-100%). Intubation was successful in 1 patient in the first attempt (8%, 95%CI: 0-22%), 1 patient in the second attempt (8%, 95%CI: 0-24%) and in 3 patients in the third attempt (27%, 95%CI: 1-53%). The overall success rate was 36% (95%CI: 11-61%).

Conclusion: This study shows that in emergency airway situations in prone position insertion of an i-gel may be considered, but blind intubation with an i-gel as intubation conduit is not recommended.

Respiration and Airway Management

Usage of Supreme laryngeal mask for optimization the respiratory support in a multidisciplinary hospital

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Background and Goal of Study: There is still a question how to solve the problem in the absence of modern devices for tracheal intubation (TI) with a patient having “difficult airway”. We wanted to evaluate the efficiency and safety of Supreme LM (SLM) in case of total myopia and mechanical ventilation while performing planned laparoscopic cholecystectomy for patients with predictable and unpredictable difficult TI.

Materials and Methods: 102 patients with signs of predictable difficult TI - 77, with unpredictable - 23. (Cormac 3-4); I – II class ASA; 56.2±12.2 years, 98.5±9.6 kg. Examination was performed using the Mallampati and Wilson scales, the Palta test, and the determination of the atlanto-occipital angle. In the presence >4 predictors of difficult TI, patients underwent direct laryngoscopy. Induction: diprivan 182.0±11.5 mg, fentanyl 0.14±0.05 mg, rocuronium 65.4±11.3 mg. Maintenance: Sevoran 1 MAC with a fresh gas flow of 1.5-2 l/min. SLM application time, ventilation quality, leakage in the neck and stomach, hemodynamics were evaluated. To determine the leak, the drainage canal was “sealed” and, after application of carbopertoneum (CP), a gastric tube was installed. CP exposure time> 30 min. in the Fowler position. At the end of the surgery, all patients were injected with Sugammadex 2 mg/kg at TOF 1-2.

Results and Discussion: 79 patients (77.5%) had 4-5 signs of predicted difficult TI, 23 patients (22.5%) had 2–3 signs. In 100% of cases, SLM was established on one try after 4.3 ± 0.4 min. Ventilation through SLM was adequate without audible and visible leakage. Respiratory Mechanics: Pin 15-18 cmH2O, VT med. = 515.5 ± 65.0 ml, SpO2 = 98-100%, EICO2 = 34.5 ± 1.6 mmHg After applying the CP there was no leakage. The duration of the surgery is 38.1 ±12.5 min, general anesthesia is 58.3±13.6 min. At the end of the surgery, SLM was removed at TOF ≥90%. The time from the end of the surgery until the removal of the SLM was 160.5 ±32.5 sec. 25% of patients indicated slight sore throat, which passed in 5-10 min. after removing the SLM. There was no regurgitation and aspiration, as well as respiratory complications.

Conclusion: SLM has established itself as a highly efficient, simple andatraumatic device. The usage of SLM in the combination of rocuronium + Sugammadex for “difficult airway” allows you to quickly start surgery, avoid residual curarisation and increase the turnover of the operating table.

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Blind intubation through an i-gel® in prone position: a prospective case series

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Background and Goal of Study: Accidental extubation in prone position is an emergency in which quick and low-resource demanding airway management is required. Regain of oxygenation is the goal, but intubation may be required for wide mouth opening, reduced inter incisor gap, tongue rigidity and xerostomia. All above represent an anaesthetic challenge, when intubation is considered.

Case Report: A 60y old woman, with a 6-years history of scleroderma, controlled arterial hypertension and dyslipidaemia, presented for scheduled laparoscopic cholecystectomy. As expected, the patient had a difficult airway (Mallampati III) with an thyromental distance below 4cm. Anaesthesia was induced with propofol, fentanyl and rocuronium. Laryngeal mask (#4 i-gel®, Intersurgical, UK) was successfully inserted and a 7cm I.D. endotracheal tube was passed through the mask, guided and confirmed over a single use flexible videoscope (AMBU® a Scope, Denmark). Nasogastric tube was also inserted through the i-gel mask, since the operation was laparoscopic. Maintenance was done with sevoflurane 2% and remifentanil. Patient's recovery was excellent and she was extubated with no airway trauma or complaint.

Discussion: Scleroderma is a challenge for intubation. Successful attempts have been made with the use of optical styles. Fibreoptic-guided tracheal intubation using a supraglottic device as a conduit has also been used, with no difference between LMA Protector and i-gel devices.

References: 1. Mendonca C, Tourville CC, et al. Fibreoptic-guided tracheal intubation using a supraglottic device as a conduit has also been used, with no difference between LMA Protector and i-gel devices.

Learning points: New generation supraglottic and bronchoscopic devises provide an excellent alternative for difficult airway problems as scleroderma.

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Background and Goal of Study: Tilt date, the endotracheal tube was considered as the gold standard for laparoscopic procedures under general anaesthesia. The disadvantages of tracheal intubation are haemodynamic responses, trauma of oropharyngeal structures, failed intubation and hypoxia. This requires a better and safe alternative. Goal of study - to compare the laryngeal tube (LTS-D) and Supreme laryngeal mask airway (SLMA) in patients undergoing laparoscopic hysterectomy under general anaesthesia.

Materials and Methods: prospectively single-center randomised study was conducted on 100 ASA II female patients, 50 each in two groups, who were posted for laparoscopic hysterectomy. Patients with anticipated difficult airway, morbid obesity, oropharyngeal pathology or at increased risk of aspiration were excluded. Pre oxygenation and induction of anaesthesia LTS-D (group 1) or SLMA (group 2) were inserted and cuff inflated. The outcomes measured were as follows: successful placement of the devices from 1-st attempt; time required for insertion; oxygen saturation (SpO2) and end-tidal carbon dioxide (ETCO2); oropharyngeal seal pressure (the PAP was not allowed to exceed 40 cm H2O); the PAP at the intra-abdominal pressure (IAP) 14 mm Hg; incidences of gastric distension (by surgeon); intraoperative and postoperative complications.

Results and Discussion: There were no significant differences between groups by success rate for the first attempt 96% in group 1, 92% in group 2 (p=0.86), 100% successful insertion was in both groups from two attempts. Mean time for insertion was 16.7 ± 15.4 ± 20.3, a and 19 ± 16 (15-22,6) a for group 1 and group 2, respectively (p=0.079). There were no statistically significant differences in SpO2 or ETCO2 between the two groups before or during peritoneal insufflation. Maximal PAP at IAP 14 mm Hg during 5 min was 19 (18-20) cm H2O and 18 (16-20) cm H2O for 1 and 2 groups, respectively, (p=0.68). Oropharyngeal seal pressure was higher (p=0.011) for LTS-D group (33 cm H 2O; 27-38) than in SLMA group (26 cm H 2O; 23-25). There was no case of regurgitation, or aspiration recorded. No significant difference in laryngopharyngeal morbidity was noted.

Conclusion: A properly positioned LTS-D and SLMA provided high degree protection of airways against aspiration and equally effective ventilation during laparoscopic hysterectomy.

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Respiratory complications in pediatric anesthesia associated with the removal of ProSeal™ - Laryngeal Mask Airway (PLMA) during immediate postoperative period
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Background and Goal of Study: Respiratory complications are the most common and feared problem in pediatric anesthesia. The type of device used to secure the airway is identified as one of the risk factors. This study was conducted to determine possible respiratory complications that can occur in immediate postoperative period after removal of PLMA in the pediatric population.

Materials and Methods: A group of a hundred and ten patients with ages between 0 to 15 years, for various procedures requiring general anesthesia with minimum duration of 2 hours, were included in a prospective observational study during 2015 to 2017. They were induced with sevoflurane and the ProSeal™ - LMA, was put following the instructions of the fabricant, according to patient’s weight. The anesthesia technique and controlled ventilation were standardized. The muscle relaxant was used only for respiratory complications or inadequate mechanical ventilation. The PLMA was removed as soon as patients regain spontaneous breathing with expired sevoflurane less than 0.3. Any occurrence after the PLMA removal was recorded (laryngospasm, bronchospasm, cough, desaturation <95%, stridor, bleeding, sore throat) then the data was analyzed using Statistical Package for the Social Sciences (SPSS).

Results and Discussion: The laryngospasm was seen in 8 cases out of 110 (7.27%); in 6 cases patient recovered with positive pressure ventilation. The other 2 patient required deepening of sedation with propofol and administration of succinylcholine. In this group, 5 patients were younger than 3 years old and had a history of respiratory infection within 10 days. The cough was most common complication. No bronchospasm, sore throat nor bleeding was present in our patients, which are possible complications of tracheal intubation.

Conclusion: The PLMA is safe disposable to manage airway in pediatric population of any range of age for many procedures that require general anesthesia with low incidence of respiratory complications in the emergence related to its removal. It is an excellent alternative to tracheal intubation minimizing use of muscle relaxant and patient’s discomfort.
Comparison of the air-Q® sp versus the LMA® Supreme™ in adults undergoing gynecological laparoscopic surgery: A single-blind, Randomized Controlled Trial

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Background and Goal of Study: The supraglottic airway device (SAD) is a good alternative to endotracheal intubation in general anesthesia. The LMA® Supreme™ has been shown in previous studies to be clinically useful in laparoscopic surgery under general anesthesia, but little research has been performed on the usefulness of the self-pressurized air-Q® sp. The purpose of this study was to compare the clinical suitability of the air-Q® sp and the LMA® Supreme™ in gynecological laparoscopic surgery.

Materials and Methods: Fifty-two patients (American Society of Anesthesiologists class I-II) scheduled for gynecological laparoscopic surgery were randomly assigned to one of two groups: the air-Q® sp group or the LMA® Supreme™ group. We evaluated perioperative ventilator parameter including the airway leakage pressure, peak inspiratory pressure, leakage rate. Also insertion difficulty and changes in vital signs over time evaluated.

Results and Discussion: The air-Q® sp has lower airway leakage pressure than the LMA® Supreme™. However, there were no significant differences in peak inspiratory pressure and leakage rate between the two groups. The airway leak signs over time evaluated.

Conclusion(s): The results produced by air-Q® sp were comparable to those of pressure was higher than the peak inspiratory pressure at all times in both groups. The airway leak

Results and Discussion:

The air-Q® sp has lower airway leakage pressure than the LMA® Supreme™. However, there were no significant differences in peak inspiratory pressure and leakage rate between the two groups. The airway leak pressure was higher than the peak inspiratory pressure at all times in both groups.

Conclusion(s): The results produced by air-Q® sp were comparable to those of the LMA® Supreme™. Therefore, the use of air-Q® sp is considered clinically useful and safe.

| Sex (M: F) | 28:4 |
| Age (years) | 46.1 ± 11.8 |
| Height (cm) | 171.0 ± 6.6 |
| Weight (kg) | 69.9 ± 15.2 |
| Disease duration (Month) | 13.9 ± 17.2 |
| Site (UE: LE) | 8:24 |
| Diagnosis (CRPS 1: CRPS 2: not CRPS) | 13:9:10 |

Two right crico-arytenoid subluxations after l-gel laryngeal mask insertions

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Background: Persistent crico-arytenoid subluxations are a rare complication of laryngeal mask insertion. On literature search only one case of left crico-arytenoid subluxation and three cases of right crico-arytenoid subluxation were retrieved with no information of what type of laryngeal mask was used.

Case report: There are two cases of right cricoarytenoid subluxations within one year-period after the l-gel laryngeal mask insertion in a regional hospital. These 2 cases were a 50 years old male and a 69 years old female underwent operations under general anesthesia with l-gel laryngeal mask. Hoarseness of voice was noticed at post-operative care and video-larynoscopic examination revealed erythematous edematous right vocal cord with limitation of movement of the cord and its joint in both cases.

Results and Discussion: Patient 1 received the right humerus head fracture fixation with arthroscopy under general anesthesia. The patient progressively recovered after 3 months, but still had residual hoarseness of voice and cough on drinking. After half a year, the patient’s hoarseness improved and recovered completely after a year. Patient 2 received the breast tumor removing surgery under general anesthesia with l-gel laryngeal mask. The patient recovered after one week but retained hoarseness of voice. This patient recovered fully after a month. By observation of the video image of these two patients, both of the vocal apertures are inclining to the left side with the esophageal aperture situated posto-laterally at the left side of the midline. In a study that was still collecting cases of CT image of the laryngeal mask we found that most of the patients had the esophage apertures at the left side of the midline with the vocal cord inclining to one side with the right vocal cord situated slightly posterior to the left vocal cord anterior to the cervical vertebal body. This means that if a laryngeal mask is put into the pharynx and if it is forced to fix at the midline anterior to the cervical vertebral body, it will eventually push the posteriorly placed right vocal cord and its cricoarytenoid joint anteriorly.

It will potentially cause subluxation of the joint but may not essentially cause a persistent subluxation. Some cases may turn to persistent subluxation if the effect lasts longer in prolonged operation time.

Learning points: These two cases and the three cases in the literature give some clue to the right-sided selection of this rare complication.

Application analysis of the spatula-assisted technique in placing a flexible laryngeal mask airway

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Background and Goal of Study: This study aimed to explore the feasibility of placing a flexible laryngeal mask airway (fLMA) with the spatula-assisted technique. Materials and Methods: A total of 64 patients scheduled for elective surgery under general anesthesia with fLMA, aged 18-80 years old, ASA I-II. The patients were randomly divided into standard finger-guided group and spatula-assisted group using random envelope method, with 32 cases in each group. The insertion time of fLMA, oropharyngeal leak pressure were measured, the fiberoptic view score, first insertion success rate and sore throat were recorded in two groups.

Results and Discussion: Sixty-two patients were available for final statistical analysis, with 31 cases in each group. Fiberoptic view score and oropharyngeal leak pressure were significantly higher in the spatula-assisted group than those in the standard finger-guided (Z=4.241, P<0.001; t=4.474, P<0.001). There was no significant difference in the first insertion success rate between two groups. The insertion time was significantly longer in the spatula-assisted group than that in the standard finger-guided (t=15.171, P<0.001). There was no sore throat within 24 hours in both groups.

Conclusion: The spatula-assisted technique can significantly improve the efficiency of fLMA, and it can be promoted in clinical anesthesia.
Comparison of ultrasound and fibre optic bronchoscope guided percutaneous tracheostomy

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Background and Goal of Study: Percutaneous tracheostomy is among the most commonly performed procedures in critically ill patients in intensive care units. It has many potential advantages over endotracheal intubation such as reduced laryngeal ulceration and respiratory resistance, early weaning and easier nursing care, ability to perform bedside. Despite numerous advantages, this may also cause serious complications due to its invasive nature. It can be performed under ultrasound or fibreoptic bronchoscope guidance to minimize complications. Recent data suggest that ultrasound can be alternatively used in percutaneous tracheostomy, hence our aim is to compare posterior tracheal wall hit, total time taken for each procedure, cannulation site in relation to carina, number of needle puncture attempt. Materials and Methods: This prospective randomised study was conducted in critical care unit of Department of Anaesthesia, JNMC, AMU in total 50 patients, 25 in each group after ethical clearance (CTRi number CTRi/2019/11/021969). They were randomised by chit in the box method into USG group who received Ultrasound guidance and FOB group who received Fibreoptic guidance and underwent percutaneous tracheostomy using Griggs technique. In USG group, we included a third physician who is not part of the study and he used fibreoptic to observe complications and noted them only and the performing physician was blinded from this. SPSS software of latest version was used for statistics. Mean, percentages, independent students t test were used for comparison in between groups.

Results and Discussion: The mean number of posterior tracheal wall hit either introducing needle or griggs forcep tip was significantly higher in USG group than FOB group (1.47 ± 1.06 vs 0.86 ± 0.53). Posterior tracheal wall hit in USG group was observed in 7, twice in 9, thrice in 4 and none in 5 cases. Cannulation site in relation to carina was more towards laterally in USG group than FOB group (19.76% vs 4.16%, p < 0.05). Total duration was higher in FOB group than USG group (< 0.05) and number of needle puncture attempt was more in USG group (2.13 ± 0.74 vs 1.06 ± 0.62, p < 0.05).

Conclusion: USG group may have advantage of lesser time duration and better neck anatomy examination but more posterior tracheal wall hit, cannulations away from centre and needle puncture attempts resulted in support of use of bronchoscope to enhance the reliability of the percutaneously placed tracheostomy.

Materials and Methods: We reviewed in the MEDLINE/PubMed, EMBASE, Cochrane Library, Scopus, and Google Scholar databases, Mesh terms “apnoeic oxygenation”, “nasal cannula”, “randomized controlled trial” with unlimited start date to April 2019, there wasn’t restriction on language for randomized-controlled trials (RCTs). Eligibility criteria: RCTs of adult patients (age older than 18 years) who received general anaesthesia for elective surgery, who required Orotracheal Intubation, that compared apnoeic oxygenation with nasal cannula or nasopharyngeal catheter against Traditional preoxygenation strategy. Which reported results in severe desaturation > 80% SpO2, Safe apnoe time SpO2 < 92%, and complications of any etiology. All statistics were performed using Review Manager 5.3 (Cochrane Collaboration, Oxford, UK).

Results and Discussion: Our primary Outcome was Safe apnoea time is the result reported in all 6 articles (n = 205) patients who were intubated for elective surgery without prior respiratory failure, in the group using nasal oxygenation with nasal or nasopharyngeal catheter with low oxygen flows, a significant increase safe apnoea time of 1.97 minutes is achieved (95% CI = 1.38, 2.55) with heterogeneity (I2 = 93%, P < 0.01).

Conclusion: Apnoeic Oxygenation is associated for prolonging the safe apnoea by 1.97 minutes, time that can make a difference in situations in which a difficult airway is addressed since a longer period of time will be obtained to offer a secure intubation without desaturation. Our study showed that using this strategy is simple, economical and safe.

Materials and Methods: This prospective randomised study was conducted in critical care unit of Department of Anaesthesia, JNMC, AMU in total 50 patients, 25 in each group after ethical clearance (CTRi number CTRi/2019/11/021969). They were randomised by chit in the box method into USG group who received Ultrasound guidance and FOB group who received Fibreoptic guidance and underwent percutaneous tracheostomy using Griggs technique. In USG group, we included a third physician who is not part of the study and he used fibreoptic to observe complications and noted them only and the performing physician was blinded from this. SPSS software of latest version was used for statistics. Mean, percentages, independent students t test were used for comparison in between groups.

Results and Discussion: The mean number of posterior tracheal wall hit either introducing needle or griggs forcep tip was significantly higher in USG group than FOB group (1.47 ± 1.06 vs 0.86 ± 0.53). Posterior tracheal wall hit in USG group was observed in 7, twice in 9, thrice in 4 and none in 5 cases. Cannulation site in relation to carina was more towards laterally in USG group than FOB group (19.76% vs 4.16%, p < 0.05). Total duration was higher in FOB group than USG group (< 0.05) and number of needle puncture attempt was more in USG group (2.13 ± 0.74 vs 1.06 ± 0.62, p < 0.05).

Conclusion: USG group may have advantage of lesser time duration and better neck anatomy examination but more posterior tracheal wall hit, cannulations away from centre and needle puncture attempts resulted in support of use of bronchoscope to enhance the reliability of the percutaneously placed tracheostomy.

Materials and Methods: We reviewed in the MEDLINE/PubMed, EMBASE, Cochrane Library, Scopus, and Google Scholar databases, Mesh terms “apnoeic oxygenation”, “nasal cannula”, “randomized controlled trial” with unlimited start date to April 2019, there wasn’t restriction on language for randomized-controlled trials (RCTs). Eligibility criteria: RCTs of adult patients (age older than 18 years) who received general anaesthesia for elective surgery, who required Orotracheal Intubation, that compared apnoeic oxygenation with nasal cannula or nasopharyngeal catheter against Traditional preoxygenation strategy. Which reported results in severe desaturation > 80% SpO2, Safe apnoe time SpO2 < 92%, and complications of any etiology. All statistics were performed using Review Manager 5.3 (Cochrane Collaboration, Oxford, UK).

Results and Discussion: Our primary Outcome was Safe apnoea time is the result reported in all 6 articles (n = 205) patients who were intubated for elective surgery without prior respiratory failure, in the group using nasal oxygenation with nasal or nasopharyngeal catheter with low oxygen flows, a significant increase safe apnoea time of 1.97 minutes is achieved (95% CI = 1.38, 2.55) with heterogeneity (I2 = 93%, P < 0.01).

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Conclusion: USG group may have advantage of lesser time duration and better neck anatomy examination but more posterior tracheal wall hit, cannulations away from centre and needle puncture attempts resulted in support of use of bronchoscope to enhance the reliability of the percutaneously placed tracheostomy.

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Results and Discussion: Our primary Outcome was Safe apnoea time is the result reported in all 6 articles (n = 205) patients who were intubated for elective surgery without prior respiratory failure, in the group using nasal oxygenation with nasal or nasopharyngeal catheter with low oxygen flows, a significant increase safe apnoea time of 1.97 minutes is achieved (95% CI = 1.38, 2.55) with heterogeneity (I2 = 93%, P < 0.01).

Conclusion: Apnoeic Oxygenation is associated for prolonging the safe apnoea by 1.97 minutes, time that can make a difference in situations in which a difficult airway is addressed since a longer period of time will be obtained to offer a secure intubation without desaturation. Our study showed that using this strategy is simple, economical and safe.
of the right hand to do common maneuvers. All operators were anesthesiologists from the Hospital Universitario Arava (Vitoria, Spain) who received a rigorous 5 min standardized training on the new device and technique, which they didn’t have previous exposure to, prior to the attempts.

Results: In total, 20 operators (12 females, 8 males) participate in the study. After randomization, 11 anesthesiologists started ETI with the Shuttlescope® and 9 started with Macintosh, doing a total of 60 intubations with each device. Mean time for ETI was 13 s [8-32] with Macintosh laryngoscope compared to 15 s [8-27] for the Shuttlescope®. Success rate was 100% of ETT in the trachea with both devices. All operators had to use their right hand when they intubate with Macintosh laryngoscope but only 3 operators used it to complete intubation with the Shuttlescope®.

Conclusions: Shuttlescope® is a novel device that allows safe and easy ETI while leaving the right hand of the operator free during the procedure, which may be a major advantage in many situations.

**Discussion:** The difficult airway in thoracic surgery is a challenge. Double-lumen endobronchial tubes may be difficult to place in anticipated and non-anticipated difficult airway. Awake fiberoptic intubation is the gold standard for anticipated difficult airway in patients with limited mouth opening. When anticipated, awake fiberoptic intubation followed by EB placing is a safe choice for the non-expert in tracheal intubation.

**References:**

**Learning points:**
1. The fiberoptic bronchoscopy is a gold standard for awake difficult airway intubation in patients with limited mouth opening.
2. EB is a good alternative to double-lumen endobronchial tubes in difficult airway.

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**5571**

**Successful intubation of a difficult airway with lung isolation in Treacher-Collins syndrome: a case report**

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Background: Treacher Collins syndrome (TCS) is a congenital malformation of craniofacial development where conventional direct laryngoscopy is difficult and often unsuccessful because of the upper airway malformation.

Case Report: 30-year-old woman with TCS needed surgery for left lower pulmonary lobe adenocarcinoma. Her medical history includes numerous craniofacial surgeries, obesity grade III, obstructive sleep apnoea and Crohn’s disease.

Preoperative airway evaluation: class III bite test, limited mouth opening, class IV Mallampati, normal thyromental distance, mandibular length and cervical flexion and extension.

We decide to realize awake fibreoptic oral intubation with a flexometallic endotracheal tube (ETT) and later place endobronchial blocker (EB) for left lung isolation. The patient was premedicated with atropine, midazolam and nebulized 5% lidocaine. In the operation room (OR) topic 10% lidocaine was applied in the mouth to tolerate VAMRAP® canula. The SAYGO technique was used to anesthetize the airway. The trachea was identified and entered without problems and the ETT was progressed until 2 cm proximal to carina. After positive capnography was confirmed, the general anesthesia was induced. EB was placed in the left main bronchus. Left pneumonectomy was carried out and the patient was extubated in the OR and transferred to ICU for observation.

**5450**

**The role of virtual laryngoscopy in preoperative airway assessment.**

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Background and Goal of Study: Clinical examination and radiographic studies play a significant role in the airway evaluation of the head and neck tumor (HNT) surgery patients but have flaws as predictors of intubation difficulty. To overcome these obstacles a comprehensive airway assessment with free online imaging software was performed. Images obtained with virtual laryngoscopy (VL) and computed tomography (CT) study were obtained to reconstruct three-dimensional virtual laryngoscopy (VL). The goal of the study was to determine whether VL is capable of predicting precisely the view of the larynx during direct laryngoscopy.

Materials and Methods: The study was performed at Oncology Centre of Latvia and included patients with the HNT. The selection criteria for inclusion were upper respiratory tract tumor and a pre-operative CT scan which was used to create virtual laryngoscopy three-dimensional images using RadAnt DICOM Viewer 5.0.0 (Medixant, Poland). Preoperative assessment of airways was performed using El-Ganzouri index and when available images of nasendoscopy were obtained. After the induction of anesthesia, a photograph of the direct laryngoscopy view was recorded. Cormack-Lehane laryngoscopy view, ability to identify obstructive hypopharyngeal lesions precluding intubation and presence of supraglottic lesions were compared between VL images and photographs of direct laryngoscopy view.

Results and Discussion: We included a total of 6 patients. VL in 5 of 6 patients precisely identified laryngeal view during laryngoscopy. Hypopharyngeal airway obstruction was seen on VL reconstructions in 3 of 4 cases. In all cases, airway anatomy information obtained from VL was inferior to unprocessed diagnostic CT and nasendoscopy.

Conclusion: VL as a single technique is not successful in predicting difficult airways in patients with HNT tumors. Multidisciplinary assessment with involvement of radiologists and surgeons allows to anticipate possible problems better.

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**5314**

**Assessing improvement of intubation skills with flexible bronchoscopy (FB) by training on an airway simulator.**

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Background and Goal of Study: The difficult airway remains challenging not only for novices, but also for experienced anaesthesiologists. With current airway equipment, exposure to using FB for intubation decreases constantly. We investigated whether regular training with a bronchoscopy simulator of experienced users in FB improves fiberoptic skills.

Materials and Methods: Using the ORSIM bronchoscopy simulator, 24 volunteers with some skills in using FB performed 6 exercises (one game, followed by two basic and three difficult airway procedures) at baseline, at 6 and 12 months. After baseline, volunteers were randomized to either no training (control), or practicing with the ORSIM (intervention) every 6 weeks for 10 minutes using a game to hit targets. Main outcome was difference in time to successful management of difficult airways at 12 months. Secondary outcomes included difference in distance with fibroscope, rotation, direction changes, tissue collisions, and confidence in own skills at 12 months.
Results and Discussion: Duration to finish difficult airway cases at baseline (cases a-c, fig. 1a) and at 12 months (cases g-l, fig. 1b) we’re not different between control and intervention groups.

Conclusion: Training fiberoptic skills by a game on an airway simulator did not overall improve performance for FB, although it improved some handling aspects during FB.

References:

Ultrasonic verification of intubation tube

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Background: Confirmation of the endotracheal tube (ETT) position in the trachea is important for the safety Protocol in maintaining upper airway patency. The search for new perspective methods of ETT visualization allowed to pay attention to ultrasonic visualization. The goal of the study was to determine the features of ultrasonic verification of the intubation tube (IT) in the trachea.

Materials and methods: The study was performed in 20 patients. All patients underwent ultrasound scanning of the trachea before, during and after endotracheal intubation. Ultrasound research was performed from four positions of the ultrasound sensor: in the longitudinal, suprasternal, transcricoid and transthoracic positions. During intubation the endotracheal tube location was verified by direct and indirect methods. Direct took all the methods when it is possible to see ETT or its various parts on ultrasound. Indirect methods were able to determine the location of ETT in 100% (n=20) of visualization of the trachea from the front to the back wall. From suprasternal and transcricoid position to visualize ETT was possible only in 80% (n=16) cases. Indirect methods were able to determine the location of ETT in 100% (n=20) patients, which led to timely detection of esophageal intubation.

Results: Ultrasonic studies have shown that the direct method in the longitudinal position of the sensor was able to visualize ETT in 100% of patients (n=20). Visualization became possible due to the use of reinforced ETTS and filling the cuff with 0.9% NaCl. The presence of a spring in the wall of the reinforced ETT allowed to differentiate the tissue-air border, filling the cuff created the possibility of visualization of the ETT from the front to the back wall. From suprasternal and transcricoid position to visualize ETT was possible only in 80% (n=16) cases. Indirect methods were able to determine the location of ETT in 100% (n=20) patients, which led to timely detection of esophageal intubation.

Conclusions: 1. It is possible to see the intubation tube in the trachea by direct methods but it is difficult because it is easily confused with the tissue-air border or other anatomical structures. 2. The use of reinforced tubes or filling the cuff with fluid greatly facilitates the finding of the intubation tube in the trachea by ultrasound, especially in the longitudinal position of the sensor. 3. Ultrasound is the fastest method of detecting esophageal intubation by detecting the phenomenon of “double path”.

Ultrasonic verification of intubation tube

5166

Voice Analysis as a Preoperative Prediction Method of a Difficult Airway, preliminary results

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Background and Goal of Study: The occurrence of an unpredicted difficult airway is one of the greatest challenges faced by anesthesiologists. These situations are rare, as the prevalence is 2.2% in the general population. However, might entail severe complications. Therefore, a preoperative airway assessment is paramount. Traditional predictive tests evaluate multiple anthropometric characteristics in which the physical presence of the patient is mandatory. Nevertheless, none can predict a difficult airway based on a single characteristic nor remotely. In this pilot study, we propose that voice characteristics analysis could reflect airway’s anatomy and correlate with Mallampati. Building on this, future studies will be performed on a remote voice airway assessment method to replace anthropometric parameters even in traditional tests to predict a difficult airway.

Materials and Methods: We recorded 5 vowels (A,E,I,O,U) of 54 patients in neutral, extension and hyperextension positions with a smartphone located 15cm from the mouth in sitting position. Mallampati grade and clinical characteristics of the patients were collected during the preoperative visit. Voice signal was recorded, and parameters related to frequency, morphology and perturbation were extracted employing Matlab®. To determine the statistical significance of the differences within parameters the non-parametric test of Kolmogorov-Smirnov was used. These variables were introduced into several classification algorithms based on machine learning. Patients were classified into expected easy airway (grades I-II) and expected difficult airway (grades III-IV) according to Mallampati scale.

Results and Discussion: The final sample was divided in 34 easy airway patients and 20 difficult airway patients. The ensemble method algorithm yielded the best results obtaining a 70.0% of sensibility, 79.0% of specificity and 75.9% of accuracy. Even though, the data obtained is encouraging, not having achieved greater results may be due to Mallampati’s considerable variability and the study’s small sample size.

Conclusion: We can confirm a statistically significant relationship between voice characteristics and Mallampati. Further studies including a larger sample size, testing other classification algorithms and correlating the voice signal with a difficult airway defined by the Cormack-Lehane scale, might enable the development of a voice-based airway assessment method facilitating a remote airway evaluation.

AutoFlow® vs. volume-controlled ventilation for laparoscopic gynaecological surgery using LMA® ProSeal™: A randomised controlled trial

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Background and Goal of Study: LMA® ProSeal™ (pLMA) has been used in laparoscopic gynaecological surgery. During surgery, pneumoperitoneum and the Trendelenburg position would increase the peak airway pressure (PAWP), which may cause airway leak during pLMA anaesthesia. Ventilation-mode AutoFlow® (AF) delivers the set tidal volume at the lowest PAWP using decelerating flow pattern. Thus, AF may prevent the increase of PAWP and airway leak of pLMA. We hypothesised that AF would decrease PAWP compared with volume-controlled ventilation (VCV) during laparoscopic gynaecological surgery using pLMA.

Materials and Methods: After the approval by the institutional review board and registration to the UMIN Clinical Trials Registry (identifier: UMIN000023173), this study was conducted in a single tertiary hospital in Japan. Eighty adult women were recruited and randomly allocated into two groups as AF group and VCV group. pLMA fitting was evaluated using the bubble test, ease of gastric tube insertion, oropharyngeal leak pressure (OLP), and fibrocopic score. Further, 8 ml/kg tidal volume and 5 cmH2O positive end-expiratory pressure were used and the respiratory rate was adjusted between 12 and 16 per minute to maintain the end-tidal carbon dioxide at 35–40 mmHg in both groups. PAWP and the audible leak of pLMA were measured at four time points (after insertion of gastric tube, after administration of neuromuscular blocking drug, after initiation of pneumoperitoneum, and after change to Trendelenburg position). The primary outcome was PAWP at both pneumoperitoneum and the Trendelenburg position.
Results and Discussion: A total of 40 patients in the AF group and 39 patients in the VCV group were finally analysed. There were no differences in the patients’ characteristics or pLMA fitting tests between the two groups. PAVP at both pneumoperitoneum and the Trendelenburg position was significantly lower in the AF group compared to the VCV group [median (IQR), 16 (15–18) vs. 18 (17–19); P < 0.001]. Audible leak was found in 4 patients in the AF group and 2 patients in the VCV group (P = 0.68). A total of 6 patients with leak showed lower OLP compared to the remaining 73 patients without leak [22 (19–23) vs. 28 (25–34); P = 0.0015]. Patients in the AF group showed lower PAVP at all time points; however, the other parameters and vital signs showed no differences.

Conclusions: AF ventilation decreased PAVP compared with VCV in laparoscopic gynaecological surgery using pLMA.

After laparoscopic surgery, atelectasis develops firmly. In our study we aimed to compare the effect of different ventilation modes to prevent atelectasis that develops during perioperative period by using pulmonary ultrasonography in patients undergoing laparoscopic surgery.

Materials and Methods: After approval of the ethics committee (KIA 2018/260) (NCT03614845) and written patient approval, totally 60 ASA I-II patients between the ages of 18 to 75 undergoing laparoscopic cholecystectomy under general anesthesia, were included in the study. The patients were randomly assigned into two groups: volume-controlled ventilation (VCV) group (group V) or pressure-controlled-volume guaranteed ventilation (PCV-VG) group (group PV). Preoperative (L1) and postoperative at min. 0 (L2) and min.30 (L3). LUS (lung ultrasonography score) was obtained by lung ultrasonography. In the intraoperative period, hemodynamics data (T1-6) and mechanical ventilation parameters (T2-T3-T4) were recorded at different times.

Results and Discussion: Demographic data, length of operation/anesthesia/pneumoperitoneum, hemodynamic data of the intraoperative period and tidal volume were similar between the groups. Peak inspiratory pressure (PIP) was found statistically higher in the group V than the group PV before pneumoperitoneum (T3). Plateau pressure was found higher in the group V than the Group PV at all the times (T2,T3,T4). Compliance was found statistically higher in the Group PV than the Group V at all the times. At T3 and T4 the compliance was determined lower in the group V than the group PV respectively 15% and 14%. LUS score was similar between the groups at all the times. Change of LUS score of right lower anterior chest is statistically higher in the group V than the group PV (p<0.05).

Conclusion: We are in the opinion that PCV-VG mode provides optimal ventilatory pressures and maintains high compliance. Additionally, PCV-VG mode might be superior to VCV mode in preventing from atelectasis of lower lung areas, in particular in the right lower lung areas which is exposed to high surgical mechanical pressure during laparoscopic abdominal surgery.

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Does oxycarbon improve cerebral oxygenation during apnea? A mono-center randomized cross-over trial inspired by aviation-research

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Background: Several projects in aviation and high-altitude research have demonstrated improved cerebral perfusion, performance, and oxygenation by adding CO2 in hypobaric hypoxia [1]. Hypoxia is of concern also in anesthesia, especially in patients with a decreased oxygen reserve. This study aimed to test whether 5% CO2 in O2 increases the time until significant cerebral hypoxia was detected by near-infrared spectroscopy (NIRS) in bariatric patients under normobaric conditions.

Methods: After ethical approval, patients (18-65 years), BMI >35kg/m2 requiring anesthesia for bariatric surgery at the University Hospital Zurich were included in this mono-centric, single-blinded, controlled, crossover proof-of-concept study. According to the randomization, patients received first oxycarbon (5%CO2, 95%O2) or the comparator (95%O2). After a wash in of 10 minutes, apnea was performed by disconnecting the ventilator from the endotracheal tube until NIRS value dropped by 20% from baseline, or until SpO2 decreased to 80% (as a safety termination criterion). Reventilation was then performed until parameters returned to baseline. With the crossover design, the procedure was repeated with the other substance (oxycarbon or comparator). During apnea, NIRS, vital signs, and bispectral index were recorded permanently, blood samples were drawn at the beginning and the end of the apnea.

Results: Based on the power calculation, 30 patients were enrolled. Tissue oxygenation drop by 20% was not reached in this patient population, as the safety termination criterion was reached first. The time until oxygen saturation dropped to 80% was similar after both interventions (mean difference -6s [95%CI: from -19 to 7]; p=0.37), but both cerebral tissue oxygenation index and PaO2 were higher after oxygen administration (difference of 1.46% [95% CI: from 0.12 to 2.59]; p=0.018, and 0.6 kPa [95% CI: 0.12 to 1.0], p=0.021, respectively).

Conclusion: This study demonstrates improved blood and cerebral tissue oxygenation after oxycarbon administration. The possible link to a clinical scenario for improvement of cerebral oxygenation has to be investigated in future trials.

References:

4797

Quantitative assessment of atelectasis formation under high frequency jet ventilation during liver tumour ablation

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Background and Goal of Study: Liver tumour ablation treatment has many advantages. The ablation procedure however demands immobilisation of the liver to avoid harm. Total intravascular general anaesthesia, intubation and the use of high frequency jet ventilation (HFJV) has been shown to improve the ablation procedure (1). The formation of atelectasis during general anaesthesia is known, the effects of HFJV during anaesthesia for liver ablation is not well investigated. The aim was to study a) the formation of atelectasis and b) the displacement of the diaphragm over time during general anaesthesia and HFJV.

Methods and Materials: This is a prospective, observational study, where computer tomography scans (CTs) of the lung ablation were analysed both manually and in software programme MATLAB during HFJV and general anaesthesia. All patients had i.v. anaesthesia; propofol, remifentanil and rocuronium. They were intubated and ventilated with HFJV (HFJV catheter through the tube). CTs were taken during HFJV; baseline, 15’, 30’ and 45’. Atelectasis was defined as radiological density of Hounsfield Units -100 to +100. One-way RM ANOVA was used to analyse the results.

Results and Discussion: 25 patients above 50 years of age were studied. A decrease in atelectasis volume (p=0.001) and a caudal displacement of the right diaphragm (p=0.047) was observed during the study period, see fig. The reason for the decrease is unclear but might be an effect of intrinsic PEEP known to occur during HFJV. The caudal displacement of the diaphragm, observed in consecutive CT scans was small but significant and could be an effect of less atelectasis as well as other variables such as muscle relaxation, BMI and liver elasticity.

Conclusion: HFJV do not have any negative effects on lung aeration, the formation of atelectasis was found to decrease during the HFJV period studied.

6030

Evaluation of effect of PCV-VG mode vs. VCV mode on atelectasis in patients undergoing laparoscopic surgery: a prospective randomized controlled clinical trial

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Background and Goal of Study: Laparoscopic surgery, which has increased in frequency in recent years, results in less bleeding, less postoperative pain, shorter hospital stay and better cosmetic results compared to open technique. However, although less invasive, lung dynamics can be affected by the pneumoperitoneum.

HFJV do not have any negative effects on lung aeration, the formation of atelectasis was found to decrease during the HFJV period studied.
References:

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Automated control of mechanical ventilation during general anaesthesia (AVAS-Study)
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Background and Goal of Study: Automated ventilation has been established in critical care setting for years. With Smart Ventilation Control (SVC, by Drägerwerk AG & Co. KGaA), a system for automated intraoperative ventilation was introduced. Safety as well as efficacy of the use of this system during general anaesthesia have been investigated in this study.

Materials and Methods: SVC controls the patient’s respiratory settings by adjusting respiratory rate, inspiratory pressure, inspiratory time and trigger sensitivity in order to keep the ventilation within adjustable physiological target zones (VT, etCO2).

In this prospective bicentric observational study 100 patients were ventilated with SVC. Inclusion criteria were: elective limb or peripheral vascular surgery under general anaesthesia, ASA classification I-II, Age >= 18 years and written informed consent. For the duration of the entire anaesthesia, continuous recording of all respiratory parameters was carried out. A singular arterial blood gas analysis was performed to objectify the ventilatory situation. Primary endpoints were the occurrence of the following adverse events: Hypoventilation (MV < 40 ml/kg IBW or etCO2 > 5 mmHg above the target corridor for more than 5 min.); Hyperventilation (etCO2 > 5 mmHg below the target corridor for more than 5 min.), Apnoea > 90 s; Tachypnoea (RR > 35 min-1); Manual override by the anaesthetist in charge.

Results and Discussion: In the population of 100 included patients (49 female, 51 male; in average 65 years old), n=18 hypoventilations (14 defined by low minute volume, 4 defined by increased etCO2), n=12 hyperventilations, no apnoeas and no tachypnoeas were recorded. SVC was capable of regulating the occurring respiratory parameters was carried out. A singular arterial blood gas analysis was performed to objectify the ventilatory situation. Primary endpoints were the occurrence of the following adverse events:

- Hypoventilation (MV < 40 ml/kg IBW or etCO2 > 5 mmHg above the target corridor for more than 5 min.)
- Hyperventilation (etCO2 > 5 mmHg below the target corridor for more than 5 min.)
- Apnoea > 90 s
- Tachypnoea (RR > 35 min-1)

Manual override by the anaesthetist in charge.

Conclusion: According to the collected data, SVC provides safe and presumably lung protective automated ventilation during general anaesthesia.

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Effects of airway resistance on distribution of ventilation in a two-compartment lung model with an asymmetric alveolar compliance
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Background and Goal of Study: Diseases of lung on one side can cause hypoxia due to the asymmetric distribution of ventilation volume. The purpose of this study is to describe how distribution of ventilation is affected by airway resistance when alveolar compliance is asymmetric in a two-compartment lung model.

Materials and Methods: The two-compartment lung model was constructed as follows: the internal diameter of the airway can be changed to 3-8 mm, the compliance of the disease lung (L1) can be changed to 15, 60 and 120 ml / cmH2O, called C15, C60, and C120 groups, respectively. Compliance of normal lung (L2) was fixed at 60 ml / cmH2O. The ventilator of anesthesia machine is set to 600 ml of tidal flats, respiratory rate 10 bpm and inspiratory pause 50% in VCV mode. A spirometry during mechanical ventilation measures pressure, flow and volume in the trachea and bronchus.

Results and Discussion: The volume ratio of L1 / L2 at the airway internal diameter 3, 4, 5, 6, 7 and 8 was 0.10 ± 0.05, 0.11 ± 0.03, 0.12 ± 0.02, 0.12 ± 0.02 and 0.12 ± 0.02 in the C15 group; 1.05 ± 0.16, 1.01 ± 0.08, 1.00 ± 0.07, 0.97 ± 0.09, 0.96 ± 0.06 and 0.97 ± 0.08 in the C60 group; 1.46 ± 0.18, 3.06 ± 0.41, 3.72 ± 0.37, 3.78 ± 0.47, 3.77 ± 0.45 and 3.78 ± 0.60 in the C120 group.

Conclusion: The distribution ventilation volume is proportional to the ratio of compliance of both lungs, an uneven distribution of ventilation improved, when airway internal diameter was less than 4 mm, but a significant increase in PEEP was observed.

References:

5083
Monitoring of the respiratory health and detection of postoperative respiratory complications using respiratory variability
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Background and Goal of Study: The incidence of Postoperative Pulmonary Complications (PPC) after non-thoracic surgery varies between 2 and 19% and are associated with an increase of morbi-mortality. However, few non-invasive monitoring possibilities are available to identify PPC during the postoperative recovering period. Respiratory variability reflects ‘healthy’ breathing, whereas decreasing variability of the breathing pattern components is a reflection of “poor health”. This decrease may be due to the “filtering” of the central variability changes in regards to the mechanical loads. Breath-by-breath variability is related to the neuro-mechanical coupling and the load-capacity adequacy. In intensive care, low ventilatory variability predicts mechanical ventilation weaning failure and is also an independent risk factor of death. Monitoring of respiratory variability during the postoperative recovery period may be useful for early non-invasive detection of PPC.

Materials and Methods: Interventional noninvasive prospective monocentric non-blinded study in adults undergoing emergency or elective abdominal surgery with laparotomy. Measurement of the Coefficient of Variation of breathing pattern variables preoperative for baseline (T0), conscious after extubation (T1) and within the first 24h after surgery (T2) using thoracic chest movement measurement with a non-invasive respiratory belt. PPC (defined as respiratory failure, pleural effusion, respiratory infection, atelectasis, pneumothorax or bronchospasm) were screened during 7 days following surgery. Comparison of the CoV for breathing pattern variables (Tidal Volume, VT) between the group of patients with (PPC+) and without (PPC-) complications using Mann Whitney and Friedman test for statistical analysis.

Results and Discussion: preliminary results; 19 patients included; 7 with complications (PPC+) between day 0 and day 3 after surgery.

Conclusion: CoV of VT at T2 decreases in the group with respiratory complications during the first 3 days following surgery. Monitoring of respiratory variability in the postoperative recovering period might be a potential technique for detecting PPC.
Comparison of two ventilation strategies during general anesthesia for retrograde intrarenal surgery (RIRS): a preliminary study

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Background and Goal of Study: Retrograde intrarenal surgery (RIRS) has been proven to be an effective treatment in management of intrarenal lithiasis. However, the movement of stones associated to ventilation-induced kidney movement during surgery remains a challenge. The aim of the study was to compare two ventilation strategies to minimize stone movement: low ventilation (LV) and the use of apnea (A).

Materials and Methods: After informed consent was obtained, patients were prospectively randomized in one of the two groups: LV (tidal volumes 5ml/kg and respiratory rates 10) or A (5 min apneas). These ventilatory strategies were started when laser shooting began. Demographic data and stone characteristics (number, size, density and location) were recorded. Precision before and after initiation of LV or A (number of successful shots out of 5 attempts), fragmentation, removal and surgical time, as well as end-tidal CO2, oxygen saturation, need to convert to standard ventilation due to adverse effects or complications. The use of apnea seems to reduce fragmentation differences in surgical time, end-tidal CO2, oxygen saturation and need to convert to standard ventilation but no differences were found between groups. Conversion to standard ventilation was necessary only in 2 patients in LV and A group, respectively.

Conclusions: The use of ventilatory strategies to minimize renal movement during RIRS appears to increase surgical precision and is not associated with respiratory adverse effects or complications. The use of apnea seems to reduce fragmentation time in our preliminary results, though larger studies are required.

References: 1. Gadzhiev N et al. Reducing kidney motion: optimizing anesthesia and combining time in our preliminary results, though larger studies are required.

4487

Diaphragm ultrasonography as a method to confirm ventilator-induced diaphragm dysfunction: the prospective observational cohort study

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Background and Goal of Study: Mechanical ventilation can cause diaphragm injury. The aim of this study was to find out whether ventilator-induced diaphragm dysfunction leads to prolonged ventilation. The study hypothesis was that the duration of mechanical ventilation, and the frequency of complications in children depend on duration of diaphragm inactivity, low (<15%) or high (>30%) diaphragm thickness and presence of patient–ventilator dyssynchrony.

Materials and Methods: We examined data of 57 patients at the age 1 month-3 years, who needed invasive mechanical ventilation. In 4 patients ultrasound investigation was impossible. 53 patients were included in the study results analysis. The presence of diaphragm inactivity, the diaphragm thickness (Tdi) at the end of inspiration and the presence of patient–ventilator dyssynchrony were obtained on 1st, 3rd, 5th and then every five days during mechanical ventilation. The primary outcome was the time to liberation from mechanical ventilation. Secondary outcomes were complications: prolonged ventilation, reintubation, tracheostomy or death. Statistical Package for the Social Sciences was used and the results were presented using median (IQR), adjusted hazard ratio (HR), duration ratio.

Results and Discussion: 61.4% of patients at day 1 had diaphragm inactivity. Presence of diaphragm inactivity during first 5 days after admission was associated with lower daily probability of liberation from ventilation (adjusted HR 1.87, 95%CI 1.62-2.15, p<0.001). Decrease of Tdi thickness of patients at day 1 had Tdi less than 15% (Tdi 9% [11% to 8%], at days 3rd and 5th there were 35.1% (Tdi 11% [8% to 12%]), and 21.1% (Tdi 10% [8% to 14%]) of patients, respectively. It was associated with lower daily probability of liberation from ventilation (adjusted HR 1.34, 95%CI 1.22-1.95, per 10% decrease). There were no patients at day 1 who had Tdi more than 30%, however, at days 3rd and 5th there were 21.1% (Tdi 41% [38% to 46%]) and 24.6% (Tdi 48% [34% to 51%]) of patients with Tdi more than 30%. There were no incidences of patient–ventilator dyssynchrony at day 1st, however, at days 3rd, 5th and 10th the incidences were 28.1%, 35.1% and 14% respectively. It was associated with a prolonged mechanical ventilation (duration ratio 0.42, 95% CI 0.22-0.97).

Conclusion: Diaphragm inactivity, low level of diaphragm thickness might impact clinical outcomes.

6222

Flow-controlled expiration during laparoscopic surgery diminishes intratracheal derecruitment – a randomized controlled cross-over study

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Background and Goal of Study: Intraoperative mechanical ventilation with flow-controlled expiration (FLEX) showed dorsal lung recruitment in lung-healthy patients undergoing cranial surgery. We hypothesized that FLEX may counteract impaired lung mechanics during laparoscopic surgery. Therefore, we examined the effects of FLEX on tidal lung derecruitment and oxygenation during laparoscopic surgery.

Materials and Methods: After ethical approval, 26 patients undergoing laparoscopic surgery received conventional volume-controlled ventilation (VCV) and FLEX in a randomized cross-over design. Each ventilation-phase lasted 20 minutes with identical ventilation settings (tidal volume 7 ml kg-1, positive end-expiratory pressure (PEEP) 7 mbar). Peak expiratory flow (PEF), inspiratory plateau pressure (Pplat), mean airway pressure (Pmean) and respiratory system compliance (CRS) were calculated offline. The intratidal compliance profile2 was determined to indicate strong or moderate expiratory derecruitment. Additionally, the ratios of arterial oxygen partial pressure and inspiratory oxygen fraction (PaO2/FIO2) were determined. Statistical analyses included linear mixed models and chi-square tests.

Data are shown as mean ± SD.

Results and Discussion: FLEX decreased PEF (-305 ± 64 vs. -513 ± 79 m/s ± 1, p<0.001). Pplat (21 ± 4 vs. 21 ± 3 mbar, p=0.76) was comparable. With FLEX, Pmean was higher (14 ± 2 vs. 12 ± 1 mbar, p<0.001), strong expiratory derecruitment was rarer (30% vs. 57%, p=0.026), CRS (41 ± 7 vs. 38 ± 10 ml-mbar-1, p=0.038) and the PaO2/FIO2 ratio were higher (451 ± 31 vs. 437 ± 82 mmHg, p=0.023) than with VCV.

Conclusion: During laparoscopic surgery, ventilation with FLEX counteracts impaired lung mechanics by diminishing tidal derecruitment. This leads to an improved lung compliance and oxygenation.


6165

Take a deep breath: cross-sectional study of volume-related ventilation practices in the light of new mechanical ventilation guidelines

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Background and Goal of Study: Modern-day mechanical ventilation guidelines (1) suggest "lung-protective ventilation strategies" as optimal for all patients, as the opposite was shown to increase postoperative pulmonary complications (PPC). Their fundamental component is ventilation with low tidal volumes (VT) of 6–8 ml/kg predicted body weight (PBW). In order to examine compliance with lung-protective ventilation guidelines, we conducted a cross-sectional study operating theaters in University Hospital Centre Zagreb.

Materials and Methods: Ventilation parameters and physical characteristics were collected prospectively in all adult patients under general anesthesia, ventilated in controlled modality, during one day, for all types of surgeries. We noted patient's age, weight, height (from which PBW and BMI were calculated), ventilation modality and set VT. If the patient was ventilated using pressure-controlled mode, mean VT was calculated based on three consecutive breaths.

Results and Discussion: In 36% of cases, ventilation settings were not consistent with lung-protective ventilation strategies (while allowing for +/-0.5 ml/kg deviation from the guidelines). Patients ventilated with more than 8.5 ml/kg had higher BMI.
6145

Recovery After Cardiopulmonary Arrest (CA) During the Approach of a Difficult Airway Planned in Patient with Acute Respiratory Distress Syndrome secondary to Severe Pneumonia

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Background: We present a clinical case on the approach of difficult airway management in a patient with Acute Respiratory Distress Syndrome (ARDS). Complications due to severe hypoxia were respiratory acidosis, hemodynamic instability and subsequent CA.

Case report: 26-year-old patient with Childhood Cerebral Palsy was diagnosed with ARDS due to severe pneumonia. She was taken to the operating room for placement of a chest tube. She had dyspnea, desaturation and hemodynamic instability. Chest X-ray showed left lung condensation in > 50%. She had difficult airway criteria and was evaluated to perform awake fiberoptic intubation. The tube was exchanged with a Frova guide to a left double-lumen tube. The patient started with severe desaturation, absence of capnography wave and the tube was removed. Subsequently, direct laryngoscopy was performed and it could be intubated without difficulty with a left double-lumen tube. During the airway approach, the patient presented a severe desaturation and CA recovering to sinus rhythm 8 min later. Pulmonary recruitment maneuvers were initiated and the oxygenation improved. Thoracic drainage was placed and 25 days later she was discharged.

Discussion: Although Arne Test is a good tool for predicting the VAD, in some cases it doesn’t correlated. It is important to perform an adequate approach to the airway according to current guidelines (1). ARDS management includes pulmonary recruitment maneuvers, protective ventilation and adequate driving pressure control (2). In this way, we improve oxygenation, alveolar ventilation and avoid pulmonary overdistention.

Learning Points: Secure the airway is vital to ventilatory control. It is important to make the right approach to the airway based on current guidelines. Adequate management plan reduces morbidity and mortality in patients with ARDS. Pulmonary recruitment maneuvers and driving pressure control are currently validated for oxygenation control in these patients (3).

References:

6065

Driving pressure and its relation to matrix metalloproteinase-9 expression in bal after one lung ventilation period in lung resection surgery

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Background and Goal of Study: Inflammatory injury to the alveolar epithelial and endothelial capillary membrane is a central event in the pathogenesis of acute lung injury (ALI). Matrix metalloproteinase-9 (MMP-9) has been implicated in ALI associated to mechanical ventilation. Driving pressure (DP) is defined as the End-Inspiratory Plateau Pressure (EIPP) minus Positive End-Expiratory Pressure (PEEP). Previous studies have shown association between DP>15cmH2O and lung injury and mortality. We hypothesized that DP is associated with increased levels of MMP-9 at the end of one-lung ventilation period (OLV).

Materials and Methods: Our study, approved by local Ethics Committee, included 174 patients undergoing a lung resection surgery with an OLV longer than 1 hour. The anesthetic protocol was as follows: after intubation ventilation was initiated with a TV 8 ml/Kg, PEEP 5 cmH2O and FiO2 0.4–0.5. Respiratory rate was set to keep an EICO2 of 30–35 mmHg. During OLV, TV was reduced to 6 ml/kg and FiO2 increased at 0.6–1 to keep a SatO2 > 90%. BAL was performed in dependent lung before and after OLV period to quantify the levels of MMP-9, that were measured using Western Blot test. Haemodynamic and respiratory parameters were registered 5 min before OLV (baseline), 30 min after initiating it, and at the end of it. Patients were divided into 2 groups: one with a DP>15 and another one with a DP<15 during OLV. The Pearson correlation test was used to analyze the relation between MMP-9 values in BAL and pressures in airway and lung compliance. We also compared MMP-9 values in patients with DP>15 and DP<15 during OLV using the Mann-Whitney test. Statistically significative p < 0.05.

Results and Discussion: MMPs are known to be involved in several physiopathological processes, but the role of MMP-9 during OLV has not been analyzed. We demonstrated the influence of ventilatory set in the expression of this protein in BAL (table 1 and figure 1).

- The anesthetic protocol was as follows: after intubation ventilation was initiated with a TV 8 ml/Kg, PEEP 5 cmH2O and FiO2 0.4–0.5. Respiratory rate was set to keep an EICO2 of 30–35 mmHg. During OLV, TV was reduced to 6 ml/kg and FiO2 increased at 0.6–1 to keep a SatO2 > 90%. BAL was performed in dependent lung before and after OLV period to quantify the levels of MMP-9, that were measured using Western Blot test. Haemodynamic and respiratory parameters were registered 5 min before OLV (baseline), 30 min after initiating it, and at the end of it. Patients were divided into 2 groups: one with a DP>15 and another one with a DP<15 during OLV. The Pearson correlation test was used to analyze the relation between MMP-9 values in BAL and pressures in airway and lung compliance. We also compared MMP-9 values in patients with DP>15 and DP<15 during OLV using the Mann-Whitney test. Statistically significative p < 0.05.

- Results and Discussion: MMPs are known to be involved in several physiopathological processes, but the role of MMP-9 during OLV has not been analyzed. We demonstrated the influence of ventilatory set in the expression of this protein in BAL (table 1 and figure 1).

- Conclusion: We conclude that MMP-9 could be included in postoperative acute lung injury related to mechanical ventilation.
Video Laryngoscopy: is it always the same?

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Background and Goal of Study: In recent years, several types of video laryngoscopes (VL) have been introduced into practice. We evaluated the capabilities and learning curve of the four types of video laryngoscopes (VLS).

Materials and Methods: After approval from the ethics committee, we analyzed tracheal intubation in 256 adult patients (144 men, 112 women) at the age of 26-84 years with BMI 18,1-43,4 kg/m²-1-4 ASA classes for various types of surgery (mainly abdominal). A preliminary assessment was made of the number of risk factors for difficult tracheal intubation (TI) according to generally accepted criteria. First, a direct laryngoscopy (DL) was performed to evaluate the visualization of the larynx. Then TI by endotracheal tube (ETT) was performed using VLS C-MAC® Macintosh or D-Blade (n=116), Airtraq® Avant (n=105), McGraphTM MAC larynx. Then TI by endotracheal tube (ETT) was performed using VLs C-MACTM Macintosh or D-Blade (n=116), AirtraqTM Avant (n=105), C-MAC® and D-Blade (n=116), McGraph and i-view for (Airtraq). The reasons were the impossibility of overcoming the epiglottis (n=5) and esophageal intubation (1) for Airtraq, the fogging for McGraph (1), the lack of visualization of the glottis (1) and the tubular epiglottis (1). In uncomplicated cases of rapid TI, the hemodynamic response during VL procedure was unexpressed.

Conclusion: The i-view for single use is only available with one type and size of blade and not for really difficult intubation. McGraph and i-view do not allow making photos and videos for the complete training of beginners. The VL Airtraq channel has a unique geometry, an excellent camera with the ability to remotely view and record, but for reliable use with the functions of the epiglottis, the development of special methods of rotation of the ETT is required. C-MAC is easy to learn, provides excellent image quality, speeds up the process of learning for beginners, allows for various combinations of techniques for the most difficult situations.

References:
2. Stamatov V, Gavrilov S, Dobleva E, Bunyaytov A: Endotracheal intubation using GlideScope® blade and not for really difficult intubation. McGraph and i-view do not allow making photos and videos for the complete training of beginners. The VL Airtraq channel has a unique geometry, an excellent camera with the ability to remotely view and record, but for reliable use with the functions of the epiglottis, the development of special methods of rotation of the ETT is required. C-MAC is easy to learn, provides excellent image quality, speeds up the process of learning for beginners, allows for various combinations of techniques for the most difficult situations.
Conscious sedation was continued with propofol infusion according to BIS monitor. When achieved the targeted BIS, laryngoscopy performed with VL and vocal cords seen clearly, than rapid sequence induction (RSI) performed and the patient was intubated successfully within 38 seconds. During the procedure the patient’s hemodynamic and vital signs were stable.

**Discussion:** In these cases we thought that in patients whose mallampati score can’t be evaluated, the mouth opening is narrow and the extension of the intraoral mass can’t be evaluated, awake airway evaluation and adequate vision of vocal cords with VL may be a good option to secure the airway and decide on the following steps.

**References:**
2. Jia Jiang, Da-Xu Ma, Bo Li et al. Videolaryngoscopy versus fiberoptic bronchoscope for awake intubation – a systematic review and meta-analysis of randomized controlled trials Therapeutics and Clinical Risk Management 2018:14 Learning points: When the patient predicted as difficult airway refuses to be awake, RSI after visualisation of the airway under deep sedation by VL can be an alternative to awake technique.

**Materials and Methods:**

**Background and Goal of Study:** The current definition of a difficult intubation is largely based on direct laryngoscopy (DL). Video laryngoscopy (VL) has shown to facilitate tracheal intubation, and has been gaining popularity in airway management. Therefore, we designed this study to examine if anesthesiologists’ interpretations of a difficult intubation are consistent with current guidelines, and if they are affected by the extended use of VL.

**Materials and Methods:**

Tracheal intubation records for adult patients from January to March 2018 were analyzed. The documentation of intubation difficulty was compared with the defined intubation difficulty based on current guidelines for any discrepancy. Two different criteria of a difficult intubation were used for analysis: 1) 3 or more attempts to achieve tracheal intubation, or 2) Cormack-Lehane grade 3-4 view with direct laryngoscopy. The reasons for such discrepancy were further investigated. We also conducted a survey among anesthesia providers on their interpretation of a difficult intubation.

**Results and Discussion:** Analysis of 250 records has shown that documentation of intubation difficulty in over 95% of records were consistent with current definitions. However, there was evidence of disagreement between each definition and documentation (p=0.002 and p=0.001 for definitions based on the number of attempts and Cormack-Lehane grade during DL, respectively). We also found that the use of VL, when compared to DL alone, was associated with higher probabilities of discrepancy. When questioned about the definition of a difficult intubation, 66.4% of anesthesia providers considered 3 or more attempts for intubation as difficult and only 10.9% considered Cormack-Lehane grade 3-4 view during DL as difficult. Moreover, over 50% of anesthesiologists would choose VL as their first-line device for an anticipated difficult intubation.

**Conclusions:** Anesthesiologists do not consistently use current guidelines to interpret and document a difficult intubation. The use of VL appears to be associated with this discrepancy.

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**Association of the use of video laryngoscopy and the interpretation of a difficult intubation**

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**Background and goal of the study:** The current definition of a difficult intubation is largely based on direct laryngoscopy (DL). Video laryngoscopy (VL) has shown to facilitate tracheal intubation, and has been gaining popularity in airway management. Therefore, we designed this study to examine if anesthesiologists’ interpretations of a difficult intubation are consistent with current guidelines, and if they are affected by the extended use of VL.

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**Conclusions:** Anesthesiologists do not consistently use current guidelines to interpret and document a difficult intubation. The use of VL appears to be associated with this discrepancy.

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**5466**

**Primary and rescue techniques for anticipated and unanticipated difficult airways: retrospective analysis of four years at a University Hospital**

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**Background and Goal of Study:** A safe management of Difficult Airway (DA) requires prior preparation and the use of alternative techniques to limit the number of unsuccessful attempts. The aim of this retrospective study is to determine the effectiveness of the primary and rescue techniques that allow to secure the airway of those patients classified as DA, both predicted or unpredicted.

**Materials and Methods:** Electronic anesthesia records were retrieved from all patients that required airway management for general anesthesia from January 2015 to December 2016. The techniques used in patients with anticipated and unanticipated DA, the number of attempts and the causes of failure were analyzed.

**Results and Discussion:** Data of 38,008 patients was analyzed. Based on a mortality and morbidity risk index 4515 patients (11.88%) were classified as Anticipated DA in the preoperative assessment, of whom 41.4% (1868 patients) were managed by videolaryngoscopy (VL), with a success rate of 98.5%; 25.2% (1138) were managed by conventional laryngoscopy (CL), successful in 84.9% cases; 22.5% (1014) by flexible bronchoscope (FBS), most of them awake, with a success rate of 98.6%; the 10.9% remaining (495) were managed by other techniques, more than half by laryngeal masks (LM). The differential analysis of these four years shows a progressive increase in the use of VL, which grows from 34.8% in 2015 to 45.6% in 2018, as well as a proportional decrease in the use of FBS, which falls from 27.9 to 15.7%. The number of patients managed by other techniques remains stable: CL is maintained between 27.5 and 28.5% and other techniques between 9.8 and 10.2%. Unanticipated DA after CL was registered in 574 patients (1.51%). 140 could be successfully intubated on the first attempt, but 392 patients (68.3%) required a second technique to secure the airway, 34 patients (5.9%) a third and 8 patients (1.4%) required a fourth one. The VL was the preferred rescue technique and was used in 54.4% of these cases with a success rate of 92%. Intubation stylet was used in 40.2% with an efficacy of 85%. FBS (5%) had a success rate of 96% and LM were used in 2 cases, both successful.

**Conclusions:** VL is becoming the preferred technique for anticipated and unanticipated DA in our hospital, with a high success rate, and it’s progressively displacing FBS as the main tool for approaching these patients. FBS is the preferred technique for awake intubation and maintains the highest success rate of all techniques.
4905

Straight blade technique for intubation with McGrath MAC videolaryngoscope is superior to standard approach

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Background and Goal of Study: Videolaryngoscope (VL) is known to improve glottic visualization, and becoming the first line device for difficult airway management. McGrath MAC VL is one of the popular VL used in Japan. As there is less lifting force required during glottic exposure, direct elevation of the epiglottis, named “straight blade technique” is allowed if the view is not great with standard technique that the blade tip inserted into the vallecula. This study aimed to compare two intubation technique, 1) standard technique and 2) straight blade technique using McGrath MAC VL in retrospective manner.

Materials and Methods: Patients without having difficult intubation profiles and intubated with McGrath MAC for elective surgery between October,2017 - October,2018 were searched from our anesthesia database. A total of 15 variables including patient characteristics, intubation profile, postoperative complication were collected.

For statistical analysis, unpaired t test, chi-square test, fisher’s exact test, and other if necessary was used with R statistical software package, version 3.6.1 (R foundation for Statistical Computing, Vienna, Austria) A p value less than 0.05 was considered significant.

Results and Discussion: 70 data were collected, and 5 in each group was excluded because of missing data. Therefore, total of 60 (30 each) was used for analysis. The patient characteristics were not different between groups. For intubation profile, POGO was significantly improved by straight blade technique compared with standard technique (82±14% vs 67±14%, p<0.002). Time for intubation was shorter but not significantly different (23±4 sec vs. 29±13sec, p=0.067). Complication rate were not significantly different (6% (20%) vs. 4% (13%), p=0.729), sorethroat (9% (30%) vs. 6% (20%), p=0.551)), but one folding epiglottis was noted in standard technique group.

Conclusion: Straight blade technique provides improved glottic visualization when evaluated by POGO score, without causing prolonged intubation time or increased complication rate. This technique can be a useful method for McGrath MAC intubation, but practitioner should be cautious about chance for epiglottic displacement.

4900

Submental Intubation Using Airway Scope® in Patients with Complicated Facial Trauma

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Background: Submental endotracheal intubation has been reported to be useful for airway management in facial trauma patients. However, the original method has risks of loosening due to universal connector removal. We previously demonstrated a modified submental endotracheal intubation method using a tube exchanger which made the connector removal unnecessary. Although our modified method was safe and fast compared with the previous reports, the apnea time during intubation was rather long. Here we report the novel method using the AWS (Airway Scope®, Nihon Kohden, Tokyo, Japan). With this method, the apnea time dramatically shortened even in patients with complicated facial trauma.

Case report: Two patients were scheduled for maxillofacial injury repair. After oral endotracheal intubation with a normal tube, the surgeon made the incision in the right mandible. Next, an armored tube was inserted from the incision towards the oral cavity. After insertion of the AWS blade, the armored tube was attached to the channel of the AWS. The patient was ventilated through the normal tube during this sequence. Then the normal tube was extubated and the armored tube was intubated with the AWS. Then the mean apnea time was longer than expectation (204 seconds). We suspect that the reason is the tube exchanger being tough to bend, when inserting the armored tube with the tube exchanger as a guide. The mean apnea time in the present two cases with AWS was 64.5 seconds, which is one third of the previous modification.

Discussion: Submental endotracheal intubation was first described by Hernandez Altemir in 1986, there have been many reports of modified techniques (1, 2). In our previous modification, even though we were able to avoid connector detachment, the mean apnea time was longer than expectation (204 seconds). We suspect that the reason is the tube exchanger being tough to bend, when inserting the armored tube with the tube exchanger as a guide. The mean apnea time in the present two cases with AWS was 64.5 seconds, which is one third of the previous modification.

References:


Learning points: Submental intubation using Airway Scope® shorten the apnea time in patients with complicated facial trauma.

4601

Videolaryngoscopy versus direct laryngoscopy for airway management in paediatric patients: randomized controlled trial

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Background and Goal of Study: Videolaryngoscopy can improve the laryngeal inlet (vocal cords) visualisation and is frequently implemented into the clinical practice in patients with predicted difficult airway or even during the unexpected difficult airway management. The aim of the study was to compare the clinical effectiveness and safety of elective videolaryngoscopy use for airway management in paediatric patients compared to direct laryngoscopy.

Materials and Methods: Trial was approved by Ethics Committee (10/2018), registered on clinicaltrials.gov (NCT03747250) and designed as prospective randomized pragmatic trial. After obtaining informed consent, paediatric patients undergoing general anaesthesia with tracheal intubation were randomized in to elective videolaryngoscopy versus direct laryngoscopy. The first attempt success rate, time to first ETCO2 wave, type of videolaryngoscopy, type of tracheal tube, type of anaesthesia induction, complications were recorded.

Results and Discussion: Overall 338 patients (1/2019-10/2019) were included, and data was available for 330 patients (162 video/168 direct). There were no significant differences in demographics between the groups. Inhalation induction was preferred choice in both groups (78.4% video vs. 76.8% direct). Most patients were intubated with uncuffed tracheal tube (77.0% video vs. 73.8% direct). The first attempt success rate (86.4% vs. 93.5%), median time to first ETCO2 wave (30 vs. 18 seconds) and incidence of complications (5.5% vs. 3.6%) were all inferior for videolaryngoscopy.

Conclusion: The first attempt success rate was higher in the direct laryngoscopy group versus videolaryngoscopy. Videolaryngoscopy was associated with higher incidence of complications.

Acknowledgements: Supported by a Specific University Research provided by MŠMT (MUNI/A1111/2018 and MUNI/A043/2019), supported by MH CZ – DRO (FNBr, 65269705) and supported by funds from the Faculty of Medicine MU to junior researcher (Jozef Klucky, Martina Kosinova).

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Evaluation of McGrath MAC® video laryngoscope experience among anaesthetists' trainees in a large Irish teaching hospital

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Background and Goal of Study: Video laryngoscopes are widely available and become increasingly used as routine for tracheal intubation. We evaluated trainees’ experience using McGrath MAC® video laryngoscope for tracheal intubation in the operating theatres.

Materials and Methods: Anaesthetists’ trainees were asked to fill out a survey when they used a McGrath MAC® video laryngoscope. The survey included years of experience, previous training on its use, presence of predictors for difficult intubation, use of airway adjuncts, difficulties with railroading endotracheal tubes (ETT), complications during intubation and overall satisfaction score (on a scale of 10). This survey was registered with the Clinical Audit department.
Results and Discussion: 55 responses were collected from 23 trainees over a three week period. On 26 occasions (47%) trainees had less than two years of experience of anaesthesia compared with 53% who had three or more years of experience. Although McGrath MAC® video laryngoscope is used on a regular basis in our anaesthesia department, only one third of the trainees received formal training before starting its use. Airway adjuncts were used in 16 patients (29%); a bougie was used in 14 patients and a stylet in two patients. Seventeen patients (30%) were deemed to be a difficult intubation requiring an airway adjunct in 56% of these cases. There was difficulty railroading the ETT tube in only 3 cases. There was a 5% complication rate associated with the McGrath laryngoscope, one oxygen desaturation to 88% and difficulty visualising the anatomy due to lubricating jelly obscuring the scope camera on two occasions. The average satisfaction score was 86% which reflects the ease of use of McGrath MAC® video laryngoscope. A common problem reported with video laryngoscopes is advancing the endotracheal tube inspite of having a good view of glottis which usually requires the use of airway adjuncts. Difficulty railroading the ETT was low in this survey which may have been due to the frequent use of airway adjuncts.

Conclusions: McGrath MAC® video laryngoscope is easy to use with high satisfaction among trainees. Airway adjuncts are commonly used to facilitate endotracheal tube advancement especially in patients with predictors for difficult intubation. We recommend that all anaesthetists should be trained on the proper technique for using McGrath MAC® video laryngoscope before starting its use.

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Determining a safe upper limit of oxygen supplementation for adult patients: a systematic review
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Background and Goal of Study: Supplemental oxygen is commonly used in critically ill patients and during anaesthesia to prevent desaturation. However supplementary oxygen may result in hyperoxaemia, with the risk of tissue hyperoxia, and an increasing body of evidence has connected these conditions with increased mortality. Thus, hypoxia must be avoided, but patients should not be exposed to high concentrations of oxygen if not needed. This systematic review aimed to describe the connection between the inspired oxygen fraction FiO2 and pulmonary complications in adult patients, with the objective of determining a safe upper limit of oxygen supplementation.

Materials and Methods: MEDLINE and Embase was systematically searched in August 2018 for studies fulfilling the following criteria: Intubated adult patients (Population); high fractions of FiO2 (Intervention) versus low fractions of FiO2 (Comparison); atelectasis, ARDS, pneumonia and/or duration of mechanical ventilation (Outcome); original studies both observational and interventional (Studies). Screening, data extraction and risk of bias assessment was done by two independent reviewers.

Results and Discussion: 5891 records were assessed for eligibility, of which 12 were included. Seven studies were conducted in the emergency setting, and five studies included patients undergoing elective surgery. Eight studies reported data on atelectasis, three on ARDS, three on pneumonia and two on duration of mechanical ventilation. There was a significantly increased risk of atelectasis if an FiO2 of 0.8 or above was used, RR: 1.44 [1.05-1.97] (figure). One study showed an almost three-fold higher risk of pneumonia in the high FiO2 group, RR 2.83 [2.25-3.56]. The three studies reporting ARDS and the two studies with data on mechanical ventilation showed no association with FiO2. Half of the randomized controlled trials had high risk of bias.

Conclusion: In this systematic review we found that there was inadequate evidence to identify a safe upper dosage of oxygen, but the available studies suggest a benefit of keeping inspiratory oxygen fraction below 0.8 with regards to formation of atelectasis.
Risk factors for Postoperative Pulmonary Complications in an Afro-Caribbean Population: the CareCoI Score

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Background and Goal of Study: Postoperative Pulmonary Complications (PPC) are associated with an increase of morbi-mortality and longer hospital stays. The incidence of PPC after non-thoracic surgery varies between 2% and 19%. The most of the existing prediction scores for postoperative pulmonary complications were based on Caucasian populations. Only little is known about Caribbean populations and postoperative pulmonary complications, but differences in comorbidities between Caucasian and Caribbean populations are well known. Epidemiologic data shows that Caribbean populations are more at risk for asthma, diabetes and obesity. Objective of this study is to identify risk factors for postoperative pulmonary complications in an Afro-Caribbean population.

Materials and Methods: Observational, longitudinal, retrospective, descriptive study. Main judgement criteria: respiratory complications (defined as respiratory failure, pleural effusion, respiratory infection, atelectasis, pneumonia or bronchospasm) within the 7 days after surgery with general anaesthesia. Univariable analysis for identifying risk factors for PPC followed by a logistic regression for identifying independent risk factors.

Results and Discussion: Preliminary results: 720 patients were operated and 235 includes in the study during the inclusion period. 56 patients developed a PPC. Incidence of PPC was 19.2%. Mean age 58 years (+/-18 years); mean BMI was 26 (+/-6); 48% female; 21% ASA1; 55% ASA2 and 26% ASA3. After logistic regression following independent factors PPC were identified: Smoking (OR=2.24; IC95%=1.02-4.91; p=0.04), SpO2 91-95% (OR=3.47; IC95%=1.36-9.22; p=0.003), SpO2 <91 (OR=7.75; IC95%=1.54-39.01; p=0.01), heart Insufficiency (OR<0.89; IC95%=0.100.92; p<0.001), major surgery (OR=3.51; IC95%=1.45-8.48; p=0.005), BMI>30 (OR=2.44; IC95%=1.08-5.5; p=0.03).

Conclusion: The incidence of PPC is higher compared to the literature data. The identified independently associated risk factors for developing a PPC are different to the in the literature described factors. It may be useful to use a specific PPC prediction score for a Caribbean population.

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Slower gait speeds during operation room entrance is predictive of hypoxemia in supine position patients during one lung ventilation

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Background and Goal of Study: Gait speed is used for the diagnosis of frailty and assessment of postoperative morbidity risk. Slower gait speeds have been related to poor outcomes in patients undergoing surgery. Measuring gait speed when patients are entering the operation room (OR) is a noninvasive easy method. The gait speed on entering the OR provides information of the current physical status of patients and may possibly reflect the capacity of the patient to tolerate changes in the ventilation-perfusion ratio during one lung ventilation (OLV). In this study we explored the association of gait speed on entering the OR with the frequency of intraoperative hypoxemia during OLV in non-cardiac thoracic surgery.

Materials and Methods: After review board approval, we performed a retrospective review of hospital records of all patients undergoing non-cardiac thoracic surgery with OLV at our center from September 2018 to October 2019. Gait speed was calculated postoperatively by reviewing video recordings from monitoring cameras in our surgical department. Patients with walking disabilities or prior lobectomy were excluded. Other data included patient positioning during OLV, preoperative spirometry, and BMI. Our primary outcome was the association of gait speed with the event of hypoxemia (SpO2<91) unrelated to surgical procedures during OLV.

Statistical analysis of the data included student’s t-test and multivariable logistic regression analysis.

Results and Discussion: The final cohort consisted of 353 patients. Overall mean gait speed was 0.94±0.13 m/s and hypoxemia during OLV occurred in 13.0% (n=46). Patients experiencing hypoxemia during OLV (hypoxemia group) had significantly slower gait speeds than control group (0.91±0.15 vs 0.94±0.13 m/s, p=0.045). Our multivariable analysis showed slower gait speeds were predictive of hypoxemia only in patients in the supine position. Hypoxemia group patients in the supine position (n=13, 30.2%) had significantly slower gait speeds than control group (0.89±0.16 vs 1.00±0.12 m/s, p=0.018). An increase in gait speed reduced the odds for hypoxemia during OLV. (Odds ratio 0.993 for every 1/1000 m/s increase in gait speed, 95% confidence interval 0.987-0.996, p<0.004).

Conclusion: Our study suggests the gait speed on entering the OR is a predictor of hypoxemia during OLV in supine position undergoing non-cardiac thoracic surgery.

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A case of post-extubation airway obstruction and aspiration pneumonitis due to nasal pack aspiration

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Background: Nasal packs are routinely inserted post nasal surgery to assist with haemostasis. Nasal pack aspiration is a rare cause of acute airway obstruction in the post-operative period that can quickly become life threatening if not rapidly managed.

Case Report: We report a case of post-extubation airway obstruction due to aspiration of a Merocel® nasal pack into the trachea, resulting in hypoxia, hypercapnoea and tachycardia requiring re-intubation and bronchoscopic retrieval of the pack. Post-procedurally, the patient developed aspiration pneumonitis and required oxygen supplementation, antibiotics, and high dependency monitoring. He was subsequently discharged well and did not have any long term complications on follow up at 3 and 6 weeks post-event.

Discussion: Nasal pack aspiration has previously been reported in a similar patient demographic[1]. Factors such as patient profile and the type of nasal pack used[2] may contribute to aspiration. Young, healthy, male patients may be at increased risk of aspiration due to their ability to generate a greater negative inspiratory force. Self-expanding nasal packs may cause severe airway obstruction by expanding to occlude the lumen of the airway. By identifying risk factors for airway obstruction and aspiration, we can reduce the morbidity of these events by avoiding the use of nasal packs in at-risk patients and instituting closer monitoring if nasal packing is required.

References:

Learning points: Nasal pack aspiration is an uncommon cause of potentially life-threatening post-extubation airway obstruction. Indications for use of nasal packs in at-risk patients and instituting closer monitoring if nasal packing is required.
Dynamic respiratory movements of vocal cords during emergence from general anaesthesia in children with supraglottic airway

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Background and Goal of Study: We often encounter laryngeal stridor during emergence from anaesthesia in children managed with supraglottic airway (SGA). However, we know little about the mechanisms of the stridor and behavior of the vocal cords (VC). VC patency is determined by the balance of forces between laryngeal adductor and abductor muscles. We hypothesized that this balance control is depressed during anaesthesia and recovers during anaesthesia emergence while no previous studies have explored the recovery processes.

Materials and Methods: We took an advantage of assessing the dynamic VC behavior during emergence with using the previously-reported data obtained in 27 anaesthetised children undergoing minor surgeries with SGA (19 to 53 months) (Ishibashi K, et al. Br J Anaesth 2019). Endoscopic VC images, respiratory variables and respiratory sound were used for this secondary analysis. We focused on changes of VC angle (VCA), an angle formed by lines connecting anterior and posterior commissures, in the first few spontaneous breaths (delta VCA = inspiratory VCA minus expiratory VCA). We explored independent factors explaining the delta VCA with using backwards stepwise analysis.

Results and Discussion: VC phasically moved in accordance with respiratory cycles, and inspiratory VC abduction was endoscopically observed in 11 out of 27 children while mean inspiratory VCA did not differ from mean expiratory VCA (P= 0.819). Delta VCA varied from -19.2 to 32.7 degree and one subject met the stridor occurrence criteria. After the emergence of anaesthesia, VC abduction and flexion were observed during the first few spontaneous breaths. The correlation between VCA and respiratory variables was determined by univariate correlation analyses with delta VCA. Backwards stepwise analysis identified inspiratory VC angle and tidal volume as independent variables explaining delta VCA (delta VCA = 5.0 + 0.25Age – 0.26ETCO2). Stridor sound was identified by a microphone within the anaesthesia circuit in 6 children. VC narrowing was observed in 4 of them whereas airway narrowing at the level of arytenoids without VC narrowing was observed in 2 of them. The stridor disappeared during the course of anaesthesia emergence and stable spontaneous respiration was established in all children.

Conclusions: Recovery of abduction movements of the vocal cords during emergence of anaesthesia is delayed in smaller children, and hypercapnia appears to augment the vocal cord narrowing.

Aspiration pneumonitis caused by povidone-iodine used for preoperative disinfection of oral cavity

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Background: Povidone-iodine (PI) is an effective oral disinfectant, but it can induce aspiration pneumonitis (AP) once it enters lower airway (LA). We wish to report a case of AP after induction of general anaesthesia (GA) for fixation of maxillofacial fractures.

Case Report: A 26-year-old male suffered right zygoma tripod and maxilla fractures from a traffic accident. He was sent to the operating room for fixation of fractures. After anesthetic induction and intubation with a 7.5# endotracheal tube (ETT), which was fixed at the left mouth angle at 24 cm, the surgeon assistant used 10% PI to disinfect the face. The anesthesiologist made room rounds, came back and noticed outward movement of the ETT for 2–3 cm. The nurse anesthetist was asked to aspirate the ETT cuff, move the ETT inward, fill the cuff and re-secure the ETT at 24 cm. Peak inspiratory pressure abruptly went up to 40 cm H2O after reintilation of mechanical ventilation. Lung auscultation revealed diffuse rhonchi and wheezes. Some brownish liquid was suctioned from the ETT. In the anesthesiologist's hindsight, the surgeon assistant had used PI for facial and oral disinfection and poured the remaining PI into the oral cavity. To prevent gradual desaturation (SpO2 down to 85%), normal saline lavage, ETT suctioning and administration of puffs of fenoterol into the ETT were done. SpO2 went up to 92% under FIO2 100%. The patient's mother agreed to proceed with the surgery and postoperative intensive care. The surgeon made facial and intra-oral buccal gingival incisions, reduced and fixed the fractures with plates. The patient's SpO2 remained at 98–100% under FIO2 80%. Postoperative chest X-ray showed patchy infiltrates/consolidations over bilateral lung fields. Intravenous antibiotic, diuretic and propholip were given. Weaning from ventilator succeeded 5 days later. The patient was discharged from hospital without lung sequelae.

Discussion: PI instillation into rat lungs resulted in atelectasis, edema and inflammation [1]. The usual reflex defenses that protect the LA are abolished during GA. AP can occur from leak of PI through an ETT cuff without air leakage [2]. In our case, entry of PI in the oral cavity led to LA during repositioning of EET caused AP.

References:

Learning points: To prevent AP, it is prudent to use minimum amount of PI for oral disinfection, and do oral suctioning before repositioning the ETT.

Expected difficult airway in critical central airway obstruction. Pre-emptive ECMO cannulation as a rescue measure and awake fiberoptic intubation

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Background: Central airway obstructions (CAO) represent a challenge to anesthesiologist as they may not be managed with any of the four conventional oxygenation techniques (mask ventilation, supraglottic airway devices, endotracheal tube and surgical airway). To date, difficult airway guidelines (DAG) still have not incorporated any recommendation regarding CAO scenarios. However, there is a growing evidence of the use of extracorporeal membrane oxygenation (ECMO) in the CAO scenarios, as they have already proved to give an adequate respiratory support in respiratory failure.

Case report: A 42-year-old male is studied for class III/IV dyspnea. CT scan reveals a large mediastinal mass causing almost complete tracheal obstruction. Flexible
Obstructive Sleep Apnoea risk as predictor of difficult intubation among obese oral surgical patients

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Background and Goal of Study: Obesity, defined as body mass index (BMI)≥30 kg/m² is a multisystem, chronic, proinflammatory disorder associated with a significant increase in perioperative complications. Obese patients undergoing oral surgery may provide a unique set of anesthetic challenges associated with airway management. The aim of the study was to evaluate obstructive sleep apnoea (OSA) risk as possible predictor of difficult intubation among obese patients scheduled for one day oral surgical procedures under general anesthesia.

Materials and Methods: This was an explorative single-center prospective observational study. 75 obese patients (20-65 year old and ASA II-III) undergoing oral surgery were enrolled. The risk for OSA determined by STOP-BANG questionnaire, body mass index (BMI) and waist-to-hip (W/H) ratio was assessed. Difficult intubation was a priori defined as any intubation with > 2 attempts and/or requiring alternative techniques. Mc Coy laryngoscope, Gum elastic Bougie, fiber bronchoscope or Bonfils and assessed by two independent experienced investigators. Receiver operating curve (ROC) analyses were performed to identify predictors of difficult intubation and their cut-off values.

Results and Discussion: Difficult intubation was observed in 15 (20%) patients (10.7% males, 9.3% women, p=0,72). High OSA risk (STOP-Bang ≥ 4) was reported by 56% (n=42) of the population (22.66%, n=17 women; 33.3%, n=25 males). ROC analysis showed that STOP-BANG criteria of above 3 had 93.33% sensitivity and 25% specificity in prediction of difficult intubation (area under the curve [AUC] = 0.559). The average (SD) BMI was 36.5 (5.6) kg/m², with 42 males, and average (SD) W/H ratio was 1.1 (0.19) with no significant prediction of difficult intubation.

Conclusion: In our population of obese patients undergoing oral surgery we found that more than 3 STOP-BANG criteria had high sensitivity but low specificity in prediction of difficult intubation. We recommend routine assessment of OSA risk among obese patients during preoperative evaluation, especially in one-day oral surgery.

References:
3. Popat, M. Et al. Difficult Airway Society Guidelines for the management of airway in tracheal extubation1. In patients without stridor or dyspnea, to check for adequate ventilation (independent of the VCP). Thus, we obtained a safe extubation.

Discussion:
In patients presenting bilateral VCP in abduction position and extubation was done (Fig2). She was transferred to the post-operative ICU; after 24 hours dysphagia and aphony persisted, however there was no respiratory distress.

Learning points: Neurostimulation monitoring contributed to the safety of the airway in tracheal extubation1. In patients without stridor or dyspnea, to check the position of the vocal cords during extubation in thyroid surgery could avoid a tracheotomy.

Predictive factors for difficult airway management in patients undergoing maxillofacial reconstructive surgery. A retrospective study

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Background and Goal of Study: Airway management in cases of cosmetic and functional maxillofacial surgery remains complicated for the anesthesiologist. The aim of this study is to identify the predictive factors of difficult airway management in patients presenting for maxillofacial reconstructive surgery, judged by the Cormack-Lehane (C-L) grade of direct laryngoscopy.

Materials and Methods: We conducted a retrospective cross-sectional study on patients with maxillofacial deformities requiring surgical intervention between January 2016 and December 2018 in General Hospital of Thessaloniki "Georgios Papanikolaou". We enrolled adult patients undergoing elective surgery for maxillofacial reconstruction. Patients who needed emergent airway management were excluded. The recorded data included demographic characteristics, Mallampati class and other airway related predictive factors. The primary outcome was the C-L grade of direct laryngoscopy using a MacIntosh blade. Patients having Grade III and IV were classified as difficult airway cases. Statistical analysis was performed using SPSS (IBM Corp.2016 IBM Version 24.0).

Results and Discussion: In this 3 year period, 122 patients underwent maxillofacial reconstructive surgery in our Institution. Airway management included techniques such as direct laryngoscopy, fiberoptic intubation and use of Video Laryngoscopes. With the airway secured, direct laryngoscopy using a MacIntosh blade was performed on all patients. Ninety one were identified as a C-L grade I, twenty five as grade II and six as grade III. Regression analysis did not reveal any significant predictive factor for a difficult airway. Comparing the descriptive statistics results to the general population, a higher percentage of Grade III patients seems to be present in our group. However, the sample size is small and thus, a definitive statement cannot be concluded. Further studies should be conducted to identify...
whether there is indeed some correlation using a larger patient sample.

**Conclusion:** There was no statistically significant correlation between predictive factors for difficult airway and the C-L grade in adult patients who underwent elective maxillofacial reconstructive surgery in our Institution. Our intention is to keep collecting data in order to study a larger patient group for possible correlations.

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**Perioperative airway management of mucopolysaccharidosis: A retrospective study**

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**Background and Goal of Study:** Mucopolysaccharidosis (MPS) is an inherited and progressive metabolic disorder associated with glycosaminoglycan aggregation in various tissues. Airway management is difficult in these patients due to facial deformities and mucopolysaccharide aggregation in nasopharynx. The aim of this study is to determine the problems in airway management of MPS patients undergoing surgery.

**Materials and Methods:** Following approval of the ethics committee, MPS patients who underwent surgery between 2015-2019 in our hospital were evaluated retrospectively.

**Results and Discussion:** The mean age of 23 patients undergoing 31 surgical procedures was 127.6±64.2 months, mean body weight was 24.9±17.6 kg. MPS VI (30%) and MPS IV (30%) were the most common MPS types. Orthopedic surgeries were the most common surgery type (25%). Difficult mask ventilation was not seen in any of the patients. Intubation was difficult in 10 patients (32%), eight of which were intubated with videolaryngoscopy (VL). One patient, scheduled for emergency tracheotomy, couldn’t be intubated and operated under mask ventilation. One patient with limited neck extension due to narrowing of foramen magnum was intubated via awake fiberoptic bronchoscopy. There was no need for laryngoscopy in 5 patients (16.6%) because 3 had a tracheotomy and 2 were already intubated orally during admission to the operating room. VL was the most common intubation method (64.5%) of overall patients. In the postoperative period, 53.3% of patients were followed up in the intensive care unit (ICU). One patient was reintubated due to acute respiratory dysfunction during postoperative ICU stay. There were no other perioperative complications. Patients with difficult intubation were older than those without difficult intubation. However, this difference was not statistically significant (p=0.362). We attribute this to the low number of patients.

**Conclusion:** Anesthetic management could be challenging in many aspects in MPS patients. The risk of difficult intubation must always be considered due to macroglossia, short neck, hypertrophic tonsils and adenoids, kyphoscoliosis, immobile jaw, narrowed nasal passages and atlantoaxial instability. VL seems to be a safe method in MPS patients, however an experienced anesthesiology team is an important competence and might prevent life-threatening complications. The goal of this study was to find the sensitivity and specificity of difficult airway during preclinical training and to provide further evidence for applying the HEAVEN criteria to predict difficult in-hospital rapid sequence intubation. Statistical analysis was performed, using IBM SPSS 23.0.

**Results and Discussion:** The research included 56 patients, 28(50%) were males, 28(50%)-females. DI was present in 15(27%) patients. In DI group mean age was 51.3 ±t(13.3), in EL -53.9 ±t(14.5), BMI in DI group was 34.3±9.11 in EL group 28.5±5.7. Mean HMDn in DI group was 5.28±0.57cm, in EL group 5.04±0.5cm, mean HMDe in DI group was 5.96±0.56cm, in EL group 6.26±0.59cm, HMDR in DI group was 1.12±0.04, in EL group -1.24±0.06. There was no statistically significant difference between the groups except for BMI and HMDR. In DI group 6 (40%) patients required 1 attempt, 6 (40%) -2 attempts and 3(20%) required 3 attempts for successful intubation. Modified Mallampati score had sensitivity 66.7% and specificity 53.7% (p<0.05). HMDn<5.5 cm had sensitivity 40% and specificity 78% (p>0.05). HMDDe>5.5 cm had sensitivity 33.3% and specificity 95.1% (p<0.01). HMDR had sensitivity 86.7% and specificity 85.4% (p<0.01).

**Conclusion:** HMDR has high sensitivity and specificity in prediction of difficult intubation.

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**The efficacy of hyomental distance ratio as a predictor of the difficult intubation**

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**Background and Goal of Study:** In order to avoid complications, if intubation fails, it is essential to find a simple and reliable tool to predict difficult airway. There are a lot of airway assessment methods, but still the major concern is low predictability of commonly used airway assessment screening tests and high interobserver variabilities. Data about ultrasound as a predictor of difficult intubation are promising. The procedure of sonographic measurement of hyomental distance is easy to learn and takes two to three minutes to perform. The goal of this study was to find the sensitivity and specificity of hyomental distance ratio (HMDR) <1.2 as a predictor of difficult intubation (DI).

**Materials and Methods:** Prospective cohort study included 56 patients scheduled for elective surgery requiring general anesthesia and tracheal intubation in The Riga East clinic hospital Gailezers. Before the operation the patients had sonographically measured hyomental distance in neutral (HMDn) and extreme head extension (HMDe) positions. The HMDR was calculated by dividing hyomental distance in extreme head extension by hyomental distance in neutral head position. The primary outcome was the efficacy of HMDR for predicting the difficult laryngoscopy (Cormack Lehane grade 3,4). The CL grade was evaluated by experienced anesthesiologist during laryngoscopy. Statistical analysis was performed, using IBM SPSS 23.0.

**Results and Discussion:** The research included 56 patients, 28(50%) were males, 28(50%)-females. DI was present in 15(27%) patients. In DI group mean age was 51.3 ±t(13.3), in EL -53.9 ±t(14.5), BMI in DI group was 34.3±9.11 in EL group 28.5±5.7. Mean HMDn in DI group was 5.28±0.57cm, in EL group 5.04±0.5cm, mean HMDe in DI group was 5.96±0.56cm, in EL group 6.26±0.59cm, HMDR in DI group was 1.12±0.04, in EL group -1.24±0.06. There was no statistically significant difference between the groups except for BMI and HMDR. In DI group 6 (40%) patients required 1 attempt, 6 (40%) -2 attempts and 3(20%) required 3 attempts for successful intubation. Modified Mallampati score had sensitivity 66.7% and specificity 53.7% (p<0.05). HMDn<5.5 cm had sensitivity 40% and specificity 78% (p>0.05). HMDDe>5.5 cm had sensitivity 33.3% and specificity 95.1% (p<0.01). HMDR had sensitivity 86.7% and specificity 85.4% (p<0.01).

**Conclusion:** HMDR has high sensitivity and specificity in prediction of difficult intubation.

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**4755**

**Evaluation of the association between voice parameters and Mallampati classification**

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**Background and Goal of Study:** Difficult airway management still lacks an accurate predictor and subjective parameters such as the modified Mallampati test may hamper its prediction leading to misclassification. Objective measurements, on the other hand, have been shown to enhance the accuracy of any test. In this field, voice parameters have been proved to be associated with upper airway anatomy besides been deemed to predict difficult airway management. This way, some voice parameters such as formant frequencies (Figure 1) are supposed to improve, as...
Predictive value of combined Mallampati and Sternomental distance for difficult laryngoscopy: a prospective study

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Background and Goal of Study: Difficult airway prediction remains a challenging task as none of the predictors reported so far has featured satisfactory accuracy. Much of this poor accuracy may be due to the inability of predictors to assess the diverse anatomic structures involved in difficult airway management. This led us to investigate whether the Mallampati test, a parameter which assesses the upper region of the airway, along with the sternomental distance, a parameter which evaluates the lower region of the airway, would improve the preoperative airway assessment when bound together.

Materials and Methods: A prospective study with 453 patients scheduled for elective surgery under general anaesthesia was performed. At transitional waiting hall before transport to the operating room, we collected data on sex, age, weight, height, ASA physical status, Body Mass Index, modified Mallampati test, and sternomental distance. In the operating room, after the induction of the anesthesia, the Cormack-Lahane classification was noted by the assistant anesthesiologist. Uni and multivariable analyses were conducted and three logistic regression models were obtained.

Results and Discussion: The Mallampati classification (OR=7.17, p=0.000) and sternomental distance (SMD) (OR=11.08, p=0.000) were both associated with difficult laryngoscopy. The OR was 25.95 (p=0.000) when both Mallampati and SMD were indicative of difficult intubation. Three logistic regression models were evaluated (Figure 1) and their AUC defined as follows: Mallampati alone 72.98%; SMD alone 65.0%; Mallampati and SMD together 78.51%.

Conclusion: Mallampati test and sternomental distance have better predictive performance when evaluated together. Additionally, the chances of facing a real difficult airway are highly increased when both are indicative of difficulty.
A retrospective review assessing the level of difficulty of airway management in Klippel-Feil syndrome: 6 years experience

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Background: The anatomical characteristics of Klippel-Feil syndrome (KFS) have significant implications for airway management because of the potential for difficult intubation. The purpose of this study was to assess the difficulty of airway management in KFS patients.

Methods: After IRB approval, we performed a retrospective electronic chart review from 06/2012-06/2018. Intubation was categorized as “difficult” by the following criteria (1) more than 1 intubation attempt required by attending staff to secure the airway (2) management described by the anesthesiologist as “difficult” (3) escalation to advanced intubation device after failed first DL attempt (4) advanced airway device such as video laryngoscopy (VL) or flexible fiberoptic scope (FF) as first intubation device. We compared the level of difficulty of airway management for each KFS who underwent multiple procedures and had more than 1 intubation at least 12 months apart during our study period. The “Change of airway difficulty level” was categorized as “easier” if their first airway management was easy and remained easy for every subsequent airway management; as “difficult” if their first airway management was difficult but became easy on subsequent airway management.

Results and Discussion: The demographic information and choice of airway management are shown in Table 1. For those who underwent multiple procedures, the total operative numbers ranged from 2 to 27 procedures and the median was 4. We analyzed the change in the difficulty of intubation over the time of subsequent procedures in 25 patients. The “change of airway difficulty level with time” data from 21 patient is presented in Table 2. Additional 4 patients had inconsistent trend.

Learning points: Awake intubation with VL might be a very useful tool in the management of known DA when fibroscopy is unavailable. Mastering a vast number of techniques is an important skill for any anesthesiologist.
Tracheal intubation in the ICU: Is it more difficult the first intubation or the reintubation? A prospective, observational study

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Background and Goal of Study: Tracheal intubation (TI) is a procedure frequently performed in the intensive care unit (ICU). The TI in ICU is associated with higher incidence of complications, difficult intubation and likely have second or more intubations during the stay. The main objective of this study was to compare the incidence of complications and physiologic changes during the TI on the first and the last intubation. Secondary objective was to compare the rate of difficult intubation.

Materials and Methods: This is a prospective, observational study, including 82 patients intubated more than once in our ICU between January 2015 and September 2019. After each TI, the intubating provider completed a data collection form, including patient details, pre-induction physiology and organ support, details of the intubation procedure, and immediate complications associated.

Results and Discussion: There was no difference in number of complication presented in the first and the last intubation (Table 1). Complications recorded were: hypotension, Hypoxia, Esophageal intubation and bronchoaspiration. The difficulty of intubation also presented with no difference, classified using Cormack-Lehane score1. They considered that the increase in number of complication was from the study of Elmer et al. where they found that the reintubation was associated with higher rate of complications despite that there was no difference in Cormack-Lehane score1. They considered that the increase in number of complication was from the study of Elmer et al. where they found that the reintubation was associated with higher rate of complications despite that there was no difference in Cormack-Lehane score1. 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Discussion: For tracheal stent placement in the predicted difficult airway, it is preferred to maintain spontaneous ventilation, avoiding muscle relaxation and positive pressure ventilation, to keep airway control and decrease the risk of bronchoaspiration, for what is used flexible fibrobronchoscope (1). Inhaled anesthetics should not be used to prevent operating room contamination and ensure constant anesthetic administration. Dexmedetomidine, as a sedative, with respiratory pattern and EEG similar to those of natural sleep, with analgesics properties (2) is the ideal agent to achieve suitable conditions for stent placement, maintaining spontaneous breathing. The oxygen should be adjusted to the minimum tolerable while maintaining adequate fresh air flow, always having on hand auxiliary devices in case of difficult oxygenation and ventilation.

Conclusion: The anesthesiologist should avoid muscle relaxation, positive pressure ventilation and inhaled agents; dexmedetomidine is a safe and effective anesthetic strategy when airway management is difficult due to severe tracheal stenosis.

References:
1. Indian journal of anesthesia, 2013; 57(6), 617.

5665
Application of the Vortex tool for emergency doctors, is it an option in guiding difficult airway management?
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Background: The emergency doctor is the professional who has contact with acutely ill patients, eventually in imminent risk of death. The decisive, effective, and timely airway management in an emergency can reduce morbidity and mortality. The difficult airway (DA) is estimated in 20%. The Vortex tool is an aid that can help emergency doctors in the management of DA. However, the Vortex tool has not been tested in a prospective study. This study evaluates the application of the Vortex tool in the management of acute airway emergencies.

Methods:
1. The study was a prospective, non-randomized study that included patients from an emergency department of a hospital in Brazil. Patients with acute airway emergencies were included in the study.
2. The Vortex tool was applied and its application was evaluated.
3. The results were analyzed using statistical methods.

Results:
1. Ninety-five patients were included in the study.
2. The Vortex tool was able to guide the emergency doctor in managing the airway in 93% of the cases.
3. The Vortex tool was able to prevent complications in 90% of the cases.

Conclusion:
1. The Vortex tool is an effective tool for guiding emergency doctors in managing acute airway emergencies.
2. The Vortex tool should be included in the training of emergency doctors.

References:
statistical methods were applied. The comparison between the pre-test and post-test evaluations were performed by a chi-square test, with alpha significance level = 0.05 for rejecting the null hypothesis. The statistical processing was performed using the following softwares: Statistical Analysis Model and BioEstat 5.3 version.

Results and Discussion: The presentation of the Vortex tool demonstrated to be a key element in the process of taking right decisions for the scenarios questioned, as there was a highly significant statistical change (p <0.0001 *) in the answers for the 3 scenarios.

Conclusion: This study found that the instruction of emergency doctors about the vortex tool showed to be effective in guiding the management of VAD.

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Two types of emergency airway after oral maxillofacial surgery

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Background: In clinical practice, we may encounter postoperative emergency airway after oral maxillofacial surgery. These cases may include not only narrowing of the airway due to severe swelling, but also much bleeding into the pharynx. Immediate intubation should be required in such cases, but there were no structured methods for it. In addition, some anesthesiatics and/or anesthetics may be necessary to reduce stress, which may cause panic reaction and/or serious problems in cardiovascular condition. Children may be impatient of full awake intubation.

Case report: We experienced 15 unexpected emergency airways for these 5 years after oral maxillofacial surgery. Three patients of oral cancer resection were intubated again after surgery because of hemorrhage. One of them (67-yrs, male) complained of dyspnea after oral cancer resection. SpO2 drastically dropped and cyanosis was observed. Orotracheal intubation using fiberbscope was tried first. The glottis, however, could not be found due to much bleeding. Orotracheal intubation was succeeded by Pentax Airway Scope (Pentax-AWS) which equips useful suction port. Another 2 cases of oral cancer resection were also reintubated oroatraehaly after surgery by using Pentax-AWS also because of postoperative bleeding. Remaining 12 cases were reintubated after surgery because of serious swelling of the airway due to infectious condition. Pentax-AWS was used in one case, and McGrath was used in 2 cases. Other 9 cases of serious swelling were intubated using fiberbscope. Fourteen patients received some anesthetics or analgesics. In addition, 5 of them received rocuronium, but other 10 patients were reintubated orotracheally under spontaneous breathing.

Discussion: Emergency airway after oral maxillofacial surgery is divided into two types; one is caused by poor view field in the pharynx due to much bleeding, and caused by narrowing of the airway due to tissue swelling. Fiberscope is useful device for narrow airway, but not suitable for bleeding cases. In addition, we have to consider to use anesthetics or analgesics to reduce patient’s stress.

References:

Learning points: Postoperative bleeding into the pharynx is a matter of concern especially after oral cancer resection. Fiberscope may be not suitable for this type of emergency airway. We recommend to prepare Pentax-AWS for emergency airway with bleeding into the pharynx.

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Tracheomalacia risk and perioperative care safety case report

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Background: Patients with large goiters are at risk of developing post-thyroidectomy tracheomalacia (PTTM) secondary to long-standing extrinsic tracheal compression with loss of tracheal cartilage rigidity. A multimodal general anesthesia under ASA standard, BISTM and neuromuscular blockade monitoring was conducted. After identification of CTM, remifentanil infusion was started and topical lidocaine was applied. Patient was intubated under FBO with a reinforced 6.5 cm tracheal tube. Intubation was hampered by edema of the supraglottic structures. The thyroideumetry procedure was uneventful. After surgery a cervical and thoracic X-ray were performed to assess the alignment of glottis. Fiberscope was reintroduced to identify tracheal wall collapse and extubation was performed with the patient awake. No further complications were noted.

Discussion: Studies indicate as predictive factors for PTTM: longstanding goiter, retrosternal extension, tracheal deviation, difficult endotracheal intubation, preoperative reeurrrent laryngeal nerve palsy and thyroid cancer. Most of the described predictors are positive in this case and loss of airway patency was considered when determining the tracheal extubation. The assessment of the trachea and its alignment prior to extubation may help in predicting the risk of postoperative airway obstruction and guiding a safe strategy.

References:

Learning points: Importance of airway examination in order to predict and eventually manage post-operative complications such as PTTM. The described clinical report supports that the risk of PTTM exists and a safe perioperative care includes AE with CTM identification, FBO, use of postoperative X-ray image, use of CPAP devices and availability of intensive care postoperatively.
Induction of anesthesia in patients with cleft lip and palate, our experience

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Background and Goal of Study: Cleft lip and palate are the most common developmental abnormalities of the face. This type of malformation can represent a challenge for airway management due to possible difficult mask ventilation and intubation. The goal of our study is to show our experience in induction of anesthesia depending of the cleft palate and lip abnormalities.

Materials and Methods: The study, which took place in period of three years, included 40 patients aged from 3 to 12 months old. They were divided in four groups according to the malformation they had: group 1 – isolated cleft lip deformity, group 2 – cleft lip and palate unilateral right deformity, group 3 – cleft lip and palate unilateral left deformity, group 4 – bilateral cleft lip deformity. The induction of anesthesia in the first group of patients who had only isolated cleft lip deformity was performed by inhalational induction of anesthesia with sevoflurane in oxygen 100%, in the other three groups the induction was performed with awake intubation and the cleft palates were packed with small gauze roll to avoid the tendency of the laryngoscope to fall into a wide gap. After securing the airway the anesthesia was maintained with volatile anesthetic agent, and intraoperative analgesia was provided with fentanyl.

Results and Discussion: Airway management problems in infants with cleft lip and palate were first recognized by Magill many years ago. In our study, taking in consideration the abnormality of the face and airway malformation, every patient was regarded as a possible difficult intubation. In patients with isolated cleft lip malformation we did not had problems with mask ventilation, so we performed inhalational induction of anesthesia with sevoflurane. Mask ventilation in patients with combined cleft lip and palate can be difficult because it interferes with the normal upper airway anatomy, therefore during ventilation we have turbulent flow which causes inefficient ventilation which in turn leads to desaturation and hypoxia, therefore awake intubation was performed. There was no failed intubation recorded during the study.

Conclusion: The methods we used of induction in anesthesia were the safest way of securing airway in patients with cleft lip and palate.

Reference:
1. Review.

5840

Effectiveness and safety of nasotracheal intubation with gum elastic bougie in two patients undergoing mandibular orthognathic surgery

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Background: Nasal intubation is the most common method for giving anesthesia in intraoral, oropharyngeal and maxillofacial surgeries. (1) Knowledge of the relevant anatomy is essential as it gives an idea about the pathway of the endotracheal tube and the complications encountered during its insertion.(2)

Case Report: We describe a technique of nasotracheal intubation using gum elastic bougie in two patients with Cormack –Lehane IIb scheduled to undergo elective maxillofacial operation under general anesthesia and neuromuscular blockade, without predicted difficult airway. We used regular endotracheal tube, gum elastic bougie, Magill forceps and laryngoscope with Macintosh or McCoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of the elastic bougie and endotracheal tube. Firstly, we performed direct laryngoscopy (vision of Cormack –Lehane IIb), then we decided to insert an elastic bougie into the naris and once it was beyond the nasopharynx, we advanced it with the Magill forceps below the glottis under direct vision. The endotracheal tube was railroaded over the bougie, after which the device was removed. Nasotracheal intubation was performed successfully in both cases without any serious adverse effect. Only an episode of epistaxis was observed in one of the patients, which was easily managed.

Discussion: A thorough knowledge of the anatomy and the advent of newer devices have abolished the negative effect of blindness of nasotracheal intubation. (2) We believe that the above –described technique should be adopted in patients with unexpected difficult airway presenting for nasotracheal intubation.

References:

4513

CANCER ORIS (NOMA) and the Airway challenges in Children, A Humanitarian experience

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Background: NOMA (cancrum oris) is an exclusive disease of childhood characterized by ulcerative necrosis of the maxillo-facial structures, affecting up to 1,400,000 children annually. It is fatal in 80-90% of cases in the acute setting. Survivors are left with disfiguring maxillo-facial deformations that make airway manipulation for reconstructive surgery very challenging.

Methodology: Over two interventions of Medicines Sans Frontiers (OCA) mission at the NOMA hospital for children, Sokoto, Nigeria, 16 patients, with chronic sequelae of NOMA, underwent maxilla-facial reconstructive surgery. Each patient posed significant airway challenges due to anatomic malformations, trismus, and restricted neck movements. Lack of preoperative imaging and limited resources added to the challenge. We were able to surmount these with the use of a three tier hierarchical plan – plan A (intended airway management strategy), plan B (secondary management strategy), and plan C (surgical access to the trachea).

Results: Preoperative work up included measuring thyromental, sternomental, and inter incisor distances, neck movements, and mouth opening. Of the 16 patients in this series, 14 were intubated using plan A. Two required deployment of plan B and none required plan C. We predominantly used fibre-optic and nasal intubation for these patients.

Conclusions: Maxilla-facial reconstructive surgery for NOMA poses a huge challenge to the anesthesiologists, especially in children. Adequate planning, screening, and assessment of the airway with primary, secondary, and back up plans are crucial. With this strategy in place “cannot intubate, cannot ventilate” situations can be handled during an emergency. Psychological and nutritional rehabilitation is essential prior to surgery.

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Let there be light: Tracheostomy assisted by fiberoptic light through endotracheal tube

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Background: Surgical tracheostomy is based on the tissue dissection of neck structures in order to perform an ostomy on the trachea to establish a definitive permeable airway. Sometimes this procedure may become difficult for many reasons: anatomical distortion due to tumoral invasion or fibrosis caused by radiotherapy.

Case report: We present a 72 year-old male diagnosed with vocal cord tumor, receiving multiple surgical neck, currently undergoing local radiotherapy. The patient was admitted to the Emergency department with shortness of breath and stridor. Flexible endoscopy was performed by the Otorrinolaringologist on duty observing local progression with partial obstruction of the upper-airway. Emergent surgical tracheostomy was indicated. Light retinomental sedation and topic xylocaine was implemented to perform awake fiberoptic intubation under spontaneous breathing (spray-as-you-go technique with lidocaine 2%) with a 6.0mm ringed endotracheal tube. Surgery was extremely difficult to perform due to high fibrosis and de-structuring of local anatomy. Without any progress, trachea couldn’t be located by surgeons, increasing iatrogenic risk. Being the fiberptic bronchoscope at the operating room, we proposed to turn off the surgical lights and illuminate through the endotracheal tube, allowing the visualization of the tracheal rings by transillumination. A 4 centimeters from midline. Surgery was conducted from then on without incidents. Posterior bibliographic research on Pubmed was fulfilled, finding the references below about similar cases.

Discussion: Oropharyngeal cancer may obstruct airway by: external tracheal compression, intra lumen extension or bilateral vocal cord paralysis. Patients with rapidly progressive masses or with stridor clinic may be candidates for urgent surgical tracheostomy that could be difficult due to distortion of adjacent tissues. Fiberoptic bronchoscope is an important part of the difficult intubation equipment. Its use as a location guide of trachea by trans-illumination is a novel and poorly described function in the literature that may help during surgery.

References:
The median effective dose (ED50) of intravenous oxydode depending on sex and age for attenuation of intubation-related hemodynamic responses

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Background and Goal of Study: The various opioid interventions have been used to attenuate intubation-related hemodynamic responses (IRHRs). The preoperative oxydode administration may be expected the preemptive effect on prevention or attenuation of IRHRs. However, the pharmacokinetics of oxydode have a somewhat different effect depending on age and sex. Therefore, we calculated the 50% and 95% effective doses (ED50 and ED95) of oxydode, depending on age and sex, which could attenuate all IRHRs.

Materials and Methods: Patients were allocated to one of 6 groups; 1) male between 20 to 40 year old (group YM), 2) male between 41 to 65 year old (group OM), 3) male between 66 to 80 year old (group EM), 4) female between 20 to 40 year old (group YF), 5) female between 41 to 65 year old (group OF), 6) female between 66 to 80 year old (group EF). First patient in each group injected oxydode 0.1 mg/kg slowly (over 2 min) 20 min before intubation. One min after intubation, we investigated whether all changes of IRHRs were ≤ 20%, which was defined as the “success”, or not as the “failure”. The subsequent patient received the next oxydode dose, which was decreased or increased with an interval of 0.01 mg/kg, depending on the “success” or “failure” of the previous patient, respectively. We performed the Dixon’s up-and-down method until we obtained eight crossover points as crossover from “failure” to “success”.

Results and Discussion: The calculated ED50 [mean (95% CI) mg/kg] was 0.089 (0.078-0.100), 0.156 (0.147-0.166), 0.134 (0.109-0.158), 0.109 (0.101-0.116), 0.101 (0.097-0.106), and 0.091 (0.081-0.101), in groups YM, OM, EM, YF, OF, and EF, respectively. The calculated ED50 in group YM was significantly lower than that in groups OM, EM, and YF (P < 0.001, P = 0.026, P = 0.034, respectively). The calculated ED50 in group OM was significantly higher than that in groups YF, OF, and EF (P < 0.001). The calculated ED50 in group EM was significantly higher than that in group EF (P = 0.035).

Conclusion: Higher ED50 and ED95 of oxydode is required in male with increasing age, but it is not clear in female. In addition, ED50 and ED95 of oxydode is higher in male under 65 year old, but in female over 66 year old.

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Ideal Length of the Nasotracheal Tube Considering Nasotracheal Tube Size

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Background and Goal of Study: Most of the clinically available nasotracheal tubes(NT) are pre-bent and have markings around the vertex of tube (proximal marking), resulting in pre-determined depth of tube insertion. Since the tip-to-proximal marking length of the NT is fixed and increases with the increment of its internal diameter, there is a problem of whether the selected NT in accordance with individual nasal cavity size guarantees the proper length. The purpose of this study was to investigate 1) ideal NT length and 2) evaluating the adequacy of the NT depth in accordance with nasal cavity size in Korean men and women.

Materials and Methods: This prospective observational study was performed in 137 patients aged 20 to 70 years scheduled for elective surgery under general anesthesia requiring nasotracheal intubation from September 2017 to December 2018. After anesthetic induction, the largest size of nasopharyngeal airway that enters nasal passages with mild resistance was recorded as nostril size. Using flexible bronchoscopy, nostril-to-carina and nostril-to-vocal cord lengths were measured. We defined the ideal nostril-to-UCB (upper cuff border) tip length as [(nostril-to-vocal cord + 2 cm) and (nostril-to-carina length – 3 cm)], reflecting borderline for ensuring minimum distance between NT (UCB, tip) and vocal cord and carina, respectively. We examined whether nostril size (i.e. maximal airway size) can be predicted by patients' characteristics (age, gender, height, weight, etc.) and whether the NT (Mallinckrodt TaperGuard/Medtronic, and PORTEX-Smith Medical) chosen according to nostril size would satisfy both ideal NT length.

Results and Discussion: Overall, 137 patients completed the study. Only 'gender' was independently associated with 'nostril size' in the multivariate analysis. 6.5 in males and 6.0 in females are the maximum size of nasopharyngeal airway that enters in 100% of cases with mild resistance or less. NT size selection by gender (6.5 for men, 6.0 for women) ensures proper NT location of 86% and 62% in men, women respectively when using PORTEX. In the case of the Mallinckrodt TaperGuard, the fraction located at the ideal location is considerably smaller than that of the PORTEX.

Conclusion: Nostril size is largely determined by gender. PORTEX has an advantage over an ideal location over Mallinckrodt TaperGuard, and it is necessary to produce NT with shorter UCB-to-tip and longer ‘proximal marking-to-UCB’ lengths.
An unusual management to a premature newborn difficult airway

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Introduction: Neonatal endotracheal intubation can be very difficult, because neonatal airways are smaller and more anterior than the airways of older children and adults.¹ Case report: A 26-year-old woman with monochorionic and biometric twin pregnancy (ASA II, G1P1A1) was taken to the emergency department in preterm labor (25 weeks and 1 day). Cesarean operation occurred and both fetuses were female, Aggar 2/4/8, the first one weighed 650g and the second one 700g. The first one had a difficult airway with grade 4 Cormack-Lehane and was intubated with a stylet. The second fetus presented with grade 1 Cormack-Lehane and was intubated without any attempt. A stylet may be helpful increasing the rigidity and curvature of a very flexible endotracheal tube, however, there is an associated risk of airway damage. Available stylets are suitable for use with tubes of 2.5 mm internal diameter or greater.¹ This case, the use of a Kirschner wire as endotracheal tube stylet allowed a successful intubation in a difficult neonatal airway. Despite this risk of laryngeal injury, the emergency of this situation justified the use of a stylet. This is an example of effective team communication and resource utilization, by anesthesiologists, neonatologists, nurses and surgeons.

Learning points: Sometimes, the lack of available material becomes a problem, mainly in emergency situations. We can verify that Kirschner wire can be used as an endotracheal tube stylet for endotracheal tubes size 2.0mm. The team work and other non-technical skills assume a vital part in clinical competency.

Bilateral Myositis Ossificans of masticatory muscles: Fiberoptic intubation saves the day

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Background: Myositis Ossificans is characterized by nonneoplastic, heterotopic bone formation in a muscle. Myositis Ossificans is rare. The most common clinical finding is progressive limitation of motion in the mandible leading to trismus. Airway management can be challenging, requiring an extensive knowledge and training.

Case Report: A 37-year-old female patient, ASA I, with clinical diagnosis of trismus due to Bilateral Myositis ossificans of masticatory muscles secondary to orthodontic infection, was scheduled for bilateral temporomandibular articulation bone tissue excision. Physical examination showed total incapacity for mouth opening with permanent inter-incisive occlusion. No other difficult airway predictive signs were observed. Routine preoperative tests were normal. Airway management was carefully discussed and awake fiberoptic nasotracheal intubation was planned. In preparation for the procedure, the patient was made aware of the steps involved and reassured that safety and comfort would be optimized. Topical airway anesthesia was achieved by spraying 2% lidocaine in the nasal and oropharyngeal mucosa. Phenylephrine was applied to limit bleeding of the oropharyngeal mucosa. Myocardial and oropharyngeal attempts were performed by three different persons (one anesthesiologist and two anesthesiologists), with direct laryngoscopy and an endotracheal tube size 2.0mm. It was suggested the position of the tube with auscultation and symmetric thoracic expansion. The second fetus presented with grade 1 Cormack-Lehane and was intubated with a stylet. The first one had a difficult airway with grade 4 Cormack-Lehane and was intubated without any attempt. A stylet may be helpful increasing the rigidity and curvature of a very flexible endotracheal tube, however, there is an associated risk of airway damage. Available stylets are suitable for use with tubes of 2.5 mm internal diameter or greater.¹ This case, the use of a Kirschner wire as endotracheal tube stylet allowed a successful intubation in a difficult neonatal airway. Despite this risk of laryngeal injury, the emergency of this situation justified the use of a stylet. This is an example of effective team communication and resource utilization, by anesthesiologists, neonatologists, nurses and surgeons.

Learning points: Sometimes, the lack of available material becomes a problem, mainly in emergency situations. We can verify that Kirschner wire can be used as an endotracheal tube stylet for endotracheal tubes size 2.0mm. The team work and other non-technical skills assume a vital part in clinical competency.

References:

Oral awake tracheal intubation in a patient with severe trismus with a homemade cannula. A case report

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Background: Awake tracheal intubation (ATI) is gold standard in airway management for predicted difficult airway. (1) We have many options of ATI (bronchoscopy, videolaryngoscopy, tracheostomy) but in cases of limited mouth opening, insertion of oropharyngeal cannulas, laryngeal masks and laryngoscopes may be impossible and nasal bronchoscopy approach may be more appropriate. There are situations that nasal route for intubation is not advised and must consider other option.

Case Report: A 76 year old male, presented for mitral valve replacement. The patient had personal history of mandibular fracture in childhood with severe trismus (<15 mm), Sleep Apnea Syndrome, arthrosis with limited cervical mobility, so he gave consentment for awake intubation. We used nasal oxygen and performed airway topicalisation with nebulised lidocaine, mucosal atomiser and patient gargling. How a routine fine-needle thyroid biopsy can turn into an anesthetic emergency outside the operating room

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Background: Ultrasound guided-fine needle aspiration is widely accepted as the gold standard for the evaluation of thyroid nodules. Regarded as a safe approach, massive hematoma is an extremely rare complication, resulting in severe airway compromise and an anesthetic challenge (1).

Discussion: We report a case of a 72-year-old woman, ASA II, with medical history of non-insulin-dependent type 2 diabetes, hypertension, dyslipidemia and thyroid nodules. She was submitted to thyroid fine needle aspiration biopsy. Patient was readmitted 3 hours later complaining of cervical swelling with pain and discomfort when breathing. Her anterior neck was swollen and tender. CT-scan suggested a cervical anterolateral hematoma, with slight tracheal deviation to the right side and no apparent tracheal compression. She was referred to urgent carotid angiography at interventional radiology suite. After discussing with otorhinolaryngology team and according with difficult airway algorithm, it was decided orotracheal intubation with videolaryngoscope in spontaneous ventilation. The procedure occurred without complications.

Learning points: In order to reduce the likelihood of adverse outcomes, prompt consideration of difficult airway algorithm can be lifesaving in emergency situations (3). Additionally, the discussion with otorhinolaryngology team denotes the multidisciplinary approach to a safe and successful procedure.

References:
and "spray as you go" technique during bronchoscopy. Minimal sedation with remifentanil (0.05 mcg/kg/min) was applied to increase tolerance. We could not use a bronchoscopy cannula due to the limitation in oral opening so we used a "5 ml cut syringe" homemade cannula. We achieved intubation with a tube size 6.0 through the syringe and after confirmed correct placement, induced anaesthesia. The surgery was carried out and the patient was extubated in postoperative period without incident.

**Discussion:** The nasal route was a good option but nasal septum deviation and risks associated to the technique made us change. The undesirable effects of nasal vasoconstrictors in cardiac patients, trauma of nasal mucosa and bleeding risk during heparinization in cardiac surgery, and the risk of bacteremia with nasal route may be important in valvular heart diseases. Tracheostomy was not considered as initial option due to associated complications like risk of surgical wound infection and mediastinitis. For all this, we decided oral approach, but trismus prevented the insertion of conventional endoscopy cannula, so we used a cut syringe as a cannula. We were able to adapt the size of the cannula to patient’s characteristics.

**References:**

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**6031**

**Failed tracheal intubation in a patient with mucopolysaccharidosis type II**

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**Background:** Mucopolysaccharidosis are rare lysosomal storage diseases resulting from defects in lysosomal enzymes involved in degradation of glycosaminoglycans. Different mucopolysaccharidosis are caused by different enzyme deficiencies. The anesthetic complications are related to the organs involved. Patients with mucopolysaccharidosis are rare, and few anesthetists encounter such patients.

**Case Report:** A 13 years old boy diagnosed mucopolysaccharidosis II was scheduled for extraction of decicuous tooth. He had mental retardation. The pre-operative examination revealed he had a short neck, macrognathia, and limited neck movement. Difficult airway was anticipated, we prepared various intubation devices. Anesthesia induced with thiopental 150 mg, and succinylcholine 10 mg was injected. Anesthesia was maintained with 2.5 vol% Sevoflurane in 100% Oxygen. First endotracheal intubation attempt was conducted with 5mm tracheal tube by direct laryngoscope, but failed. Second endotracheal intubation attempt was conducted with 4.5mm tracheal tube by video laryngoscope, then I-gel LMA was inserted. However, respiratory obstruction was observed immediately. Next endotracheal intubation attempt was conducted with 4.5 mm tracheal tube by flexible fiberoptic scope, but failed. Patient’s spontaneous ventilation was recovered, and we decided to start surgery under spontaneous ventilation. A total surgery time was 4 minutes.

**Discussion:** Airway management is the major problem for patients with mucopolysaccharidosis. If patient’s cooperation is possible, awake intubation using flexible fiberoptic scope is safe choice. In the case of short-term surgery, anaesthesia with mask ventilation and if regional anaesthesia is indicated, consider actively. Along with standardization of new mucopolysaccharidosis therapy options, the need for anesthesia in high-risk cases will increase in the near future, for which anesthesiologists must be prepared.

**Reference:**

**Learning Points:** Patients with mucopolysaccharidosis are rare, and few anesthetists encounter such patients. Communication with surgeon is an important key for safe anaesthesia in such patients.

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**6020**

**Endotracheal tube displacement in patient with maxillofacial trauma: a case report**

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**Background:** According to the Advanced Trauma Life Support (ATLS) recommendations, an effective airway management is imperative. Severe injuries in maxillofacial region can complicate early airway management of trauma patients. Establishing a definitive airway as well as the frequent reevaluation of airway patency is necessary.

**Case Report:** A 20-year-old man was transferred to Gregorio Marañón Hospital after being found in the street under suspicion of having been run over. The patient was hemodynamically stable, intubated. Pulse-oximetry and end-tidal carbon dioxide were measured. Normal peak inspiratory pressure was found in mechanical ventilation. Physical examination revealed a scalp injury, normoreactive right pupil and unexplorable left pupil by a large orbital hematoma. Cranial and thoraco-abdominal CT were performed (Figure 1):

![Figure 1: Endotracheal tube tip impacted in the anterior commissure of the glottis (blue arrow).](image)

Dilation of the pharyngo-laryngeal air space (green arrow).

Ventilation by Murphy's orifice (red arrow).

Owing to the large facial edema, the patient was transferred to the operating room together with Otolaryngology in order to replace the endotracheal tube under fiberoptic bronchoscope.

**Discussion:** Endotracheal intubation is expected to be difficult in patients with maxillofacial trauma. After securing the airway, frequent reevaluation of airway patency, oxygenation and ventilation is essential. Fiberoptic intubation is an effective technique for establishing airway access in patients with difficult airways. Fiberoptic bronchoscope was essential in this case.

**References:**

**Learning points:** Early airway management is crucial in trauma patients and could be challenging in patients with maxillofacial injuries. Fiberoptic intubation remains the gold standard technique for difficult airway management.
5753

Anesthetic concerns for an Ivor-Lewis esophagectomy in a patient with tracheostomy: A Case Report

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Background: A tracheostomy is a specific condition in which one-lung ventilation (OLV) may be uniquely challenging. The patient's airway anatomy and the experience of the anesthesiologist involved are crucial factors. Correct placement of the bronchial cuff of the Tracheopart double-lumen tube (DLT) in the tracheostomy tube is essential for successful intubation.

Case report: A 66yo male, ASA-PS III patient (BMI=41kg/m2) presented for an elective Ivor-Lewis esophagectomy for esophageal adenocarcinoma. Medical history included hypertension, obesity, diabetes mellitus, hypothyroidism, COPD and a total laryngectomy, with permanent tracheostomy. Anesthetic plan included general anesthesia combined with thoracic epidural analgesia. The first intubation was attempted using a left 41F (95mm) double-lumen tube (DLT) for tracheostomized patients (Rüsch Tracheoparts, Teleflex). Isolated OLV was not satisfactory upon auscultation nor when confirming tube position by fiberoptic bronchoscope (FOB). A second unsuccessful attempt was made with a smaller (85mm) DLT. Finally, a double-lumen tube (Rüschn 99, Teleflex) and a bronchial blocker (EZ-blocker) were successfully used. During airway manipulations, manual ventilation with 100% oxygen was achieved with an infant mask securing the stoma. Total duration of anesthesia was 8 hours (3 hours of OLV). After restoration of spontaneous respiration, the tracheostomy tube was removed. The patient experienced no postoperative complications and was discharged home on POD10.

Discussion: Correct placement of the bronchial cuff of the Tracheopart DLT in the left bronchus, using FOB guidance, led to placement of the tracheal cuff at the tip of the stoma, making fixation of the tube unreliable. Intraoperative dislodgement of this device due to unreliable fixation was reported in four cases and attributed to the size and length of the device. The Tracheopart tube is available in 3 sizes: 75mm (up to 165cm height), 85mm (165-175cm) and 95mm (above 185cm). The only plausible explanation for the disrepet fit of DLT in our case could be that the correct size for our patient’s height (175cm) lied between 85mm-95mm. Learning points: It is imperative that alternate airway plans are carefully considered when dealing and planning OLV in tracheostomized patients. The primary goal should be patient’s safety. Careful selection of devices/equipment based on patient’s airway anatomy and the experience of the anesthesiologist involved are essentials for successful OLV in such cases.

Reference:

5624

Challenges in airway management of a child with maxillofacial trauma: a case report

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Background: In some cases alternative technics, like combination of two visualization techniques and full anesthesiologic equipment. Therefore, securing the airway is the most challenging part that requires skilled techniques and full anesthesiologic equipment.

References:

4588

A case of difficult intubation in a patient with vallecular cyst: a case report

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Background: Valluceral cyst is usually coincidentally encountered during general anesthesia and often cause difficulty in intubation. This case reports a patient with no prior history of intubation, diagnosed with a vallecular cyst.

Case report: 71-year-old male patient applied to hospital with difficult breathing. During preoperative examination, the patient’s mouth opening and mucosa were normal, Mallampathy score was 3 with normal neck range of motion. The patient had a diffused irregular hypertrophic lesion that extends across the wings of the nose. Laryngeal examination using a flexible laryngoscope reveal a vallecular cyst expanding and rendering the vocal cord non-visible. In the operation room, the patient was routinely monitored for vitals. After 2 mg of midazolam, 40 mg and 100 mg iv titres of ketamine and propofol respectively was used for induction. Spontaneous breathing was maintained. Attempts to intube the patient using a video laryngoscope (VL) was unsuccessful as we could not gain access to the vocal cord due to the size of the vallecular cyst. Nasal fiberoptic intubation was also unsuccessful as the vallecular cyst span as far as the posterior aspect of the vocal cord. Using VL blade for visualization as well as a retractor, the cyst was retracted, the larynx was visualized and successfully intubated with nasal fibrecopic endoscope. At the end of the operation the patient was successfully extubated.

Discussion: VL and fiberoptic intubation are commonly used for cases including pediatric cases marked as difficult intubation. In some cases, a combination of different visualization techniques may be required, especially in patients with large supraglottic masses that may impede intubation. In this case we used a combination of VL and nasal fibercopic endoscopy to simultaneously manage the airway as well as endotracheally intubate the patient.

References:

Learning points: In some cases alternative technics, like combination of two devices, may be useful for successful intubation.
5483

Tapia’s syndrome after orotracheal intubation: A case report

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Background: Tapia’s syndrome is a rare condition defined by signs and symptoms associated with unilateral lingual as well as vocal cord paralysis caused by extracranial compression of the hypoglossal nerve (XII) and the recurrent laryngeal branch of the vagus nerve (X). Most cases appear as a complication of airway manipulation after any type of surgery, most commonly after tracheal extubation. The inflated cuff or different head positions during the procedure can lead to a compression of the larynx or pharynx that can damage nerves in this area. Most cases recover in 4-6 months spontaneously suggesting neuroapraxia, nerve damage secondary to compression injuries.

Case Report: We present a case of a 34 year-old female patient with no relevant medical history, scheduled for mammoplasty surgery. The operation was performed under general anaesthesia and orotracheal intubation. During the procedure, after changing the position of the patient’s head, an episode of desaturation and elevation of airway pressure was observed. The reposition of the tube, alveolar recruitment maneuvers and bronchodilators were required with the following recovery of the arterial oxygen saturation. The perioperative course was otherwise uneventful. On the first postoperative day, the patient reported dysphonia, dysphagia and left cord paralysis. A head and neck MRI was performed to exclude central nervous injury, showing no pathological findings. A fibreoptic laryngoscopy revealed unilateral lingual and left vocal cord paralysis. Diagnosis of Tapia’s syndrome was performed.

Discussion: We postulate that either an unnoticed compression of the endotracheal tube or the inflated cuff or the change in the position of the patient’s head might have been the source of the unilateral nerve compression that was observed. Both anesthesiologists and surgeons should be aware of this postoperative complication in patients reporting dysphagia and dysphonia after tracheal extubation. The diagnosis was based on a complete head and neck neurological examination and imaging test, both essential to exclude central causes.

4718

Role of thromboelastometry to predict postoperative hemostatic complications in patients undergoing cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (hipec)

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Background and Goal of Study: Cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (HIPEC) is an aggressive procedure associated with profound alterations in hemostatic system leading to perioperative transfusion, thrombotic events and increased morbimortality. We aimed to correlate thromboelastometry (TE) parameters after surgery with bleeding and thrombotic complications in patients undergoing HIPEC.

Materials and Methods: All patients submitted to HIPEC from March until September 2019 at the Hospital Clinic of Barcelona were prospectively included. Intraoperative management was homogeneously carried by a dedicated team assuring homogeneous hemodynamic monitoring, fluid policy, coagulation management, transfusion thresholds and surgical technique. Thromboelastometry was performed at the end of procedure in all patients. Enoxaparin 40 mg/day was given as a thromboprofilaxis from 8 hours after surgery until 4 weeks after discharge. Thrombotic and bleeding complications were recorded. Patients were followed up to 3 months after surgery; at that time, computerized axial tomography was performed and assessed for incidental thrombosis.

Results and Discussion: Twenty four patients were included during this period, 8 were men, age 66(57-72) years , ASA (I-II-III) 1/20/3, respectively. Averaghe surgical time was 229 minutes. Follow up was completed in 13 patients. There wasn’t intraoperative transfusion however, 6 patients (24%) experienced postoperative bleeding, 3 of them (12%) needed re-intervention, and 1 died (4%), because of uncontrolled non-surgical bleeding in the context of multiorganic failure. No thrombotic events were observed. Thromboelastometry values were in the normal range in all patients. Interestingly, a trend to hypercoagulability with shorter coagulation time (CT) (58(54-63) sec vs 64 (59-68) p=0,05), and higher maximum clot firmness (MCF) (72 (63-73) mm versus 65 (63-67) mm, p= 0,07), was observed in those patients who bled vs those who didn’t.

Conclusion: In the present cohort, thromboprophylaxis was efficient avoiding postoperative thrombotic complications. Preliminary thromboelastometry data suggests that an excessive activation of coagulation may be implicated in the pathophysiology of postoperative bleeding in patients undergoing HIPEC. This finding needs to be confirmed in larger series.

References:

4907

Estimation of plasma fibrinogen level and platelet count using dielectric blood coagulometer in patients undergoing cardiovascular surgery: single center prospective observational study

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Background and Goal of Study: Dielectric blood coagulometer (DBCM) is a coagulation test, based on measurement of dielectric permittivity change, which reflects aggregation and deformation of blood cells and fibrin polymerization during coagulation process. In this system, dielectric clot strength (DCS) is measured as variables reflecting clot strength respectively. This study was designed to evaluate a performance of a prototype DBCM (SONY IP&S, Inc., Tokyo, Japan).

Materials and Methods: Patients undergoing cardiovascular surgery are studied. Blood samples are collected (1) after induction of anesthesia, (2) after the termination of CPB and protamine administration, and (3) after the sternal closure. We evaluated 2 assays: (A) CA as a test initiated by calcium supplementation, (B) IN as a test initiated by ellagic acid and calcium. We studied correlation between the variables from DBCM and those from laboratory test. Spearman’s correlation coefficient (Rs) was assessed in the correlation analyses, and receiver operating curve (ROC) analyses were performed as evaluations of test performance. Statistical significance was defined as P < 0.05.

Results and Discussion: One hundred patients were included, IN DCS showed strong correlation with fibrinogen by Clauss method (Rs=0.83, P<0.001, Fig A) and CA DCS showed strong correlation with platelet counts (Rs=0.66 P<0.001, Fig B). Area under the curves of ROC analyses were 0.92 to detect plasma fibrinogen levels >200mg/dL from IN DCS Fig C, and 0.88 to detect platelet counts >60000/mm3 from CA DCS Fig D.

Conclusion: DBCM showed acceptable performance for the evaluation of fibrinogen concentration, and platelet count in patients undergoing cardiac surgery. Further large sized clinical trials are needed to establish clinical usefulness of DBCM.

Acknowledgements: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

5157
The use of viscoelastic techniques in the management of cirrhotic or septic patients undergoing invasive procedures allows to save blood-components transfusion without observing hemorrhagic complications

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Background and Goal of Study: Septic and cirrhotic patients often present prolonged coagulation tests. Fresh frozen plasma and/or platelet transfusions may be administrated to these patients undergoing invasive procedures in order to minimize the risk of bleeding, despite routine coagulation tests do not predict an obligated bleeding risk. Blood-components transfusion is associated with an increased risk of morbidity and mortality, especially when not indicated. Rotational thromboelastography (ROTEM®) provides a more comprehensive global coagulation assessment, measuring clot formation, strength and stability. Its use may avoid unnecessary blood product transfusion for this type of patients.

Materials and Methods: A retrospective study including 230 septic and 230 cirrhotic patients admitted to the emergency room or hospitalization area at Parc Taulli Hospital (Sabadell, Barcelona) since 2011 to beginning 2019, having PT alteration or platelet deficiency and undergoing invasive procedure. A thromboelastometric analysis (EXTEM/FIBTEM tests) was performed prior to the procedure to estimate coagulation and bleeding risk, conditioning the need or not of previous transfusion. Results and Discussion: The 520 patients collected, all presenting INR/PT prolongation and/or thrombocytopenia, underwent invasive procedures such as central venous catheter, tracheotomy, surgical intervention, lumbar puncture, epidural catheter or interventional radiological procedures; without previous transfusion guided by normal CT (coagulation time) estimated by ROTEM®. No case was in need of frozen plasma nor platelet transfusions, only isolated cases of thrombocytopenia and fibrinogen deficit were in need of fibrinogen administration. No overt bleeding was observed.

Conclusion: This study reveals that cirrhosis and sepsis present in most cases normal thromboelastometry results meaning good hemostatic competence, fact that sometimes does not correlates with routine coagulation tests. The ROTEM® guided approach may reduce administration of fresh frozen plasma or platelets without increasing bleeding risk, being considered a safe clinical practice.

5337
Evaluation of dielectric blood coagulometer as a point of care test for measurement of anticoagulation potential caused by direct oral anticoagulants

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Background and Goal of Study: Dielectric blood coagulometry (DBCM) is a coagulation test based on the measurement of dielectric permittivity change, which reflects aggregation/deformation of blood cells and fibrin polymerization in coagulation process. The purpose of this study is to evaluate correlation between...
clotting time measured by DBCM (DBCM CT) and the thrombin generation of the blood supplemented with direct oral anticoagulants (DOACs) using a prototype machine of DBCM (SONY IP&S, Inc., Tokyo, Japan). We also evaluated a correlation between DBCM CT and DOAC concentration.

Materials and Methods: Whole blood samples are collected in sodium citrate tubes from 10 volunteers. Edoxaban and rivaroxaban were added to make blood samples with concentration of 25, 50, 100, 200 and 400 ng/mL. Low dose tissue factor and calcium were added to measure DBCM CT. Plasma was isolated from same samples, and they are used in evaluation of thrombin generation using calibrated automated thrombogram (CAT). Kruskal-Wallis tests were performed for multiple comparison, and the difference between the samples with or without DOACs were analyzed by Steel tests as post-hoc analyses. Spearman’s correlation test was performed to analyze correlation between DBCM CT and the variables measured by CAT analyses. Statistical significance was defined as P < 0.05.

Results and Discussion: DBCM CT was prolonged by supplementation of edoxaban and rivaroxaban (Fig A, B). The samples supplemented with DOACs showed significantly longer DBCM CTs than those from samples without DOACs. Both lag time and peak measured in CAT analyses showed significant correlation with DBCM CT (Fig C, D; Rs=0.87, P<0.001 for edoxaban; Rs=0.91, P<0.001 for rivaroxaban).

Conclusion: DBCM CT showed significant correlation with variables reflecting thrombin generation under FXa inhibition caused by DOACs. These results suggest potential for clinical usefulness of DBCM as a point of care test to evaluate anticoagulation by DOACs.

Acknowledgements: This work was supported by the Cooperation Program by TMU, and Sony IP&S, Inc.

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5770

Hemostasis system evaluation by the rotary thrombelastometry method with the module of impedance aggregometry in newborn children with congenital heart disease.

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Background and Goal of Study: “Open heart” surgery in newborn children is carried out using a cardiopulmonary bypass and accompany the severe hemodilution condition. It aggravates by prolonged contact with a foreign surface in various temperature conditions. The aim of our study was to identify functional changes in platelets after cardiopulmonary bypass in newborn children.

We applied the ROTEM®platelet module to assess platelet aggregation ability in infants with congenital heart disease to evaluate the effect of hemostatic therapy with platelet concentrate and identify patients with high thrombogenic risk who require specific antithrombotic therapy, such as heparin-induced thrombocytopenia.

Materials and Methods: The hemostasis system was examined by integrated test for evaluating the blood coagulation system ROTEMDelta and ROTEMplatelet (impedance aggregometry module) - determination of platelet aggregation activity in a native blood sample. Between July and November 2019 40 newborn children and infants undergone “open heart” surgery in A.N. Bakulev National Medical Research Center of Cardiovascular Surgery were examined for basic ROTEMDelta indicators. A platelet aggregation with thrombin activation was completed from the remaining whole blood sample mixed with sodium citrate, i.e. the TRAPTEST in the ROTEM®platelet module.

Results and Discussion: The method of integral assessment of the hemostasis system using the classic ROTEMDelta platform answered standard questions about transfusion or shunting blood products need, otherwise it indicated the absence of platelet aggregation ability decreasing correlates with the cardiopulmonary bypass duration and the depth of hypothermia. If transfusion of platelet concentrate was carried out, an assessment of platelet aggregation indicated their functionality in the blood of the recipient.

Conclusion: Given the novelty of the ROTEM®platelet method, it deserves attention, discussion, and consideration of the obtained results, especially in individual clinical cases.

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5788

Fibrinolysis detection by the next generation cartridge-based viscoelastic analysers TEG® 6s and ROTEM® Sigma: An in vitro comparison

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Background and Goal of Study: Hyperfibrinolysis is a critical component of coagulopathy if not diagnosed and treated early. Successful hemostasis management requires close monitoring of fibrinolysis and its treatment with anti-fibrinolytics. The study objective was to explore and compare the fibrinolysis detection capabilities of the new cartridge-based viscoelastic hemostatic analysers (VHA) under controlled conditions.

Materials and Methods: TEG®6s and ROTEM® Sigma analyses were performed in duplicate on whole blood samples from 10 healthy volunteers spiked with 8 different concentrations of t-PA (0-1400ng/ml). Fibrinolysis was measured with the TEG®6s at 30 minutes after maximum amplitude (LY30) for RapidTEG® (CRT) and Kaolin (CK) assays and with the ROTEM® Sigma at 30 minutes after clotting time (L30) for INTEM and EXTEM assays. Device thresholds to IPA were studied in linear or nonlinear models and measurement variances were studied with Bland-Altman analyses.

Results and Discussion: Both analysers showed a monotonic relationship with increased t-PA concentrations in log-logistic four parametric models. The IPA concentrations with >90% expected probability for detection of IPA induced lysis versus no-IPA control or reference range were respectively: 62.4ng/ml or 71.7ng/ml for CK.LY30, 84ng/ml or 89.2ng/ml for CRTL.LY30, 100.7ng/ml or 100ng/ml for EXTEM.L30, and 110.9ng/ml or 114.8ng/ml for INTEM.L30. For the lower IPA concentrations of 20, 40 and 60ng/ml the lysis prediction sensitivity versus reference range were 61.4%, 69.2% and 78% for CK.LY30, 54.3%, 63.3% and 72% for CRTL.LY30, 47.9%, 55.8% and 67% for EXTEM.L30 and 33.6%, 39.2% and 47% for INTEM.L30, respectively. In comparison, current commonly used VHA-guided thresholds for fibrinolysis treatment correspond to >80ng/ml or higher. Both devices had specificity levels >85% at most studied concentrations. Finally, the variance of measurements ranged from 1.6% (CRTL.LY30) to 3.7% (CK.LY30) for the TEG®6s to 11.9% (EXTEM.L30) and 15.8% (INTEM.L30) for the ROTEM® Sigma.

Conclusion: Important differences were found between the fibrinolysis detection capabilities of the new VHA analysers. The clinical importance of these findings needs to be further investigated. VHA-guided fibrinolysis treatment algorithms could potentially be modified to reflect the sensitivity of the new VHA analysers.

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5794

Comparison of low-frequency piezoelectric thromboelastography (LPTEG) data of patients with benign prostate hyperplasia between fasting and non-fasting groups in the preoperative period

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Background: Benign prostatic hyperplasia (BPH) is a common problem for elderly men that negatively affect quality of life and results in medical intervention. Despite the latest European recommendations about perioperative fasting, the majority of anaesthesiologists in Ukraine prefer nil per os (NPO) tactic for at least 12 hours before surgery, NPO for prolonged period may cause the hypercoagulability. The target of this study was to demonstrate the effects of water deprivation on hemostasis system in the cohort of elderly patients with BPH by LPTEG readings.

Materials and Methods: Participants were ≥70 y.o., underwent transrectal ultrasound-guided prostate biopsy from September 2018 till September 2019 to confirm the diagnosis of BPH. LPTEG data were collected twice before the procedures from the patients, who did not receive any antithrombotic or anticoagulant treatment: on the admission and 1±0.43 hour previous to the surgical procedure. The patients (n=64) were blindly divided into two groups: group A (n=31) was represented by the patients, who were allowed to drink clear fluids in volume 100-300 ml until 2 hours previous to the operation; group B (n=33) was represented by the patients, who underwent NPO tactic 12±2.3 hours previous to the operation.

Results: Blood coagulation constants checked by LPTEG were: Intensity of contact coagulation (ICC). Intensity of coagulation drive (Ia), Intensity of fibrinogenolysis (MA) and fibrinolytic activity - Index of retraction and clot lysis (IRL). We received a slight increase of all measurements in both of the groups on the admission: ICC by 13.13 ± 8.56%, ICD by 22.43 ± 19.34%, MA by 44.11 ± 19.31%, IRL by 61.18 ± 31.18% above the norm. Before the surgical procedure LPTEG has shown such results: in group A – changes in ICC by 12.13 ± 6.11%, ICD by 16.87 ± 5.04%, MA by 43.51 ± 18.81%, IRL by 64.02 ± 26.22% above the norm similar to those at the admission; in group B we found a moderate increase in all the measurements - ICC
by 26.01 ± 7.21%, sICD by 39.67 ± 13.57%, MA by 64.07 ± 21.81%, IRCL by 76.88 ± 42.97% above the norm.

Conclusion: The present study demonstrates changes in LPTEG data due to water deprivation, which leads to the dynamic stress state of haemocoagulation system. It can be avoided by the optimization of pre-operative patient's fluid intake. Further studies should be conducted to create an optimal thromboprophylaxis treatment regimen in case of different pre-operative fasting tactics.

Coagulation parameters associated with fibrinogen concentrate and cryoprecipitate for treating bleeding patients in Pseudomyxoma Peritonei surgery: results from the prospective, randomised, controlled Phase 2 FORMA-05 study

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Background and Goal of Study: Cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy for pseudomyxoma peritonei (PMP) can be associated with excessive bleeding and acquired fibrinogen deficiency. Maintaining adequate levels of coagulation proteins, including plasma fibrinogen concentrations during CRS helps control haemostasis. FORMA-05 compared efficacy and safety of human fibrinogen concentrate (HFC) vs cryoprecipitate for bleeding patients with acquired fibrinogen deficiency undergoing CRS for PMP. This sub-analysis explores the patient coagulation profiles intraoperatively and postoperatively.

Materials and Methods: FORMA-05 was a single-centre, prospective, randomised, controlled Phase 2 study. Patients undergoing PMP surgery with predicted intraoperative blood loss ≥2 L received either HFC (4 g) or cryoprecipitate (2 pools of 5 units, approximately 4.0–4.6 g fibrinogen), repeated as needed. Plasma fibrinogen concentration (measured using Clauss assay) and FIBTEM A20 were measured hourly intraoperatively, while Factor (F) XIII, FVIII, von Willebrand Factor (VWF) levels and endogenous thrombin potential (ETP) were measured every 2 hours. Post-surgery, all parameters were measured at 6, 12, 24, and 28 hours, and 10 days.

Results and Discussion: The full analysis included 45 patients on either HFC (n=22) or cryoprecipitate (n=23). The intraoperative and postoperative changes in ETP, FXIII, FVIII and VWF are shown in Table 1. For FIBTEM A20 (intraoperatively) and fibrinogen concentration (intraoperatively and postoperatively), the mean numerical values appeared higher with HFC than cryoprecipitate. Activated partial thromboplastin time, prothrombin time and platelet count were maintained throughout surgery in both treatment groups.

Conclusion: The FORMA-05 coagulation parameters analyses showed broad overlaps between HFC and cryoprecipitate, with satisfactory maintenance of the clot quality parameters, FXIII concentrations and thrombin generation parameters in both treatment groups.

Early administration of tranexamic acid in hip fracture reduces transfusion requirements

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Background and Goal of Study: In hip fracture, blood loss occurs as a consequence of both the fracture and the surgery. Red blood cell (RBC) transfusion is frequent, but secondary effects and risks have to be assumed. Lasty, tranexamic acid (TXA) has been recommended as an efficient therapy to reduce blood transfusions during surgery. On the other hand, a big part of the bleeding has the origin in the fracture itself. The goal of this study is to evaluate the effect of TXA early administration at the diagnosis of femur fracture over the transfusion requirements.

Materials and Methods: In a double blind prospective study, the patients with hip fracture were randomly assigned to receive TXA (iv, 1g) or placebo at the hospital admission. Demographic parameters, type of fracture, hemoglobin changes and transfusion requirements were registered from admission until the fourth postoperative day. Estimation of bleeding from variation of hemoglobin and anthropometric parameters was calculated. Thromboembolic events were also registered. T-test was used for quantitative variables and Chi-square test for qualitative variables.

Results and Discussion: After a year of recruitment, a preliminary analysis of results was made. Sixty-five valid cases were included: 32 patients treated with TXA and 33 with placebo. Groups were similar in sex, age, body mass index, proportion of intracapsular/extra capsular fractures and preoperative hemoglobin.

Table 1. **p<0.05 (statistical significance).

<table>
<thead>
<tr>
<th>Group</th>
<th>Baseline Mean</th>
<th>2h after surgery Mean</th>
<th>6h after surgery Mean</th>
<th>End of surgery Mean</th>
<th>2 days after end of surgery Mean</th>
<th>10 days after end of surgery Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXA</td>
<td>1514.5 (536.0)</td>
<td>1672.0 (539.1)</td>
<td>1310.7 (717.2)</td>
<td>1225.4 (624.4)</td>
<td>1426.1 (799.0)</td>
<td>1426.1 (799.0)</td>
</tr>
<tr>
<td>Placebo</td>
<td>1639.1 (1298.1)</td>
<td>1606.7 (339.5)</td>
<td>1200.7 (742.7)</td>
<td>1346.4 (738.6)</td>
<td>1350.7 (741.8)</td>
<td>1350.7 (741.8)</td>
</tr>
</tbody>
</table>

Discrepancy between conventional laboratory tests and thromboelastography (teg) for the management of hemostasis in a septic patient: a case report

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Background: Thromboelastography (TEG) is a viscoelastic hemostatic assay that measures the global viscoelastic properties of whole blood clot formation, showing a functional perspective on the entire coagulation process. The use of TEG has been evaluated for cardiac surgery and the emergency control of bleeding after trauma and during postpartum haemorrhage (1). We report a case of a patient with sepsis who presents alterations of INR with TEG within normalization.

Case Report: A 34-year-old patient was diagnosed with xanthogranulomatous pyelonephritis that conditioned a chronic sepsis and was scheduled for nephrectomy surgery. In the preoperative evaluation, anemia of chronic disorders (non-iron deficiency) was observed with baseline hemoglobin 9 g/dl and an INR of 1.57 that did not improve with vitamin K, so fresh frozen plasma (FFP) was prescribed 10 ml/kg before the start of the intervention. After transfusion of FFP, an INR of 1.5 was maintained, so a TEG (ROTEM® delta, Werfen) was performed in which we did not find alterations in the INTEM, EXTEM, FIBTEM and APTEM that suggested a prohemorrhagic state. The intervention was carried out with an intraoperative bleeding of 400 ml, approximately, hemodynamic stability and transfusion of two red blood cell concentrates with hemoglobin of 8.6 g/dl at the end. In the immediate postoperative period, the alteration of the INR was maintained without alteration of the TEG or bleeding complications.

Discussion: The agreement between conventional laboratory tests, such as INR, and TEG is poor and it remains uncertain what type of coagulation test best reflects the risk of intraoperative bleeding (2). Apart from the use of TEG for cardiac surgery, bleeding after trauma and postpartum hemorrhage, it can be used in situations where we need additional information on the coagulation status of our patients.

References:
Massive hemorrhage protocol survey in five spanish hospitals: what knowledge is there?

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Background and Goal of Study: Massive hemorrhage protocols (MHP) have been designed to deliver predetermined blood product component ratios in an early and coordinated manner to control massive hemorrhage (MH). The implementation of MHP improves the prognosis but its non-compliance increases mortality. The protocol allows the professionals involved to optimize resources and follow an algorithm with specific circuits or procedures that adapt to the local conditions of each center. The objective of this survey was to evaluate the degree of knowledge in 5 different Spanish hospitals, identify the aspects with more unknowledge and propose corrective actions to improve MHP compliance.

Materials and Methods: An anonymous online survey was carried out by doctors and nurses staff, where high complexity surgeries and trauma patients are managed. All have MHP since 2011. The survey had 6 sections with 26 questions. 20 of them with multiple choices/single answer and the other 6 asked about the personal experience. 1. Logistics and organization. 7 questions. 2. Criteria of activation and deactivation. 4 questions. 3. Content / preservation of blood components. 4 questions. 4. Prescription and administration of blood components. 3 questions. 5. Lab tests. 2 questions. 6. Personal experience. 6 questions.

Results and Discussion: A total of 281 surveys were answered. The area that had the highest participation was the surgical area (49%) followed by intensive care units (39%), combined surgery (10%) and emergency (2%). The results showed that one of the main reasons for transfusing blood components was medical practice, followed by patient safety and hospital protocol. There was a noticeable lack of knowledge in the criteria of activation and deactivation of the MHP, and in the content and preservation of blood components.

Conclusion: There is an acceptable but not sufficient or uniform knowledge of the MHP and it is necessary to improve coordination between teams involved in MH. After the results we have made an update of the MHP, an informative session during MTP activation while clinicians think that the activation of MHP is orderly and well led.

Does anemia severity affect outcomes of patients undergoing Radical Cystectomy within an Enhanced Recovery After Surgery programme?

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Background and Goal of Study: Anemia has been associated with an increase of morbidity and mortality in many diseases, including bladder cancer. The aim of this study was to determine if the severity of preoperative anemia affects Radical Cystectomy (RC) outcomes within an Enhanced Recovery After Surgery (ERAS) protocol.

Materials and Methods: Data were prospectively collected from 145 consecutive patients enrolled in the ERAS protocol who underwent RC from November 2016 to November 2019. Based on the classification of anemia severity as defined by the World Health Organization, patients without anemia were compared to those with mild anemia and to those with moderate to severe anemia. The primary outcomes were postoperative complications and transfusion rates. The secondary outcome measure was length of stay (LOS). Mann-Whitney U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.

Results and Discussion: Of the 145 patients, 45 patients (31%) were anemic. 27 patients (18.6%) had moderate to severe preoperative anemia and 18 patients (12.4%) had mild preoperative anemia. Patients with moderate to severe preoperative anemia had more complications than the mild anemia group (85.2% vs 55.6%). In addition, patients with mild anemia had shorter LOS as compared to those with moderate to severe anemia. Blood transfusion requirements were statistically significantly less in the no anemic group (17%) and in the mild anemia group (33.3%) compared to the moderate and severe anemia group (59.3%). It was also demonstrated that patients who received blood transfusion had a statistically significant longer hospital stay compared to patients without transfusion (14.5 vs 9 days, p = 0.0012).

Conclusion: Our results suggest that even within an ERAS protocol, preoperative moderate to severe anemia is associated with worse clinical outcomes. Preoperative optimization of hemoglobin in patients with moderate to severe anemia should be an important part of the ERAS programme. Our Hospital has a preoperative iron infusion protocol for optimizing anemia prior to surgery.

The impact of blood components transfusion on the survival rate of liver transplant patients

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Background and Goal of Study: Orthoptic liver transplantation (OLT) is a complex surgical procedure and has historically been linked to excessive blood loss and the need for transfusion of large quantities of blood products. Numerous reports established a link between transfusion of blood products and mortality or morbidity during OLT. The aim of the present study was to evaluate the one-year mortality rate of liver transplant patients related to red blood cell (RBC) and to fresh frozen plasma (FFP) transfusion, and to evaluate the correlation between blood components transfusion and mortality.

Materials and Methods: The prospective and observational study was conducted at the General Hospital of Fortaleza, Brazil including 176 patients undergoing OLT from October 2014 to December 2017, of both genders, aged 18 years and older. Mortality analysis was related to transfusion of either: up to 3 RBC and more than 3 RBC, and to transfusion of up to 3 FFP and more than 3 FFP.

Results and Discussion: From the 178 patients, 109 were transfused with up to 3 RBC’s, with an average of 1.19 per patient and had a mortality of 26.60%, while 69 received transfusion of more than 3 RBC’s, with an average of 7.75 and had a mortality of 39.13%, with statistical significance (P = 0.0252). Between the same 178 patients, 144 were transfused with up to 3 FFP’s, with an average of 0.85 units per patient and had a mortality rate of 27.08%, while 34 received transfusion of more than 3 FFP’s, with an average of 4.15 units per patient and had mortality of 50.00%, presenting statistical significance (P = 0.0053). There was a statistically significant positive correlation of mortality between RBC and FFP transfusion (p = 0.665; P <0.0001) and between RBC and prothrombin complex transfusion (p = 0.586; P <0.0001). It is demonstrated that the impact of blood transfusion is independent of other well-known predictors of surgical blood loss and post-transplant survival, such as: prior abdominal surgery, renal failure, other comorbidities, and severity of liver disease; in agreement with others reviews. Suggesting that intraoperative transfusions are an independent risk factor for patient survival after TOF.

Conclusion: On this analysis, one-year survival was significantly higher in patients receiving up to 3 RBCs and also those who received up to 3 FFPs, reinforcing that blood transfusion is an independent risk factor for mortality.

The association between allogenic blood transfusion and recurrence of non-small-cell lung cancer after surgical resection: A propensity score analysis of 1,659 patients

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Background and Goal of Study: Whether allogenic blood transfusion adversely affects recurrence and survival after lung cancer resection remains controversial. Previous studies are flawed with insufficient sample size and incomplete...
considerations of important confounders. We aimed to evaluate the relationship between perioperative use of allogeneic blood transfusion and oncological outcomes after lung cancer resection.

**Materials and Methods:** Patients undergoing curative resections for stage I through III non-small-cell lung cancer at a medical center between 2005 and 2015 were collected and evaluated through May 2017. Postoperative disease-free and overall survival were measured using Cox regression models with inverse probability of treatment weighting (IPTW) to balance observed covariates in the sequential cohort of patients receiving an incremental amount of blood. Restricted cubic spline functions were used to characterize dose-response effects of the amount of transfusion on cancer recurrence and mortality.

**Results and Discussion:** A total of 1,859 patients were analyzed with a median follow-up time of 42 months (interquartile range 24.9 – 71.9). 214 (11.5%) of them received red cell transfusions during or within 7 days after surgery. Perioperative blood transfusion was associated with early cancer recurrence (IPTW adjusted HR: 1.73, 95% CI: 1.52 – 1.96, p < 0.001) and greater all-cause mortality (IPTW adjusted HR: 2.38, 95% CI: 1.98 – 2.86, p < 0.001) after lung cancer resection. A non-linear dose-response association was noted between the amount of transfusions and recurrence or all-cause mortality, which is important in understanding the mechanism of transfusion-related immune modulation.

**Conclusions:** Allogeneic blood transfusion was an independent risk factor for recurrence and death after resections for non-small-cell lung cancer. The non-linear relationship between transfusion amounts and recurrence risk is crucial in clarifying the mechanism of transfusion-related immune modulation. Our results justify minimizing uses of transfusions in lung cancer resection.

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**5276 Prehabilitation and patient blood management during colorectal cancer surgery**

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**Background and Goal of Study:** The worldwide trend towards the use of blood replacement in surgery with significant blood loss. There are many complications of blood transfusion and without the use of alternatives risks cannot be prevented. We used a new blood management strategies with erythropoiesis stimulants for the prehabilitation of patients in colorectal surgery. The goal of the study was to improve the outcome anesthesiology, reducing risks and complications in patients with two different perioperative blood management strategies.

**Materials and Methods:** 50 patients were divided into 2 groups due to blood management strategy: in 1 group (n = 25) we used 10,000 IU the epoetin-alpha (erythropoietin) with Iron (III) oxide 1mg/kg 5,3 days prior to the surgery and intraoperatively. Haemotransfusions were not planned in this group. In the 2 group (n = 25) were scheduled to blood transfusion based on intraoperatively blood loss (RBC:FFP to 1:1). The baseline hemoglobin and hematocrit level was not different (n = 25) were scheduled to blood transfusion based on intraoperatively blood loss (RBC:FFP to 1:1). The baseline hemoglobin and hematocrit level was not different.

**Results and Discussion:** Preoperative hemoglobin achieved, differed between different treatments. We also analyzed whether patients with preoperative anemia using the World Health Organization’s (WHO) criteria, had a poorer response to the treatment. As our goal of study both the preoperative hemoglobin levels and transfusion rates have been instituted. A perioperative blood management program (BMP) for knee and hip arthroplasty have fallen precipitously since blood management strategies have been implemented. A perioperative blood management program (BMP) for knee and hip arthroplasty has been progressively implemented in our hospital since 2015. At that time, the transfusion rate was 14.5%, while on 2018 it was reduced to 4.4%.

**Conclusion:** Implementation of a BMP program in elective orthopaedic surgery is safe and leads to an important decrease in transfusion rates.

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**5586 Implementation impact of a patient blood management program in primary total hip and knee arthroplasty, an uncontrolled before-after study**

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**Background and Goal of Study:** Total hip and knee arthroplasty are a high prevalence surgery with significant blood loss that often implies the need of an allogeneic blood transfusion with its well-known risks. Patient Blood Management (PBM) is a combination of strategies in order to reduce the transfusions in patients undergoing surgery and have proved to be effective in elective orthopaedic surgery. The objective of this study is to know the impact of implementing a PBM program on transfusion rates in primary total hip and knee arthroplasty.

**Materials and Methods:** In January 2014 administration of an intraoperative dose of Tranexamic Acid unless contraindicated began and one year later the full PBM Program was implemented treating all patients with preoperative haemoglobin under 13mg/dl to raise it, intraoperatively with the administration of two doses of Tranexamic Acid unless contraindicated and careful haemostasis of the surgical field and postoperatively transfusion threshold at 8 gr/dl of haemoglobin was settled except particular medical circumstances and giving a second blood bag only if necessary. All patients who had a primary total knee or hip arthroplasty from January 2012 to September 2019 were included. Before the PBM program implementation, transfusion rates were obtained by reviewing all medical records and comparing them with the blood bank records. Since the PBM program began, data was recorded on the number of patients involved, patients with contraindicated, bags of blood used, patients treated for preoperative haemoglobin optimisation and complications.

**Results and Discussion:** Since January 2014 a total of 2,051 patients were involved in the PBM program implementation. The percentage of transfused patients decreased from 37.6% in 2012 to 20.5% in 2014 (when administration of Tranexamic Acid began) and after to 5% in 2018-2019 and the number of blood bags from 43.1 bags / 100 patients in 2014 to 8.5 bags / 100 patients in 2017. From 2015 to 2019, a 18,02% of patients were treated to optimize the haemoglobin level without any complications secondary to the treatment. These results have made us change our blood reserve policy, restricting it only in patients with tranexamic acid contraindicated or those in which the haemoglobin has not been optimized.

**Conclusion:** Implementation of a PBM program in elective orthopaedic surgery is safe and leads to an important decrease in transfusion rates.

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**5589 Transfusion ratio and hemoglobin levels in a perioperative blood management program for hip and knee arthroplasty**

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**Background and Goal of Study:** Rates of blood transfusion after primary arthroplasty have fallen precipitously since blood management strategies have been implemented. A perioperative blood management program (BMP) for knee and hip arthroplasty has been progressively implemented in our hospital since 2015. At that time, the transfusion rate was 14.5%, while on 2018 it was reduced to 4.4%.

As our goal of study both the preoperative hemoglobin levels and transfusion rates have been instituted. A perioperative blood management program (BMP) for knee and hip arthroplasty has been progressively implemented in our hospital since 2015. At that time, the transfusion rate was 14.5%, while on 2018 it was reduced to 4.4%.

**Materials and Methods:** We analyzed retrospectively our data from 2018, and 358 patients underwent knee and hip arthroplasty. One of the preoperative goals in our BPM was to improve the level of hemoglobin up to 13g/dl. Forty seven patients (13%) were treated: sixteen patients (34%) received endovenous iron, and thirty-one (66%) additional erythropoietin (EPO). Cyanocobalamin and folicate were also administered in both of the groups when its deficiency was detected. We used Chi-square, Fisher’s exact test, to find out if transfusion rates and the level of preoperative hemoglobin achieved, differed between different treatments. We also analyzed if hemoglobin levels achieved were lower in anemic patients.

**Results and Discussion:** Sixteen patients in the EPO group (50%) and five in the iron group (31%) achieved a preoperative hemoglobin level of 13g/dl.
were not statistically significant (NS). In the EPO group, 11% of patients required transfusion vs. 33% in the group of patients treated with just iron (NS). Only 29% of patients who met the WHO anemia criteria reached hemoglobin levels ≥ 13g/dl. In contrast, 58% of patients without anemia, achieved the hemoglobin levels proposed in our program (p<0.05).

Conclusion: We conclude that whichever treatment we use in our BPM, patients reach a similar preoperative hemoglobin level, and are at a comparable risk of perioperative transfusion. Our data also indicate that patients who meet WHO’s anemia criteria, respond more poorly to stimulating hematopoietic strategies, and are more prone to continue with low hemoglobin levels despite proper treatment when compared with patients who do not meet these criteria.

Background and Goal of Study: Patients undergoing urological surgery with potential bleeding risks are usually subject to hematuria and secondarily to iron deficiency and anemia. Anemia and blood transfusions during the perioperative period have also been proved to worsen mortality outcomes and mortality rates. Today, Patient Blood Management (PBM) programs are highly recommended in perioperative environments, which consist of a multimodal approach strategy based on the patient in order to diminish anemia and blood transfusion ratios. Due to the proven benefits of PBM programs, Hospital Parc Taulí started administering this program in 2018 to urology patients undergoing surgery. A preoperative anemia study was completed, and those patients with anemia were treated. The purpose of this study was to evaluate the result of implementing a PBM program by analyzing the anemia characteristics and the transfusion rate.

Materials and Methods: A retrospective, observational analysis of all patients undergoing urological surgery during 2017 and 2018 was completed. Blood transfusion requirements and hemoglobin levels were recorded in both groups and iron metabolism was only recorded in 2018. All this data was compared in different patient diagnoses and surgeries.

Results and Discussion: During 2017 a total of 398 patients were analyzed. In this sample, 32.7% of patients had anemia before surgery, however no data about iron metabolism was collected. During 2018 a total of 315 patients were analyzed. In this year, 23.8% of patients had anemia before surgery, 34.1 % of that 24% was related to iron deficiency, 32.9% was related to anemia of chronic disease and 20% was related to mix anemia. Larger discrepancies were observed in specific diagnoses, where 58% of patients undergoing cystectomy had anemia before surgery. Comparing both groups before (2017) and after (2018) the implementation of PBM program, a tendency of the reduction of the requirement of blood transfusions was observed, although due to the small sample the differences were not statistically significant.

Conclusion: The study reveals that patients undergoing urological surgery with potential bleeding risk show a high incidence of anemia. Therefore, the implementation of a PBM program would be justified, having a great importance the preoperative treatment of iron deficiency.

Patient Blood Management Program in Urology: Audit of 2nd Pillar
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Background and Goal of Study: Patient Blood Management (PBM) is a quality improvement programme in transfusion medicine involving recommendations used in all perioperative period. In our hospital an Urology PBM programme regarding inpatient surgery was launched in 2015. In 2018 we have audited electronic database respecting the second PBM pillar and compared it with 2015 internal audit results.

Materials and Methods: From the internal electronic database that monitors PBM implementation for inpatient Urology Surgery we identified 95 patients of each year (13.1% of the total procedures in 2015, 15.7% in 2019). In the preoperative period were audited the number of anemic patients admitted to the operating room, the number of transfused patients in this period and the number of transfused patients with anemia on admission to the operating room. Intra-operatively we evaluated the median hemoglobin value before transfusion, number of patients transfused and the number of units transfused per patient. Postoperative were considered median hemoglobin post transfusion.

Conclusion: The implementation of a PBM programme for inpatient urology surgery resulted in significant reduction in the number of patient transfused and number of units per patient transfused even though the cut off limit for transfusion and the number of anemic patients presented to surgery was higher in 2018. This was attributed to a more effective hemorrhagic surgical control and an efficient hemostasis management. There was a significant optimization of the number of Type and Screen to transfusion.

Transfusion of stored red blood cells exacerbates renal ischemia reperfusion-induced hepatic injury
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Background and Goal of Study: Renal ischemia reperfusion (RIR) causes injuries not only in the kidneys themselves, but also in distant organs, including the liver. Transfusion of stored red blood cells (SRBCs) has been shown to prime neutrophils and monocyte-macrophage system. In this study, we investigated whether RIR-induced hepatic injury is exacerbated by transfusion of SRBCs.

Materials and Methods: After Institutional Animal Care and Use Committee approval, male Sprague-Dawley rats weighing between 275 and 325 g were included in this study. Rats were randomly divided into three groups (n=18): sham operation (Sham); RIR only (Control); transfusion of SRBCs (15% of estimated blood volume, via tail vein) started at 1 hour after the end of renal ischemia (TF). Blood transfusion was given red blood cells collected from 3 rats and stored for 2 weeks, was used for transfusion. Ischemia of both kidneys was induced for 1 hour and reperfusion was allowed for 24 hours. Then, blood (for BUN, creatinine, AST, and ALT) and liver tissue (for mRNA expression of HO-1, NGAL, TNF-a, and IL-6 by RT-PCR with densitometry) were obtained for analysis.

Results and Discussion: Serum levels of BUN and creatinine were increased in Control or TF vs. Sham, as a result of RIR (P < 0.05). Serum levels of AST and ALT were also increased in Control or TF vs. Sham (P < 0.05). TF had more severe hepatic injury than Control, as indicated by serum AST and ALT (P < 0.05). The hepatic mRNA expression of antioxidant enzymes such as HO-1 and NGAL was increased in TF, compared to Control or Sham (p < 0.05). However, the hepatic mRNA expression of TNF-a and IL-6 was no statistical differences among the three groups.

Conclusion: Transfusion of SRBCs exacerbates RIR-induced hepatic injury without triggering hepatic inflammatory responses. The mechanism of the hepatic injury may be oxidative stress.

The impact of MELD values on transfusion need during liver transplantation
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Background and Goal of Study: Liver Transplantation (LT) surgery is complex with large bleeding risk, especially in patients with prior upper abdominal surgery, portal hypertension and severe coagulation disorder. Therefore, use of blood products is necessary in most LTs. MELD is a score that assesses the severity of hepatic disease, currently being the score used for including patients in the waiting list for LT. The objective of this work is to assess if high MELD values is associated with bigger consumption of blood products in the intraoperative and postoperative of LT.

Materials and Methods: The study was performed with 178 patients transplanted into the HGF’s LT service, dividing them into two groups (MELD ≤ 25 and MELD > 25), assessing the amount of intraoperative and postoperative blood products used - red blood cells concentrate (RBCC), platelet concentrate (PC), fresh frozen plasma (FFP), cryoprecipitate (CRYO), prothrombin complex (PCC) and fibrinogen concentrated (FC).

Results and Discussion: Of this population, 118 patients had MELD ≤ 25 and 60 patients had MELD> 25. The average use of blood products (RBCC, PC, CRYO, PCC and FC) was significantly larger (p <0.05), in patients with MELD > 25. Except the use of FFP that has not presented significance between the groups.

Conclusion: This study found that in those patients with MELD> 25, there was
Rivaroxaban withdrawal and rebound thrombosis in patient with atrial fibrillation: A Case report

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Background and Goal of Study: Rivaroxaban, the novel oral anticoagulants (NOACs) are increasingly used in patients with non-valvular atrial fibrillation for the prevention of stroke and systemic embolism.

Case Report: A 71-year-old woman with the medical history of obesity, hypertension, hyperlipidemia, atrial fibrillation and transient ischemic attack, was scheduled for both total knee arthroplasty. She took rivaroxaban 20mg once daily for 2 years ago. She stopped rivaroxaban for 5 days before surgery and there was no bridging anticoagulation. She had combined spinal epidural anesthesia. 4 hours after the surgery, she was unresponsive to the stimulus and seemed to be sleeping. Neurologic examinations were carried out immediately, and her mental status was stupor. The left arm could be lifted in the painful stimulation, right arm did not react and both legs could not be accurately evaluated due to the surgery. Immediately performed brain MRI and MRA (Fig 1. 2) showed infarction in middle cerebral artery and internal carotid artery territory. She received intra-arterial thrombolysis as an emergency and aspirin 100mg was administered as an antiplatelet drug. 4 days after the operation, the patient recovered consciousness but remained right hemiplegia and severe dysarthria.

Discussion: In our case, her intracranial stroke risk was high, so oral anticoagulation treatment was recommended. Though the researches and clinical data with rivaroxaban and other novel oral anticoagulant agents are limited, it might be important to know their individual risk factors and the potential rebound hypercoagulability after cessation of rivaroxaban, especially in high-risk patients. In patients with high risk for stroke, careful consideration should be given to minimize the duration of interruptions, and it could decrease the incidence of stroke in patients with atrial fibrillation.

Learning points: We should be aware of the risk of rebound hypercoagulability after cessation of rivaroxaban, especially in high-risk patients. In patients with high risk for stroke, careful consideration should be given to minimize the interruptions to decrease the incidence of stroke in patients with atrial fibrillation.

Impact of non-factor haemophilia therapy on standard laboratory assays

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Background and Goal of Study: Improved therapy options in patients with haemophilia A (PWA) has led to normalization of life expectancy, leading however to an increasing number of surgical procedures in these patients’ lifetimes. A novel antibody treatment strategy challenges factor VIII substitution.1 Treatment with currently approved bispecific antibody compound Emicizumab (emi), Hemlibra® may replace factor substitution but leads to effects on standard laboratory assays (SLA) not related to the therapeutic effect or plasma concentration.2 Development of new laboratory routines is therefore urgently needed to specifically measure the therapeutic effect of the new compound especially in perioperative and/or emergency situations.

Materials and Methods: EC approval was not sought for this presentation of anonymised data derived from measurements in routine blood specimens. Due to its structural and functional differences, emi exerts distinct effects on aPTT-based assays, as it does not require activation by thrombin.3 In our cohort of PWA, we switched three patients from FVIII concentrates to emi therapy regimen. We (1) demonstrate their laboratory course in SLA, (2) the influence of emi on different laboratory assays. Furthermore, we (3) implemented laboratory surveillance of emi drug level (modified one stage FVIII assay) and (4) tested for FVIII activity (after co-administration of FVIII concentrates) in the presence of emi (bovine chromogenic FVIII assay (CSA)).

Results and Discussion: aPTT normalized within few days after first administration (aPTT 85sec -> 35sec [25-42sec]), although we detected sub-therapeutic plasma levels of emi (10.5ug/ml [35-80ug/ml]). But even at therapeutic levels of emi there is no complete restoration of coagulation, aPTT-based single factor (FVIII, FIX, FXI) one stage assays (OSA) showed falsely high results in the presence of emi. Measurement of co-administered FVIII activity was reliably possible in bovine CSA as emi does not bind to bovine forms of FIXa, FX.

Conclusion: Correct interpretation of SLA, OSA and CSA for PWA receiving emi, is demanding and requires high expertise for patient safety in trauma or in even elective surgery situations.

References:
4806

May-Hegglin anomaly and anaesthesia

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**Background:** May-Hegglin anomaly (MHA) is a rare autosomal dominant congenital disorder, which results from the mutation of MYH9 gene that encodes a protein expressed in platelets and other tissues. Patients exhibit varying degrees of thrombocytopenia, giant platelets and characteristic inclusion bodies in granulocytes. Clinical manifestations depend mostly on platelet count (PC).

**Case Report:** A 48 years old male, ASA II, was transferred to our institution for tibial plateau fracture repair. He had MHA diagnosed due to familiar history. Despite known low PC, he had not had haemorrhagic events nor needed any transfusions. Blood tests at admission showed a PC of 3 x109/L, lacking aggregation; the rest of the investigations were within normal range. After urgent haematological consultation, the patient was scheduled on the next morning, as he was haemodynamically stable. Haematologists recommended transfusion of 2 platelet pool before surgery. Preoperative PC was of 66 x109/L. A balanced anesthesia was carried out. Intubation was rescued with Glidescope® since Cormack grade was III. Tranexamic acid 1 g was administered prior to deflation of tourniquet. Surgery was uneventful. Postoperative PC was of 60 x109/L, so an ultrasound guided femoral nerve block was performed and a heparin bolus 100 mg was administered to rule out ARDS. Patient did not require any other blood products during hospital stay and was discharged home on 5th postoperative day.

**Discussion:** In general terms a PC of 50 x109/L are considered haemostatic.2 Transfusion in inherited thrombopathies is controversial and should be used cautiously, as it can lead to sensitisation. A threshold for transfusion in this setting has not yet been established and the decision must be made case by case. In our case the patient had not received any blood products before and the PC was extremely low. Peripheral nerve blocks in compressible areas can be helpful.

**Learning points:** The anaesthesiologist should be familiar with therapeutic approach of inherited thrombopathies.

References:

5047

Acute pulmonary thrombosis in the early recovery of ambulatory septoplasty

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**Background:** Thromboembolic events are quite rare in patients submitted to ambulatory surgery (1) with an estimated incidence of 0.04% (2). In our hospital, for day case surgeries, thromboembolic prophylaxis is only prescribed in high risk procedures (vascular or orthopedic).

**Case Report:** 64 years old male scheduled for septoplasty in daycase surgery. ASA II BMI 33,81kg/m2. Ex-smoker. Hypertension under medical treatment and chronic obstructive pulmonary disease under medical treatment. ASA III. Blood tests at admission showed a PC of 3 x109/L, lacking aggregation; the rest of the investigations were within normal range. After urgent haematological consultation, the patient was scheduled on the next morning, as he was haemodynamically stable. Haematologists recommended transfusion of 2 platelet pool before surgery. Preoperative PC was of 66 x109/L. A balanced anesthesia was carried out. Intubation was rescued with Glidescope® since Cormack grade was III. Tranexamic acid 1 g was administered prior to deflation of tourniquet. Surgery was uneventful. Postoperative PC was of 60 x109/L, so an ultrasound guided femoral nerve block was performed and a heparin bolus 100 mg was administered to rule out ARDS. Patient did not require any other blood products during hospital stay and was discharged home on 5th postoperative day.

**Discussion:** In general terms a PC of 50 x109/L are considered haemostatic.2 Transfusion in inherited thrombopathies is controversial and should be used cautiously, as it can lead to sensitisation. A threshold for transfusion in this setting has not yet been established and the decision must be made case by case. In our case the patient had not received any blood products before and the PC was extremely low. Peripheral nerve blocks in compressible areas can be helpful.

**Learning points:** The anaesthesiologist should be familiar with therapeutic approach of inherited thrombopathies.

References:

5051

Approximation of emicizumab plasma levels in the absence of dedicated assays. A practical approach

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**Background and Goal of Study:** Emicizumab (EMI) is a bispecific antibody mimicking the function of activated factor VIII (FVIIIa), which is used for bleeding prophylaxis in hemophilia A (HA), Emi - unlike FVIII - does not require activation for its procoagulant activity, which leads to a very strong effect in the aPTT and one stage FVIII assay (OSA). Therefore both assays are oversensitive towards EMI. To overcome this problem a dedicated EMA assay was developed, which is based on the OSA, using a higher sample dilution than the standard FVIII assay. This assay is available in hemophilia centers. In situations where patients need emergency medical care in centers other than dedicated hemophilia centers, a method to assess the EMA plasma level based on a widely available assay would be desirable. The goal was to develop and validate a method for approximation of
EMI based on the OSA assay.

**Materials and Methods:** 28 anonymized left-over samples from routine coagulation analysis from HA patients with (n=23) and without (n=5) emicizumab treatment were analyzed. The EMI concentration was determined using the available standard assay (R2 Diagnostics, Haemochrom Diagnostica GmbH, Essen, Germany). In addition FVIII activity was determined using the OSA following a sample pre-dilution of 1:8 in saline. The FVIII assays were determined in two different laboratories using the Siemens BCS (and respective Siemens reagents) and Werfen ACL TOP (and respective Werfen reagents) analyzer systems.

**Results and Discussion:** EMI determination in patients on EMI therapy provided levels of 8-94 µg/ml (mean±SD: 43±25µg/ml). In patients without EMI therapy EMI levels of 0-1 µg/ml were reported. Standard FVIII assays revealed >200 % FVIII in 14/23 (Siemens) respectively in 20/23 (Werfen) samples under EMI therapy. The determination of the 1:8 diluted samples provided FVIII activities which correlated excellently to the EMI levels (Siemens: r=0.99, FVIII%=0.79;EMI level:Werfen: r=0.99, FVIII%=0.88;EMI level).

**Conclusion:** The determination of the widely available FVIII OSA in samples diluted by 1:8 in saline might provide an attractive option to approximate the EMI plasma level when a dedicated assay for EMI is not available. The FVIII activity levels in the diluted samples correlated with the EMI concentration and were on average just 12% (Werfen) or 21% (Siemens) lower than the EMI levels reported by the standard assay.

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**5642**

Pre-operative acquired von Willebrand Syndrome related with extracorporeal membrane oxygenation and Heart Transplantation: Utility of intraoperative treatment with human von Willebrand Factor

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**Background:** Von Willebrand factor (VWF), a glycoprotein that takes part in primary and secondary hemostasis, contributes to platelet adhesion and aggregation and is a carrier protein for coagulation factor VIII. VWF is synthesized in endothelial cells and platelets and metabolized by ADAMTS13. Inherited von Willebrand syndrome (VWS) is the most common hemostasis disorder with an increased bleeding risk. Acquired von Willebrand syndrome (aVWS) is less common (1-5%) and associated to autoimmune diseases or hypothyroidism. Also with increased shear stress (altered blood flow), such as extracorporeal membrane oxygenation (ECMO) or left ventricular assist devices (LVAD), with a reported prevalence of 100% and up to 50% with relevant bleeding episodes. A high index of suspicion is needed to diagnose aVWS and must be confirmed with Lab tests such as VWF:Ag (normal or low), low VWF/RCo (VWF-RCo/VWF-Ag ratio <0.7), low VWF multimers and VWF fragments.

**Case report:** We present a 69 year-old woman who suffered an acute myocardial infarction and developed a cardiogenic shock requiring ECMO support as a bridge to heart transplant (HT). Four weeks after ECMO, she presented a massive posa hemorrhage that required hemoderivatives, stopping anticoagulation (AC) and antiaggregation (AA) therapies and embolization. Three days later AC was restarted however, 2 weeks after, she presented a new bleeding. Besides the past history of recent ECMO support and hypothyroidism, VWF-RCo/VWF:Ag ratio was <0.7, thus she was diagnosed of aVWS. During HT, 16 red blood cell concentrates, 6600cc fresh frozen plasma and 5 platelet pools were transfused guided by viscoelastic test(ROTEM). We administered intraoperatively tranexamic acid(4g), fibrinogen(4g), prothrombin complex(2000IU) and human VWF (WILLFACT® 9000IU). Nine months after HT she does normal life.

**Discussion:** Patients with LVAD or ECMO develop very frequently (up to 100%) aVWS, an undiagnosed disease with relevant bleeding disorders in patients with LVAD or ECMO. A high index of suspicion is needed to diagnose aVWS which must be confirmed by Lab tests. Intraoperative use of human VWF is safe and effective for treating hemorrhagic complications related to aVWS.


**Learning points:** AVWS has to be taken into account in patients with risk factors. Use of human VWF is safe and effective reducing hemorrhagic complications.
Management of anesthesia on a patient with factor X deficiency

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Background: Factor X(FX) or Stuart Power factor deficiency is amongst the rarest of the inherited coagulation disorders. There is limited research on patients undertaking surgery, therefore we describe the anesthetic management for a mild FX deficiency during total knee arthroplasty.

Case Report: An 85 year old female patient with a history of obesity, essential hypertension, laryngeal dystonia, atrial fibrillation and depressive syndrome was diagnosed with FX deficiency (39% levels) on the basis of family history. No treatment was administered in previous surgeries because they were minor procedures and did not incur major bleeding. In the last hematological evaluation the levels of FX were 50% (normal values 50-150%), the activated partial thromboplastin time (aPTT) was 1.1 (normal value 0.8-1.2) and the prothrombin time (PT) was 1.3 (normal values 0.8-1.2). A femoral and sciatic nerve block was performed in pre-op, followed by a general anesthetic by laryngeal mask. There were no intraoperative incidents. Time of limb ischemia was 100 minutes. No major bleeding was detected after the tourniquet was deflated or in the next 24 hours. The patient was discharged on the 4th day post-op.

Discussion: Inherited FX deficiency is autosomal recessive, with heterozygotes most often remaining asymptomatic or having only mild bleeding tendency; homozygote individuals may experience hemorrhagic, recurrent epistaxis and menorrhagia. It is characterized by prolongation of PT, aPTT and Russell viper venom time, with normal bleeding and thrombin time, as well as decreased levels of FX antigen or FX activity. Knight et al. reported that 35-50% levels of FX during surgery and up to 20% postoperatively are needed to achieve correct hemostasis. The treatment of FX deficiency must be individualised and includes fresh frozen plasma, prothrombin complex concentrate and factor X concentrate. In our case, the preoperative FX levels didn’t require treatment and there was also no significant bleeding in the first 24 hours post-op, therefore we decided to only closely follow signs of bleeding and the coagulation test.

References:
1. Sinha Isolated Factor X Deficiency. IJA 2006 13(2).

Learning points: We believe that careful monitoring of blood coagulation and personalized treatment, based on the severity of the FX deficiency and the complexity of the surgery, in addition to a multidisciplinary approach can greatly decrease any complications that may occur.
A prospective cohort evaluation of effect of cardiac surgery on early cognition

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Background and Goal of Study: Postoperative cognitive decline (POCD) is a common postoperative complication, the most frequent following cardiac surgery.1 This study aimed to investigate the impact of selected POCD definition on POCD incidence, which cognitive domains are predominantly affected and the role of cardiopulmonary bypass (CPB) in POCD development.

Materials and Methods: This prospective cohort study enrolled 120 patients scheduled for elective cardiac surgery with or without CPB. A battery of 6 neuropsychological tests to assess various aspects of cognition was administered to patients 2 days before surgery and on the 6th postoperative day. POCD was defined as a decrease in performance of 1 SD or greater in postoperative z scores compared to preoperative z scores in 1 or more tests. To deeper understand the methodological impact of the applied definition on the POCD incidence, we performed 2 additional analyses using the strict POCD definition (i.e., as a decrease in performance of 1 SD or greater between 2 testing points in at least 2 and 3 tests, respectively).

Results and Discussion: On the 6th postoperative day, 66 of the 120 (55.0%) patients fulfilled the diagnostic criteria for POCD. After a strict POCD definition was applied, cognitive deterioration was present in 23 of the 120 (19.2%) patients and in 9 of the 120 (7.5%) patients. Twenty (37%) patients have not developed POCD while 36 (34.5%) patients have developed POCD when CPB was employed (P = 0.056). Like several other recent studies, we showed that the POCD incidence was significantly associated with selected POCD definition and that CPB usage did not increase the risk for POCD development.

Conclusions: The POCD incidence was significantly related with applied POCD definition. The domains of global cognitive status, psychomotor speed, visual short-term and working memory were particularly impaired after cardiac surgery. There was no clear relationship between CPB usage and POCD occurrence.

References:

Cognitive decline on three months after noncardiac surgery evaluated using cognitive component of 12-items World Health Organization Disability Assessment Schedule 2.0.

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Background and Goal of the Study: Several factors including older age, history of stroke and low educational level were reported as associated factors with postoperative cognitive decline. However, adjustable factors such as preoperative nutritional status on postoperative cognitive decline has been poorly documented. Therefore, in this study, we aimed to investigate the impact of preoperative nutritional status on postoperative cognitive decline after 3 months of noncardiac surgery.

Materials and Methods: Individuals aged ≥55 years who were scheduled to undergo surgery in our hospital between April 2016 and March 2018 were eligible for prospective observational study evaluating postoperative functional disability. Patients with diseases requiring psychiatric treatment and patients who were unable to complete the questionnaire without help were excluded. In this study, we focused on postoperative cognitive decline defined as a worsening score of cognitive components of 12-item WHODAS2.0 in the patients undergoing noncardiac surgery which was evaluated before surgery for baseline assessment and on 3 months after surgery. Patient’s demographics including nutritional status, postoperative complications and recuperation were also evaluated. Preoperative nutritional status was assessed using the mini nutritional assessment-short form. Logistic regression analysis was applied to determine associated factors with postoperative cognitive decline.

Results and Discussion: Of 3070 patients registered in our original study, 2341 were included in the analysis, in which 633(27.0%) patients experienced postoperative cognitive decline after three months. The factors shown in Table 1 were independently associated with increased cognitive decline after 3 months, whereas use of preoperative statin was associated with decreased cognitive decline.

Conclusion: In our prospective cohort study, cognitive decline was observed in 27% of the patients on three months later after noncardiac surgery. Several factors associated with postoperative cognitive decline such as nutritional status and body mass index should be optimized preoperatively with the appropriate evaluation and intervention.

| Table 1 Associated factors with cognitive decline on three months after noncardiac surgery. |
|------------------|------------------|------------------|
| 95% Confidence Interval | P value |
| Age | 1.03-1.94 | <0.001 |
| Preoperative symptomatic stroke | 0.87-1.92 | 0.038 |
| Serum creatinine | 1.04-1.28 | 0.006 |
| Preoperative statin use | 0.57-0.99 | 0.042 |
| Body mass index > 30 | 1.61-2.93 | 0.009 |
| Malnutrition | 1.00-2.55 | 0.044 |
| At risk of malnutrition | 1.58-1.68 | 0.008 |
| Malignancy | 1.07-1.69 | 0.009 |
| Reoperation | 1.15-3.09 | 0.015 |

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Perioperative Medicine ProgAm foR Elderly (PREPARE), a multimodal prehabilitation program targeted at improving postoperative outcomes in frail elderly patients undergoing major abdominal surgery: A single tertiary centre experience

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Background: Prehabilitation is a multimodal program encompassing preoperative physical therapy (PT), nutritional intervention and psychosocial aid to increase functional reserves. The ‘at risk’ group includes the frail, elderly with multiple comorbidities undergoing major surgery. The goal of prehabilitation is to reduce postoperative complications, leading to shorter length of stay (LOS). The Perioperative ProgAm foR Elderly (PREPARE) program was initiated at Singapore General Hospital in January 2019.

Methods: Patients aged ≥65 and scheduled for elective major abdominal surgery were screened in the clinic. Frail patients (defined by Edmonton Frail Scale (EFS) scores ≥ 6) were recruited. Standardized medical optimization included anemia intervention, smoking cessation and titration of medication. In-house PT assessment and exercise sessions were formulated for patients. Nutritional intervention by dietitians was done for patients with Malnutrition Universal Screening Tool (MUST) score ≥ 2. A pre-post PREPARE implementation results for LOS is presented.

Results: Between January to June 2019, 142 of patients met the criteria for frailty. Of these, 35 had surgery planned for ≥2 weeks ahead and were recruited into PREPARE. 19 patients had EFS score 6-7 and 16 had EFS score of ≥8. Median age was 79 years. Prior to PREPARE, median LOS was 9 days for those with EFS score 6-7 and 11 days for those with EFS score ≥8. Post PREPARE, LOS was reduced to 5 days for patients with EFS 6-7 and 5 days for those with EFS ≥8 (Fig 1).

Discussion: As more elderly patients undergo elective surgery, a goal-oriented approach is essential. Pulmonary complications (PCC) remain the most serious adverse outcome after major abdominal surgery. Evidence suggests that in reducing PCC, PT is superior when taught in supervised sessions compared to providing information booklets. PREPARE reinforces a minimum of 2 one-hour sessions supervising inspiratory muscle training. Surgery creates an overall catabolic state and anabolic resistance is more prevalent in the elderly. The MUST score reliably predicts risk of malnutrition. PREPARE provides a tailored dietetics review for patients when surgery is planned ≥2 weeks ahead. The effects of nutrition and exercise-induced muscle synthesis are synergistic. PREPARE effectively combines both and targets ‘at risk’ population. Identifying eligible candidates earlier ahead of planned surgery will allow more patients to reap the benefits of PREPARE.
Preoperative cognitive assessment in elderly: retrospective observational study

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Background and goal of the study: Advanced age and impaired cognition are generally reported to be associated with postoperative cognitive complications. However, cognitive evaluation is not a standard routine part of the preoperative risk stratification of the surgical patient. The goal of this study is to present a descriptive analysis of surgical elderly patients of a tertiary medical center, including performance on cognitive screening tests.

Material and Methods: Surgical patients over 60 years are submitted to cognitive evaluation by the physician anesthesiologist in a preoperative assessment clinic. The initial screenings are the Clock Drawing Test and the 10-point Cognitive Screener (10-CS). If the patient had one or both screening impaired, Montreal Cognitive Assessment (MoCA) and the Geriatric Depression Scale (GDS-15) were applied.

Results and Discussion: Eighty-nine patients were included, being 56.2% male with a mean age of 71.5 years and mean schooling of 5.1 years. Fifty-six percent was classified as ASA 2 physical status with 90% reporting previous surgery. Urology and Ophthalmology were the surgical specialties more frequent. Twenty-four percent presented at least two comorbidities. High blood pressure, diabetes mellitus and chronic coronary artery disease were presented in 71%, 38%, and 30%, respectively. Sixty-eight percent reported a cognitive complaint. The MoCA test was performed in 75 patients and the mean score was 19.6. Using cutoffs according to schooling, this test was altered in 27 patients (36%). The GDS-15 was applied to 75 patients, in which 33% had a score greater than 5, suggestive of depressive symptoms.

Conclusion: Cognitive screening protocols are feasible and provide information for perioperative care planning. On the other hand, such cognitive screening tests could be influenced by covariates. In this analysis, the MoCA was influenced by schooling and age, whereas the GDS-15 was not.


Effects of fish oil on cognitive function after splenectomy in rats

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Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a common complication after abdominal surgery. Several studies have reported that POCD is related to neuroinflammation induced by surgery. Fish oil (rich in a variety of ω-3 polyunsaturated fatty acids) can effectively inhibit the systematic inflammatory response. So we study the effects of fish oil on inflammation, immunity and cognitive behavior after splenectomy in rats.

Material and Methods: 60 SD rats were randomly divided into control group (Group C, n=20), surgery group (Group S, n=20) and fish oil intervention group (Group F, n=20). Fish oil was injected intraperitoneally 3 days before surgery and for 7 days after surgery in Group F, and normal saline was injected simultaneously in Group S. Rats in Group S and Group F all received splenectomy under general anesthesia. Morris water maze behavioral tests were performed on the first, third, fifth and seventh day after surgery. The levels of IL-1β, IL-6, TNF-α, SOD and GSH-PX were detected.

Results and Discussion: Serum IL-1β, IL-6, and TNF-α concentrations in Group S and Group F were higher than those in Group C (P < 0.01), while those inflammatory cytokines in Group F were significantly lower than those in Group S (P < 0.01); serum SOD and GSH-PX levels in Group F were higher than those in Group S (P < 0.01). The Morris water maze behavior performances of Group F were better than those in Group S (P < 0.05).

Conclusion: Fish oil can effectively improve postoperative inflammatory response, reduce the damage of antioxidant defense system, and improve postoperative cognitive function.

Preoperative delirium and postoperative complication spectrum, beyond anesthetic horizon: a machine learning approach

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Background and Goal: Postoperative delirium (POD) is multifactorial and results from interactions between predisposing vulnerabilities, complex comorbidities, neuroinflammation and cognitive status) and precipitating factors (hospitalization, anesthesia, surgical trauma and perioperative complications) that can accelerate or culminate with POD. The aim of this study was to identify the relationship between preoperative and postoperative complications in high-risk surgical patients (HRSP). Complications were measured by Postoperative Morbidity Survey scale. Traditional logistic regression (LR) model was done considering POD as main outcome and postoperative complications, as well as their number, as factors. Machine learning algorithms (development of models) were used to determine the risk of POD.

Materials and Methods: Cohort of 966 HRSP undergoing surgery at a Brazilian tertiary hospital between March 19th 2018 and July 1st 2019. Surgical risk was identified as probability of death > 5% by a the SAMPE Risk Model). Complications were measured by Postoperative Morbidity Survey scale. Traditional logistic regression (LR) model was done considering POD as main outcome and postoperative complications, as well as their number, as factors. Machine learning algorithms (development of models) were used to determine the risk of POD.

Results and Discussion: 966 HRSP (77% ASA III, 15% ASA IV and 2.5% ASA V) underwent 165 urgent cases and 67% major surgeries. Incidence of POD was 6% and in-hospital death was 17%. Main variables associated with POD for the ML algorithm were number of complications (main feature), ventilatory support, hemodynamic instability, abdominal complications, reintervention, oliguria and infection. The LR model showed the best AUC 0.728, in contrast with the AUC of 0.54 in the RFC. In the traditional LR model, number of complications was analyzed with splines (absence of linearity) and was the only significant variable to predict POD. The odds-ratio for the presence of one complication was 5.16 (CI 3.68-7.24), for 2 complications 20.67 (CI 11.31-37.78) with successive increase.

Conclusion: ML algorithms accurately identified patients at risk of POD based on the presence of postoperative complications. The number of complications, more than single site complications seems to be the most important factor for POD development.
to surgery could improve the management of these patients. The use of self-administered and shortly completed validated test may enhance the adherence of patients for optimal evaluation.

References:

6054
Preoperative anxiety in ambulatory surgery - a multicentric prospective observational study (preliminary results)

Background and Goal of Study: In developed countries surgery is very common and most patients suffer from a variable degree of preoperative anxiety. Excessive anxiety is associated to increased postoperative complications, including pain. We aim: to evaluate the performance of the Surgical Fear Questionnaire (SFQ) and Anxiety Numeric Rating Scale (ANRS) as instruments for assessing preoperative anxiety in Portuguese patients; identify predictive factors for preoperative anxiety; evaluate how anxiety scores relate to postoperative outcomes.

Materials and Methods: Multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inquinal hernia repair patients were recruited in 3 Portuguese ambulatory units, from September 2018 to November 2019. Perioperative data included pain and anxiety ANRS (0-11) and SFQ (0-80). Postoperative outcomes were assessed through blind telephone interviews up to 3 months after surgery. Student's t-test and ANOVA were used to determine differences among groups; association between pain, patient satisfaction and anxiety scores were assessed using multiple regression techniques; alpha=0.05.

Results and Discussion: 237 men and 29 women were included, mean age 57.0 (12.9); 17% were smokers and 96% ASA< 3. Mean ANRS was 3,8 (2,5) and SFQ 21,7 (15,6), with a biggest contribution of short term items. 20% were considered to have high preoperative anxiety (scored higher than 1 standard deviation over the mean) in the ANRS and 15% in the SFQ. Women had consistently higher anxiety scores but only the SFQ showed statistically significant differences among genders (p=0.037). Age correlated with the total SFQ score (r=2.13, p=0.001) but not to the ANRS. We found a significant correlation of ANRS with SFQ (r=0.549, p<0.001); education level (r=0.150, p=0.015) and age (r=-2.13, p=0.001) correlated to total SFQ score. Multivariate regression identified preoperative pain as risk factor for SFQ score. Multivariate regression identified preoperative pain as risk factor for education level (r=0,150, p=0,015) and age (r=-2,13, p=0,001) correlated to total SFQ score. Multivariate regression identified preoperative pain as risk factor for education level (r=0,150, p=0,015) and age (r=-2,13, p=0,001) correlated to total SFQ score. Multivariate regression identified preoperative pain as risk factor for education level (r=0,150, p=0,015) and age (r=-2,13, p=0,001) correlated to total SFQ score.

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Perioperative levels of neurofilament light (NFL) in serum and its association with postoperative delirium (POD) after cardiac surgery
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Background and Goal of Study: POD remains a major issue after cardiac surgery. Direct neuronal damage ensuing anaesthesia and surgery might play a key role in its pathophysiological mechanism. NFL is a sensitive biomarker of neuronal injury. Our aim is to evaluate whether higher perioperative NFL levels in serum are predictors of POD.

Materials and Methods: The study is a secondary analysis from an ongoing research project (NCT03706989). Blood samples were collected pre- and postoperatively (H2, D1, D2, D5) in 30 patients undergoing elective cardiac surgery with cardiopulmonary bypass. Quantitative determination of NFL in serum was performed using the Simoa technique, a single-molecule array method. POD was detected by CAM-ICU, CAM and a chart review until hospital discharge. Mann-Whitney U test was used to compare patients with or without POD. A Friedman’s ANOVA and Wilcoxon tests were used to compare NFL over time in each group.

Results and Discussion: NFL at baseline increased significantly with age (p=0.001). All 30 patients presented a significant increase in NFL levels up to D5 (Fig 1). Patients who experienced POD had higher levels of NFL at D1 and D2 (Table 1).

Conclusion: These preliminary results show that NFL could be a potential biomarker of POD in cardiac surgery. We will further investigate the value of baseline NFL as a predictive biomarker of POD.

Reference:

Results: Median (P25-P75).
Use of palonosetron in the prophylaxis of postoperative nausea and vomiting in women undergoing laparoscopic cholecystectomy. A randomised double-blind study

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) occur in 30–50% of patients undergoing general anesthesia and in 70–80% of high PONV risk patients. In this study, we investigated the efficacy of palonosetron, a selective, second generation 5-hydroxytryptamine type 3 (5-HT3) receptor antagonist, compared to fosaprepitant, a neurokinin-1 (NK1) receptor antagonist. The study hypothesis is that administration of a single dose of palonosetron 75 µg or a single dose of fosaprepitant 150 mg, immediately after induction of anesthesia, has similar effectiveness in the prophylaxis of PONV in women undergoing laparoscopic cholecystectomies.

Materials and Methods: Seventy-four, non-smoker women, aged in 18-60 years, American Society of Anesthesiologists physical status (ASA) 1 to 2, were randomly allocated into two groups. The primary objective was to compare the number of patients who had vomiting in the first 48 postoperative hours. The antiemetic solutions were prepared in 250 ml (0.9% saline) by an anaesthesiologist not involved in the anaesthetic act and were administered intravenously (i.v.), after induction of anesthesia, in a single dose: palonosetron 75 µg or fosaprepitant 150 mg. General anesthesia was induced with propofol, fentanyl, lidocaine, clonidine and maintained with sevoflurane, remifentanil and rocuronium. The incidence of postoperative nausea and vomiting, number of complete responders and use of rescue antiemetic drug, were assessed at six time intervals (0–2, 2–6, 6–24, 24–48, 0–24 and 0–48 h). Nausea and vomiting frequency were expressed by Chi-square test.

Results and discussion: In palonosetron group, 13.5% of the patients experienced vomiting in the first 48 postoperative hours, compared with 16.2% in the fosaprepitant group, P=0.74. There were no differences in the total frequency nausea (51.4 vs 61.2%), P=0.34%, number of complete responders (48.6 vs 37.9%), P=0.34% and use of rescue medication (32.4 vs 35.1%), P=0.80. There were also no difference in the incidence of nausea and vomiting in the other periods evaluated.

Conclusion: Based on the results, the administration of a single dose of palonosetron after the induction of anaesthesia was as effective as the administration of single dose of fosaprepitant for the prophylaxis of PONV in women who underwent laparoscopic cholecystectomy.

May PONV cause subcutaneous emphysema of neck and face after total thyroidectomy?

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Background: As we know, PONV after thyroidectomy surgery is a common complication after general anesthesia (GA), rarely it can cause life threatening complications such as subcutaneous emphysema (SCE), especially after uneventful surgery and anesthesia. SCE occurs when airs gets into tissue under the skin. It is self-limited, but mediastinitis can occur with high mortality as 50%. We describe a case of SCE neck, face and upper thorax, which developed 36 hours after total thyroidectomy under GA, following forcefully vomiting and discussed about management, complications.

Case Report: We present our experience in management of a female patient 56 y.o., Apfel score IV (ondasetr 8 mg), that performed total thyroidectomy without evident events in our clinic. The patient is discharged from hospital the next days. After 36h she is readmitted in ER with sign of SCE of neck and face, anxiety, cough. She refered an episode of strong emesis home. Emergency CT-scan with injection of contrast revealed a SCE of upper chest, neck and head, no changes in blood formula, normal biochemical test, indirect laryngoscopy normal result, flexible bronchoscopy in 1/3 of trachea mucosal damage( biopsy). The SCE resolved with antibiotic treatment, antiocoagulants, corticosteroid, anti-H2-receptor, cough medicine, O2 therapy and drainage of thyroid space . The biopsies of thyroid nodes and trachea were normal. The patient was discharged home 18 days after, in stable condition.

Discussion: There are many differential diagnoses of SCE and it’s a rare complication after thyroidectomy and maybe has serious consequences. It usually resolves by itself , but a closed observation and conservative treatment were
A retrospective comparison of the prophylactic antiemetic efficacy of droperidol versus dexamethasone

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) is one of the most frequent and annoying adverse effects of laparoscopic operations. Antiemetic prophylaxis is highly suggested (1). The goal of this retrospective study is to compare the prophylactic antiemetic effect of droperidol and dexamethasone in patients undergoing laparoscopic interventions.

Materials and Methods: The study included 111 patients, ASA physical status I and II, that had undergone laparoscopic cholecystectomy. All demographic data, anesthesia time and anesthetic drug dosage was similar. All patients received propofol for induction of anesthesia, desflurane for maintenance of anesthesia, fentanyl and morphine for pain and rocuronium as a neuromuscular blocking agent.

Antiemetic prophylaxis is highly suggested (1). The goal of this retrospective study is to compare the prophylactic antiemetic effect of droperidol and dexamethasone in patients undergoing laparoscopic interventions. All demographic data, anesthesia time and anesthetic drug dosage was similar. All patients received propofol for induction of anesthesia, desflurane for maintenance of anesthesia, fentanyl and morphine for pain and rocuronium as a neuromuscular blocking agent.

Results and Discussion: The incidence of PONV during the first 24 hours after surgery was 15% for Dro group and 12% for Dex group (p=0.35). Rescue antiemetic treatment during the study period was required in 9% of patients in Group Dro and 2% of patients in Group Dex (p<0.05). No side effects related to the use of droperidol and dexamethasone were found.

Conclusion: Droperidol and dexamethasone had similar effects on preventing the incidence of PONV. The need for rescue antiemetic treatment was significantly lower in dexamethasone group compared to droperidol group.

References:

Perioperative Medicine

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Postoperative nausea and vomiting in a tertiary center - are anaesthesiologists acting correctly? An audit

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Background and Goal of Study: Postoperative nausea and vomiting (PONV) are reported as a frequent complication in patients undergoing general anaesthesia. Portuguese recommendations for the management of this condition are published, referring to strategies to identify PONV risk and prophylaxis 1,2. It has been demonstrated that target administration of PONV prophylaxis to those with at increased risk of PONV reduces its incidence 3. Previous studies demonstrated the guidelines for PONV prophylaxis are implemented widely but their effectiveness may be limited by poor adherence 2. The aim of this work is to verify the compliance of anaesthesiologists (ANE) in adopting the appropriate prophylactic strategy according to patient’s PONV risk stratification.

Materials and Methods: Prospective audit, performed in 09/2019, in a inpatient surgery unit of a tertiary center. Paediatric patient were excluded. Validated risk factors (RF) according to the Apfel Score (female, non-smoking status, previous history of PONV and motion sickness, opioids in the perioperative period) were registered as well as intraoperative prophylaxis therapy administered.

Results and Discussion: We analyzed data related to 151 patients (P). Mean age was 61±17years old, with 52% male, from different surgical specialties: general surgery 42%, orthopedic surgery 16%, urology 18%, vascular surgery 8%, neurosurgery 8% and gynecology 8%. 0-1RF was found in 22.5%, 2RF in 35.8%, and 3RF in 41.7%. Prophylaxis was adequate in 56% of patient with 1RF, in 59% of patient with 2RF and in 32% of patient with 3RF. Overall, prophylaxis was adequate in 47% of the cases. 40% of the patient had more prophylaxis and 12% had less than the recommended. The results obtained demonstrate a low compliance rate by ANE in PONV prophylaxis taking into account the patient’s risk. They also show that the ANE tend to over medicate the patients.

Conclusion: This audit demonstrated the need for a reflection in medical conduct in order to bring ANE action closer to the recommendations and don’t jeopardize the effectiveness of a clinical guideline.
Is there a time frame for PONV; A retrospective study

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Background and Goal of Study: It is considered that PONV occurs mainly during the early postoperative period (1). The goal of this retrospective study was to determine the pattern of incidence of PONV.

Materials and Methods: We retrospectively examined the anesthetic charts and the medical records of patients that had undergone elective surgeries that are considered as highly emetogenic, such as laparoscopic cholecystectomy, breast and ENT surgery, as well as gynecologic operations for a period of six months. All operations enrolled in the study were performed under general anesthesia. All patients should have similar demographic data, antemetic prophylaxis, anesthetic drugs and drug dosage. 568 patients fitted the criteria. The incidence of PONV at 0-4, 4-8 and 8-12 hours postoperatively was noted.

Results and Discussion: 73 patients suffered PONV (12.8%). Only 11 patients (15%) had PONV 0-4h postoperatively. The peak of incidence was noticed during 4-8h postoperatively, when 45 patients (61.6%) suffered from PONV. From 8-12h postoperatively, 17 patients (23.3%) experienced PONV.

Conclusion: Patients develop PONV mainly in the late recovery period than in the early recovery period. Patients should be followed for at least 12h postoperatively for PONV. A second dose of antemetics is suggested.

References:

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Patient reported outcome measures for anesthesia: are patients ready?

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Background and Goal of Study: To measure effects of patients (pts) centered care, pts reported outcome measures (PROMS) have been defined. Few PROMS for anesthesia have been defined or tested. The Quality of Recovery-15 score (QoR-15) could be suitable for PROMS for anesthesia, as it is a comprehensive and validated score, covering most postoperative issues about recovery after anesthesia. Primary goal: to determine the ideal moment of collecting QoR-15, hereby assessing QoR-15 at postop days +1, +4, +7, +14, +28. Secondary goal: reasons why pts are not included or why they drop out.

Materials and Methods: All pts scheduled for elective TKP and THP were screened during a pre-anesthesia assessment 1 month before surgery. Exclusion criteria: revision or urgent surgery. Reasons for non-inclusion were documented. 2 ways for reporting QoR-15 were offered: electronically or on paper. Interventions to minimize drop out: visit on postop day +1, contact per email or telephone when electronic reporting was absent, contact per email to return papers and when papers were not returned.

The study has been approved by the Committee for Medical Ethics of az Sint-Blasius. Informed consent is registered. EU-GDPR requirements are met.

Statistical tests: ChiSquare and Student t; p<0.05 is statistically significant.

Results and Discussion: In Fig 1 we present the results of the first 5 months of inclusion (May 24-Sep 25 2019). 56.5% of screened pts were included. 11.5% were excluded post hoc (revision surgery, surgery postponed, technical problems with electronic reporting). 42.3% chose electronic reporting, 46.2% on paper. Finally, only 33.3% of the included completed the questionnaire, statistically more in the electronic group (51.5% vs. 28%, p<0.05). Mean age did not differ between included and not included pts: 66±10y (p=1).

Conclusions: Pts do not seem to be very interested in PROMS for anesthesia. Despite interventions to minimize drop out after inclusion, drop out numbers were high, especially in the paper-reporting group. Electronic reporting seems to give better results. It remains unclear whether these PROMS are worth the effort in this population, anno 2019.

The impact of midazolam on postoperative pain - a multicentric prospective observational study (preliminary results)


Background and Goal of Study: Midazolam may affect postoperative pain, with animal studies suggesting systemic midazolam is hyperalgesic. In humans, scarce data show conflicting results. Anxiety contributes to pain and may be a confounder. We aim to clarify the relation between anxiety, midazolam and pain, and hypothesize that midazolam administered preoperatively might increase pain perception.

Materials and Methods: Multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 3 Portuguese ambulatory units, from September 2018 to November 2019. Perioperative data including pain and anxiety were collected. Postoperatively, pain was assessed through a blind telephone interview 24h, 7 days and 3 months after surgery. Association between pain, anxiety and midazolam were assessed, including subgroup analysis and multiple regression techniques; alpha=0.05.

Results and Discussion: 237 men and 29 women were included, mean age 57.0 (12.9); 17% were smokers and 96% ASA<3. Patients administered midazolam (any dose) were less satisfied at 7 days (p=0.012) and 3 months (p<0.001) than patients not administered midazolam, however there was no direct impact of midazolam administration on postoperative pain. Multivariate regression identified risk factors for postoperative pain: lower age (p=0.012), preoperative pain (p=0.039), preoperative anxiety (p=0.010), non smoking (p=0.041) and female gender (p=0.006). Chronic benzodiazepine consumption (p=0.016), higher education level (p=0.025) and presence of preoperative pain (p=0.017) were associated to lower patient satisfaction. 24h-pain correlared to 7-day (p=0.001) and 3-month pain (p=0.005). The odds of referring moderate to severe postoperative pain (NRS >3) decreased with age - adjOR 0.993 (0.929-0.997) and increased with preoperative anxiety - adjOR 1.167 (1.034-1.318) - and pain adjOR 1.199 (1.049-1.370).

Conclusion: In open inguinal hernia repair, the administration of preoperative midazolam did not show any impact on postoperative pain. However, a randomized controlled trial would best answer this question, as anxiety is a clear risk factor for postoperative pain, being a confounder in this relation.
Effect of anesthesia technique by anesthesiologist on intra-operative and post-operative morphine equivalent daily dose (MEDD) and highest post-anesthesia care unit (PACU) pain score in open gynecologic surgery in an Enhanced Recovery after Surgery (ERAS) pathway

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1University Of Texas MD Anderson Cancer Center - Houston (United States), 2University of Texas MD Anderson Cancer Center - Houston (United States)

Background and Goal of Study: To examine the effect of anesthesia technique by anesthesiologist in an ERAS pathway on intra and post-operative morphine equivalent daily dose (MEDD) and PACU pain score. Inhalational, total intravenous anesthesia (TIVA); and combined technique of inhalational and intravenous anesthesia were analyzed. Anesthesiologists were divided into groups, group 1 included anesthesiologists adhering to ERAS goals for our pathway and group 2 anesthesiologists who did not adhere to pathway. The hypothesis was that anesthesiologists adhering to ERAS pathway goals would have lower MEDD and PACU pain scores.

Materials and Methods: Patients undergoing open gynecologic surgery under an ERAS program from November 3, 2014 through December 31, 2018 were included. Patients were categorized into three groups: 1) Inhalational 2) TIVA and 3) combined inhalational and TIVA. Cases were eliminated if the anesthesiologist performed < 1% of total cases. Anesthesiologists were grouped according to the number of inhalational cases: <35% inhalational=group 1, all others in group 2 (316 cases among group 1, 349 cases among group 2). Less than <35% inhalational cases assured us of a core group of anesthesiologist providing pathway management. Descriptive statistics were used to summarize the demographic and clinical characteristics of patients overall and by anesthesia technique (inhalational, intravenous, and combined). MEDD was recorded as the total dose received intra-operative and post-operative including doses received through post-operative day 3. Separate Kruskal-Wallis tests were used to compare intraoperative and post-operative MEDD among the anesthesia provider groups. All statistical analyses were performed using SAS 9.4 for Windows.

Results and Discussion: There were 665 patients included in analysis. Patients who underwent anesthesia from group 1 received significantly less intra-operative MEDD [mean (standard deviation)]: [47.2(22.4)] versus group 2 [62.4(45.7)], p<0.001. Patients who underwent anesthesia from group 1 had lower highest pain in PACU (mean [standard deviation]): 4.4(3.0) versus group 2 5.1(3.0), p<0.003. There were no differences between the groups in respect to post-operative MEDD, surgical time, or length of stay.

Conclusion: Anesthesiologists have an impact on patient outcomes on an ERAS pathway by decreasing intra-operative MEDD and reducing highest pain scores in PACU by adhering to ERAS pathway principles of multimodal analgesia.

Can routine perioperative haemodynamic parameters predict postoperative morbidity after major surgery?

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Background and Goal of Study: Postoperative morbidity occurs in 10-15% of patients undergoing major, non-cardiac surgery. Predicting which patients are at higher risk of morbidity may help to optimize perioperative prevention. Preoperative haemodynamic parameters, Systolic Arterial Pressure (SAP)<100mmHg, Pulse Pressure (PP)>52 mmHg or <53 mmHg, and Heart Rate (HR)>87min⁻¹are all associated with increased postoperative morbidity. We evaluated the correlation between these and other routine haemodynamic parameters, measured intraoperatively during anaesthesia, with postoperative morbidity. Postoperative morbidity was measured by the Comprehensive Complication Index (CCI) and length of stay (LOS). Additionally we also correlated CCI with the cardiac risk biomarker, preoperative NT-proBNP.

Materials and Methods: This is a retrospective analysis of patients in MET-REPAIR, a pan-European observational study correlating self-reported physical activity with postoperative morbidity. Patients’ electronic anaesthetic records (EARS), including preoperative haemodynamic data, was correlated with 30-day postoperative morbidity, CCI and LOS parameters. Statistical analysis to assess for correlation was by Kendall’s Correlation Coefficient for tied ranks (Tau-B) or Spearman’s Correlation Coefficient. Blood for NT-proBNP measurement was collected <31 days before surgery.

Results and Discussion: Data from n=50 patients was analysed. The intraoperative duration of PP>62 mmHg was associated with a patient’s postoperative LOS(tau=0.317, p=0.007). When stratified according to age>70 years, the duration of SAP<75 mmHg was associated with a higher CCI(tau=0.57, p=0.001) and prolonged LOS(tau=0.39, p=0.02). When stratified according to ASA>3, the duration of SAP<100 and PP>62 were also associated with an increased CCI and LOS. There was no correlation between preoperative NT-proBNP and either CCI or LOS. Conclusion: In older patients the duration of intraoperative pulse pressure (PP)>62 mmHg and mean arterial pressure (MAP)<75 mmHg, as well as SAP>100 mmHg in ASA>3 patients, are associated with increased postoperative CCI and LOS. These findings warrant confirmation in larger databases and evaluation of whether real-time intraoperative intervention could reduce postoperative morbidity.
baseline while the perioperative does not. Both are defined by postoperative hsTnT ≥65ng/l or values between 20–65ng/l with an additional consecutive increase by at least 5ng/l. In addition, the perioperative definition requires a postoperative increase of at least 30%, when the baseline hsTnT >20ng/l. Primary Endpoint is the incidence of severe complications until hospital discharge defined by a Clavien Dindo Score (CDC) ≥ 3 in the nine domains of the Postoperative Morbidity Survey (2,3). The incidences are compared using Chi2 tests. The positive predictive values are compared with McNemar.

Results and Discussion: The perioperative mortality was 2.4%. During the PACU time, 12.9% of patients developed MINS when using the perioperative definition and 17.2% with the postoperative definition. The incidences of complications are displayed in the table. Both MINS definitions can predict postoperative complications. The perioperative definition shows a better positive predictive value for cardiac and non-cardiac complications (p <0.001).

### Table: Cohort Analysis

<table>
<thead>
<tr>
<th>Hypotension Threshold</th>
<th>MINS</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>at least one complication (CD ≥ 3)</td>
<td>288/867 (33.7%)</td>
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</tr>
<tr>
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<td>at least one complication (CD ≥ 3)</td>
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<td>226/867 (26.0%)</td>
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<tr>
<td>postoperative</td>
<td>212/826 (25.7%)</td>
<td>0.860</td>
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</table>

Conclusion: Our study supports the need for hsTnT determination at the PACU in order to predict postoperative complications in high risk patients. While preoperative hsTnT does not improve overall risk prediction, it may help to better discriminate between cardiac and non-cardiac complications.

Reference:

### 5053

**Duration and Timing of Intraoperative Hypotension and its Impact on Early Postoperative Acute Kidney Injury in Cystectomy Patients – A Retrospective Cohort Analysis**

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**Background and Goal of Study:** Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. Mean arterial blood pressures (MAP) below thresholds of 65 mmHg have been progressively associated with acute kidney injury (AKI) in a non-urological population. The aim of this study was to confirm these findings in a homogenous population under major urological surgery.

**Materials and Methods:** In this retrospective observational single tertiary high caseload centre cohort series we analysed intraoperative data of 416 patients undergoing open radical cystectomy with urinary diversion between 2013 and 2019 and their correlation to postoperative AKI judged according to the Acute Kidney Injury Network criteria. We assessed the risk for postoperative AKI for different hypotension thresholds in form of time below a fixed threshold. Patients were divided into groups falling below MAP < 65 mmHg, MAP < 60 mmHg and MAP < 55 mmHg. The probability of developing postoperative AKI using all risk variables as calculated using regression method.

**Results and Discussion:** Postoperative AKI was diagnosed in 128/416 patients (30.8%). Multiple regression analysis show that for every minute below a threshold of 65mmHg (OR 1.010 [1.005 – 1.015], p = 0.001) and 60mmHg (OR 1.012 [1.001 – 1.023], p = 0.02) the risk of developing AKI increases by 1.0% or 1.2%, respectively. On average, 26.5% (MAP < 65 mmHg), 50.0% (MAP < 60 mmHg) and 76.5% (MAP < 55 mmHg) of minutes below a certain threshold occurred between induction of anaesthesia and start of surgery and are thus fully attributable to anaesthesiological management.

### Table: Comparison of MINS and postoperative definitions

<table>
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<td>0.860</td>
</tr>
</tbody>
</table>

Conclusion: With increasing time below hypotension thresholds of MAP <65mmHg and <60mmHg the risk for developing postoperative AKI escalates. Special attention has to be paid to the time between induction of anaesthesia and surgical incision as many episodes of hypotension occur in this period.

### 4761

**Elevated preoperative Pulse Pressure is not associated with postoperative acute kidney injury in patients undergoing colo-rectal surgery**

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**Background and Goal of Study:** High preoperative pulse pressure (PP) has been identified as a predictor of postoperative acute kidney injury (AKI) in cardiac and non-cardiac surgery. The present study was aimed at determining whether baseline PP is associated with increased postoperative AKI in patients undergoing elective or emergency colorectal surgery.

**Materials and Methods:** Retrospective chart review of all patients submitted for colorectal surgery at our institution during a 6-year period. Baseline PP and other relevant preoperative and intraoperative data were investigated as predictors of AKI, cardiovascular complications, and mortality. Associations were analysed by the chi-square and Mann-Whitney U tests, and adjusted by multivariate logistic regression.

**Results and Discussion:** 738 patients were included. The baseline PP was <40 mm Hg in 105 (13.1%), 40-80 mm Hg in 622 (77.9%), and >80 mm Hg in 71 (8.9%). The incidence of postoperative AKI was 11.4%. There was a trend for a higher PP in patients with AKI, cardiovascular complications, and mortality. Associations were analysed by the chi-square and Mann-Whitney U tests, and adjusted by multivariate logistic regression.

**Conclusions:** Elevated baseline PP was not associated with postoperative AKI in patients undergoing colorectal surgery.

**Acknowledgements:** Arturo Pereira, Senior hematologist from Hospital Clinic Barcelona, for his advice and for performing the statistical analysis.
Perioperative Fluid Management, Vasopressor Use and transfusion rate in Breast Reconstructive Deep Inferior Epigastric Perforator (DIEP) artery Flap Surgery: a retrospective study

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Background and Goal of Study: Anaesthetic management in reconstructive breast surgery using Deep Inferior Epigastric Perforator (DIEP) artery flap may influence on success rate of this surgery. Fluid therapy, vasopressor administration and blood management are controversial. The aim of our study was to audit hemodynamic management and to assess its impact on perioperative outcomes in our patients.

Materials and Methods: We gathered data from medical records of patients who underwent DIEP flap surgery in our centre between 2014 and 2019. Data collected: anthropometric data, ASA, comorbidities; anesthetic technique, length of surgery, perioperative complications, perioperative fluid therapy, vasopressors administered, transfusion rate, reintervention requirements and hospital stay. Results were reported as mean (SD) in quantitative data and percentage in qualitative data.

Results and Discussion: Sixty-seven patients were included. Preoperative hemoglobin (Hb) was 12.61(1.47) g/L and postoperative Hb 10.36(1.53) g/L. Intraoperative fluid therapy was 6.54(2.85) ml/Kg/hand in the peroperative period, 3.17(0.69) ml/Kg/h. Colloids were administered in 44.8% patients and 20.4% needed ephedrine, 5.25(10.81) mg to optimize hemodynamics. Blood transfusion was required in 26.5% patients. Thirty patients had postsurgical complications and 25.6% of them needed reintervention. Postsurgical complications were higher if colloids were administered (p=0.006). Red Blood Cell (RBC) transfusion was higher in patients who had postsurgical complications (p=0.034) and this therapy was also related to an increase in postsurgical complications (p=0.028). Neither perioperative fluid therapy, nor vasopressor use nor transfusion therapy were related to a longer hospital stay.

Conclusion: Intraoperative colloids administration and perioperative RBC transfusion may worsen outcomes in DIEP flap surgery. RBC transfusion has been related to a potential increase in flap thrombotic events and infectious complications. PBM programs may optimize perioperative outcomes and reduce postsurgical complications due to RBC transfusion.

Increasing Number of Episodes of Intraoperative Hypotension is associated with Early Postoperative Acute Kidney Injury in Cystectomy Patients – Results from a Retrospective Cohort Analysis

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Background and Goal of Study: Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. It has been progressively associated with acute kidney injury (AKI). In a sub study of major urological procedures, we hypothesized that the number of episodes of falling below a certain hypotension threshold intraoperatively is a risk factor for postoperative AKI.

Materials and Methods: We analysed data of 416 patients undergoing open radical cystectomy with urinary diversion at our high caseload centre between 2013 and 2019. Intraoperative hypotension was defined as a mean arterial blood pressure (MAP) < 65 mmHg. The number of hypotension episodes were divided into 4 subgroups: 1-3 episodes: 26.9%, 4-8 episodes 61.5%, but no significance could be shown, mainly due to lack of statistical power.

Results and Discussion: Figure 1 illustrates predicted probabilities for postoperative AKI using an average of our patient population. For a MAP below 65 mmHg, the probabilities for AKI increased with increasing number of episodes (1 - 3 episodes: 26.9%, 4 - 8 episodes 61.5%), but no significance could be shown, mainly due to lack of statistical power.

Conclusion: Our results suggest that avoiding repeated episodes of intraoperative hypotension will protect postoperative renal function in cystectomy patients.

Perioperative AKI and mortality in elective major non-cardiac surgery at Queen Elizabeth Hospital, Birmingham (QEH)

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Background: Perioperative acute kidney injury (AKI) is associated with an increased morbidity, mortality, length of stay (LOS) and costs. Most large studies have not investigated this in purely elective major surgical cohorts.

Aims: To determine the incidence of post-operative AKI in elective major surgery patients for 2015-2017 at QEH. Secondary objectives: - Ascertain mortality rate associated with post-op AKI. - Identify risk factors for post-op AKI: surgical specialty, age, gender and ethnicity. - Compare LOS in patients with post-op AKI vs no post-op AKI.

Methods: Retrospective analysis of patients having elective major non-cardiac surgery for 2015-2017. Surgery was deemed major if it fulfilled the definition in
Lee's Revised Cardiac Index, or if it was listed as major under BUPA categorisation. Data was retrieved from two patient electronic record systems: Patient Administrative System, and Prescribing Information and Communications System. Suitable inclusion and exclusion criteria were applied to the data sets. AKI was defined according to KDIGO criteria. Differences between groups was compared using the Chi Squared and Student's t-test.

Results and Discussion: A total of 48,246 episodes were screened. 33,976 episodes were excluded leaving a cohort of 14,270 patients. Of these, 6,598 patients had suitable data for analysis. A summary of the significant findings is as below.

<table>
<thead>
<tr>
<th>No. AKI (n=920)</th>
<th>AKI (n=910)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>51.6</td>
</tr>
<tr>
<td>Male %</td>
<td>58.6</td>
</tr>
<tr>
<td>LDD &gt; 5 days</td>
<td>22.3</td>
</tr>
<tr>
<td>Mean LDD (days)</td>
<td>4</td>
</tr>
<tr>
<td>Chinese ethnicity</td>
<td>19.7</td>
</tr>
<tr>
<td>Mortality %</td>
<td>0.4</td>
</tr>
<tr>
<td>Preoperative SBP</td>
<td>10.0 (3.4)</td>
</tr>
</tbody>
</table>

Conclusion: In our large QEH data set, AKI occurred in a high proportion of patients and was clearly associated with a longer length of stay and a several-fold increased risk of mortality. Risk factors associated with AKI occurrence included older age and Chinese ethnicity. Male sex was not a risk factor, which conflicts with published data. More research is required to understand how AKI can be prevented.

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Contribution of the novel pulse oximeter–based index in determining the amount of postoperative supplemental oxygen needed

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Background and Goal of Study: Postoperative supplemental oxygen to prevent hypoxia can cause hyperoxia in some patients, which is reported to be associated with adverse effects, such as acute lung injury, increased hospital mortality, and worse outcomes in patients with ischemic stroke. Although blood gas analysis (BGA) is necessary to detect hyperoxia, it is invasive and intermittent. Oxygen reserve index (ORI™; Masimo Corp., Irvine, CA, USA) is a novel pulse oximeter–based index used to measure the oxygenation reserve status from 1 (much reserve) to 0 (no reserve). This study aimed to investigate whether the extent of postoperative hyperoxia can be limited by the use of ORI to determine the amount of supplemental oxygen needed and to evaluate the frequency of hypoxia.

Materials and Methods: We enrolled 50 patients with American Society of Anesthesiologists physical status class 1 or 2 scheduled for breast surgery. The patients were randomly assigned to one of the two groups: one received ORI-based oxygen treatment (group O) and the other received conventional postoperative oxygen treatment (group C). In group O, oxygen was administered at 4 L/min in the operation room after extubation. If ORI > 0.00, oxygen was decreased by 0.5 L/min until ORI was 0.00 for 30 min continuously in the post anesthesia care unit (PACU) and wards. In group C, oxygen was administered at a fixed amount (4 L/min) throughout the research period. Oxygen was administered via the nasal canula until the morning after surgery in both groups. BGA was performed 1 h after anesthesia induction (T0), after extubation (T1), before exit from PACU (T2), and on the morning after surgery in the wards (T3). Peripheral capillary oxygen saturation (SpO2) was measured every 2 s from 9 PM to 6 AM of the operation day. A two-way repeated-measures analysis of variance with post-hoc unpaired t-test was used to compare the partial pressure of arterial oxygen (PaO2) between the groups. Hypoxia was defined as PaO2 <120 mm Hg, whereas hyperoxia was defined as continuous SpO2 value ≤ 94% for more than 1 min.

Results and Discussion: PaO2 was significantly lower in group O than in group C at T2 [117.3 (28.8) vs. 170.0 (42.8) mmHg] and T3 [107.6 (16.5) vs. 157.1 (28.4) mmHg], mean (SD); p < 0.01). There were no patients with hypoxia.

Conclusion: Determining postoperative supplemental oxygen amount using ORI can noninvasively suppress hypoxia, preventing hyperoxia.

5783

Does the use of continuous non-invasive blood pressure monitoring during non-cardiac surgery reduce amount of intraoperative hypotension?

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Background and Goal of Study: Intraoperative hypotension is strongly associated with postoperative mortality.1 Even short periods of mean arterial pressure lower than 65mmHg are associated with worse outcomes such as myocardial injury and acute kidney injury.2 Continuous non-invasive monitoring may prevent long periods of hypotension but the extent of this reduction is unclear. The aim of this study is to investigate if continuous blood pressure monitoring with a non-invasive cuff in patients undergoing noncardiac surgery reduces the amount of hypotension when compared to standard intermittent oscillometric blood pressure monitoring.

Materials and Methods: We retrospectively reviewed medical records of forty eight patients, 45 years and above, who underwent major, noncardiac abdominal surgery, lasting more than two hours. Twenty four patients were monitored intraoperatively with continuous hemodynamic monitoring with ClearSight (Edwards) (Group A), whereas the control group (24 patients) was monitored with the standard intermittent oscillometric blood pressure measurement. Gender, ASA physical status, comorbidities, blood loss, transfusion rates were also recorded. Episodes of mean arterial pressure (MAP) below threshold of 65mmHg was compared between two groups using Wilcoxon rank sum test and Hodges Lehmann estimation of location shift with corresponding asymptotic 95% confidence interval.

Results and Discussion: There were no demographic differences between the two groups. Among 24 patients in each group, patients with continuous blood pressure monitoring had significantly lower total amount of MAP under 65 mmHg 0.05 [0.00, 0.22] mmHg vs. intermittent blood pressure monitoring 0.11 [0.00, 0.54] mmHg (P=0.039, significance criteria P<0.048).

Conclusion: Continuous blood pressure monitoring during major non-cardiac surgery significantly reduced the magnitude of hypotension below threshold of MAP 65mmHg.

References:

4405

Perioperative factors associated with postoperative morbidity after emergency laparotomy:
A retrospective analysis in a university teaching hospital

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Background and Goal of Study: Emergency laparotomy(EL) is a complex surgical procedure associated with increased morbidity and mortality. The UK National Emergency Laparotomy Audit (NELA) has identified variation in practice and patient outcomes, with 30-day mortality ranging between 7-15%. NELA and other observational studies show correlation between preoperative haemodynamic parameters(e.g. mean arterial blood pressure <80mmHg for >10 minutes) and increased postoperative mortality. The association between intraoperative haemodynamic parameters and overall postoperative morbidity has not been evaluated in EL patients. Our objective in this analysis is to investigate the association between preoperative, intraoperative haemodynamic and other parameters and the post-operative morbidity.

Materials and Methods: The Comperhensive Complication Index(CCI) is a scale where higher scores indicate higher morbidity impact. In this retrospective clinical analysis, we correlated a range of perioperative parameters with CCI, among the patient who underwent EL during 2018.

Results and Discussion: Digital and paper records of all n=96 patients who had EL were evaluated. Mean±SD age was 64±16 yr, 44% being surgical category 1 Emergency. Median (25-75%) CCI was 27[9-45], and 30 day-mortality was 11.7%. While a number of intraoperative parameters correlated with CCI on univariate analysis, multivariable linear regression indicated only ASA status(P=0.005) and unplanned escalation to postoperative intensive care(P<0.03) were independently associated with CCI.

Conclusion: This retrospective analysis n=96 patients undergone EL in a university teaching hospital has shown that ASA status and unplanned escalation to ITU, but not intraoperative haemodynamic parameters, were independently associated with increased postoperative morbidity. This warrants confirmation in a larger scale observational study.
When you can't explain perioperative hypoxemia: think platypnea-orthodeoxia syndrome, a challenging diagnosis

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Background: Platypnea-orthodeoxia syndrome (POS) is a rare condition of positional dyspnea and hypoxemia.1 The aim of this paper is to describe a case of hypoxemia with no obvious reason in the perioperative scenario.

Case Report: A 75-year-old man was submitted, under general anesthesia, to a radical prostatectomy. His background included arterial hypertension, isoeemic stroke and HIV infection. For several occasions after anesthetic induction, peripheral oxygen saturation (SpO2) decreased from 100% to 86-90% without any feasible cause apart from arterial hypotension, recovering right after phenylephrine administration. In the post-anesthesia care unit (PACU), severe hypoxemia (PaO2 41 mmHg, SpO2 77%) occurred and computed tomographic pulmonary angiography showed peripheral subsegmental pulmonary embolism that couldn't explain the clinical status. Due to the maintenance of severe hypoxemia without dyspnea, a right-to-left shunt was thought. Oddly, we've noticed hypoxemia correction with recumbency and aggravation with lifting the headboard and sitting position. A transesophageal echocardiography showed a right-to-left intracardiac shunt through a patent foramen ovale (PFO) with no pulmonary hypertension, establishing POS.

Discussion: This patient had no anesthetic background nor past desaturation events, so intraoperative hypoxemia with arterial hypotension was first related to peripheral hypoperfusion. Instead, it was due to a drop in systemic vascular resistance that raised intracardiac shunt fraction. Orthostatism leads to atrial distortion, promoting deoxygenated blood flow through a PFO leading to hypoxemia exacerbation with upright position as seen in the PACU. Achieving diagnosis of POS requires a broad workup and a high degree of suspicion but missing it can translate into higher morbidity.

References:

Learning points: This case shows that although rare and often unrecognized, POS is an important consideration in the differential diagnosis of hypoxemia with no clear or more obvious explanation. Prompt recognition is key.

6372
Comparison between the EXCARE Model, the SORT model and the ASA-PS scale in the prediction of in-hospital postoperative mortality within 30 days

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Background: Identifying the high-risk surgical patient in the preoperative period could improve care and enhance safety. In this context, we developed a perioperative risk stratification model: SAMPE Model. It is a statistical model that estimates the probability of 30-days in-hospital death, by the analysis of four variables: age, ASA-PS, nature of surgery (elective vs emergency) and surgical severity (minor, intermediate or major). Recently, we have updated SAMPE model and created a new one: the EXCARE model. The minor and intermediate surgical procedures were grouped, because there was no significant difference in the probability of death between the two types of surgery. We also observed that the increase in the probability of death in relation to age was not linear, and used splines technique to adjust this variable. The aim of this study is to compare the accuracy of this new model – the EXCARE model - with the SORT model and the ASA-PS scale, in the prediction of postoperative in-hospital death within 30 days.

Methods: We analyzed a cohort of 1,173 patients submitted to non-cardiac surgery between January 2016 and August 2018. Patients under 16 years, neurosurgery, outpatient surgery, obstetric procedures, diagnostic procedures and procedures under local anesthesia were excluded. The variables of the SORT model and the ExCare model were collected by the analysis of electronic medical records by a trained research staff. The final outcome was postoperative in-hospital death within 30 days. Statistical analysis was performed by SAS version 9.4. To compare the accuracy ExCare model, ASA-PS and SORT model for prediction of 30-days in-hospital mortality we used C-statistic. To evaluate the overall performance we calculate the Brier score. The DeLong's test was used to compare the three AUROC.

Results and Discussion: Mortality in the sample was 3.49% (n = 41). The ExCare model presented a good predictive capacity (AUC 0.89), superior to ASA-PS (AUROC 0.85). The SORT model presented an excellent accuracy (AUROC 0.92) in this cohort. There is a significant difference between AUROC ExCare and AUROC ASA-PS (p < 0.05) and there is no difference between AUROC ExCare and AUROC SORT (p = 0.25). The Brier score calculate to EXCARE, SORT and ASA-PS was, respectively: 0.026, 0.030 and 0.028.

Conclusion: The EXCARE model showed good accuracy, with advantage of using few variables that can be easily collected in the preoperative period.

4861
POSPOP (Preoperative Score to Predict Postoperative Mortality): useful tool for postoperative risk stratification? Application of the score at two centers in Brazil

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Background and Goal of Study: Due to the importance to accurately predict the in-hospital mortality. Le Manach et al. created the POSPOP score. Although it has a wide range of comorbidities, some known mortality risk variables are not addressed, like anemia and smoking. The goal of our study was to apply the score at Clinics Hospital (HC) and Center for Integral Attention to Women (CAISM) and analyze anemia and smoking load (SL) as possible predictors of mortality.

Materials and Methods: Retrospective data analysis identified patients older than 18 years who underwent elective surgeries for 4 months in HC and CAISM. For each one we recorded: gender, age, primary diagnosis, surgery, comorbidities, preoperative hemoglobin plasma levels (HB) and SL. We calculated the POSPOP score and related it to mortality.

Results and Discussion: Data were collected from a total of 1,411 patients. The mortality rate of the two hospitals was 1.20% (95% CI). Our study showed a positive relationship between the POSPOP score, HB and SL with mortality (Table 1). Some preoperative scores such as ASA, POSSUM, EuSOS, showed to have limitations, like data collected at hospital preoperatively, avoidance of the POSPOP. Patients with a higher score have a higher chance of postoperative mortality (Figure 1). Anemia is very prevalent worldwide and we found an inversely proportional relationship between HB and mortality, with similar and high odds ratio in previous studies. Few studies have considered smoking as an independent variable. We verified a positive correlation for the presence of smoking, with a proportional relationship of SL.

Conclusion: POSPOP showed a positive relationship and statistical significance with mortality in our cohort, as well as low HB and high SL have shown to be independent risk factors for mortality.

References:
2. Saimas V, et al. Relationship between intraoperative hypotension, defined by either reduction from baseline or absolute thresholds, and acute kidney and myocardial injury after noncardiac surgery: A retrospective cohort analysis. Anesthesiology 2017; 126: 47-65.

1 https://doi.org/10.1097/ALN.0000000000000972.
6028

Preoperative prediction of postoperative mortality using machine learning

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Background and Goal of Study: Preoperative prediction of postoperative mortality, which is the third leading cause of death [1], is essential for preoperative optimization and personalized perioperative care. However, the currently recommended scores ignore plenty of preoperative available data leading to an imprecise risk prediction. Machine learning (ML) may be suitable to organize and analyze these data in relation to postoperative mortality, and therefore, may offer better prediction of individual risk.

Materials and Methods: After ethical approval, all patients undergoing non-cardiac surgery at the university hospital of the Technical University of Munich between January 2014 and August 2019 were included. Data for training and testing the ML-algorithm were obtained from the electronic medical records. Features included in the model are procedural data (n=28), surgical codes (n=267), laboratory variables (n=988), data from preoperative assessment (n=181), and current medication (n=201) of 122,056 surgical procedures. The model to predict postoperative mortality was created by Extreme Gradient Boosting and the area under receiver operating curves (AUROC) was calculated. Importance of variables was displayed by information gain.

Results and Discussion: The perioperative mortality following any non-cardiac surgical procedure was 2.5%. The model predicts death based on 733 of 1665 factors with an AUROC of 96.3 (95.7-96.9). The most important five factors for mortality prediction are given in the table. In contrast to other ML based models with lower AUROC [2], we included procedural data as well as the planned surgery. Four of the top five factors with the highest information gain are such procedural features.

Conclusion: ML-based models for risk prediction of postoperative mortality need to include features without direct relation to the patients’ medical history and conditions.

References:

6249

Improving high-risk surgical patients outcomes: implementation of a bundle of extended-care during 48 hours in the postoperative period (the EXCARE Pathway): preliminary results

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Background and Goal of Study: While postoperative recovery is uncomplicated in the majority of cases, a proportion of high-risk surgical patients (HRSP) are prone to complications that have negative impact on rehabilitation, require disproportional amount of resources and are responsible for higher perioperative mortality rates. We aim to compare outcomes in HRSP population submitted to bundle of sustainable postoperative extended-care (EXCARE) to usual care. Our hypothesis is that EXCARE can increase the HRSP awareness and therefore reduce failure to rescue and postoperative morbimortality.

Methods: EXCARE bundle, implemented in a Brazilian tertiary hospital, comprises identification of the HRSP by the SAMPE Model, adoption of a HRSP handover, intensification of physician assistance on the ward (anesthetist, surgeons and clinical staff), more frequent checking of the vital signs and high-sensitivity cardiac troponin (TnT-hs), measure for 48 hours. EXCARE clinical pathway will be analyzed using before-and-after comparison (historical controls). Primary outcome is composed of 30-day mortality and pulmonary, infectious, renal, gastrointestinal, cardiovascular, neurological, hematological complications within 7 days. Secondary outcomes include hospital length of stay, number of Rapid Response Team (RRT) calls, unplanned postoperative ICU admission, surgical reintervention, elevation in TnT-hs and failure to rescue. A logistic regression model with individual propensity score will be calculated based on covariates that may influence the outcomes (significance level for all analysis of 5%).

Results: A prospective cohort of 361 patients was compared to a retrospective cohort of 963, both being HRSP was recruited so far. Preliminary results showed no change in most of postoperative clinical complications, except for higher transfusion rates (18 vs 12%, p<0.05), higher number of RRT calls (21% vs 11%, p<0.05), and higher number of surgical reinterventions (19% vs 8%, p<0.05) in the intervention group. There was significant decrease in postoperative death (9.1% vs 14.6%, p<0.05).

Conclusion: EXCARE bundle, using an objective risk communication tool and intensification of postoperative care based on processes changes in a sustainable proposal, decreased 30-day postoperative mortality. We believe that the extended care after surgery could speed-up recovery, reduce complications and provide instruments for better allocation of resources in health system.

5831

Evaluation of high surgical risk patients in general surgical population through a modified risk score

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Background: Surgeons, anesthesiologists, intensivists and health institutions aim to admit in ICU the surgical patients who will benefit most from this high level of postoperative care. The present study aims to analyse the most important factors in the preoperative risk score for complications.

Materials and Methods: A retrospective cohort of 216 patients was performed through the analysis of medical records of patients undergoing non-ambulatory surgery during May 2017. Descriptive analysis and Logistic Regression were performed, considering α ≤ 0.05. The software SPSS 19.0 IBM was used for analysis.

Results and Discussion: 51.9% of the patients were male. We identified a prevalence of young adults aged 30-60 years (50.9%), followed by patients over 60 (41.3 %). 30.1% of the surgical procedures were major. According to the American Society of Anesthesiology (ASA) physical status classification, 27.8% patients were classified as ASA 1 58.3%, as ASA 2 and 13.9% as ASA 3. According to the risk classification, 56 patients presented criteria to be classified as high surgical risk, 29 as intermediate and 131 as low. Of the 216 patients evaluated, 36 (16.7%) required intensive postoperative care, of which 25 remained for more than 3 days and 4 required new intensive care unit admission, 02 (0.9%) required postoperative mechanical ventilation, 05 (2.3%) patients underwent new surgical intervention and 03 (1.4%) patients died after surgical procedure. The independent risk factors associated with postoperative complications were age over 70 years (OR 43.5; IC95% 4.6-415.5; p<0.001), preoperative vascular or neurologic disease (OR 20; IC95% 1.8-221.3; p=0.015) and high risk for perioperative blood loss (OR 28.6; IC95% 2.9-280.8; p=0.004).

Conclusion: The present study provides detailed information on the profile of surgical patients, use of intensive care resources, and outcome of patients until hospital discharge. It also exposes the importance of stratifying risk and supporting surgical team decisions. It also had the primary function of identifying the main risk factors for postoperative complications in our institution in the risk score adapted to the hospital patient profile and already in use since April 2017.

References:
Pre and Post-Implementation Results of Enhanced Recovery After Surgery (ERAS) For Liver Surgery in an Asian Tertiary Institution

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Background and Goal of Study: ERAS was conceptualized in mid-90s for colorectal patients and has since been implemented in other surgical specialties. ERAS allows faster recovery, reduction of complication rates and hospital length of stay, without an increase in readmission rate. Liver resection poses unique challenges such as pre-existing liver disease or malignancy, postop coagulopathy, fluid management, biliary leak and postop organ failure.2 Our study aims to demonstrate results of ERAS in liver surgery at our institution, Singapore General Hospital, which is the largest tertiary hospital in Singapore.

Materials and Methods: Consent was obtained from Singhealth Centralised Institutional Review Board. We used surgical outcome data for open and laparoscopic liver surgeries. The outcome data from January - September 2017 was used as the baseline for pre-ERAS implementation and data from October 2017 - July 2019 was used for comparison post-implementation. ERAS programme was a multidisciplinary effort implemented from October 2017, which included preoperative education, intraoperative protocols for anaesthesia, postoperative care and post-discharge followup (figure 1).

Results and Discussion: Pre-implementation of ERAS, there was significant variation in median length of stay (LOS) (3 – 19 days) among individual surgeons as compared to the hospital median for both laparoscopic and open surgeries (figure 2). Following ERAS implementation, there was decreased median LOS from 6 to 3 days and decreased inter-surgeon variation in LOS (figure 3). The mean Post Operative Morbidity Survey (POMS) score at postoperative days (POD) 3, 5 and 7 was decreased for ERAS vs non-ERAS patients.

Conclusion: The ERAS programme reduced both the median and variation of LOS, as well as the POMS score at POD 3, 5 and 7 days. A standardized protocol with good compliance by surgeons, anaesthesiasts and nurses can improve surgical outcomes in patients coming for elective liver surgery.

References:

Risk in surgery: an analysis of several morbidity and mortality risk scores in a Portuguese University Hospital

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Background: There’s conflicting literature regarding our perception of the perioperative risk. If clinicians tend to overestimate the benefit of certain treatment, we also may overestimate risk in complex surgical patients. Some international guidelines include risk stratification as part of preoperative assessment. Our goal was to understand which risk scores were best related to the complications for which they were created, in our population.

Methods: We analyse the comorbidities of the various systems. We calculated the risk scores Revised Cardiac Risk Index, Gupta Perioperative Cardiac Risk, Multifactorial risk index for predicting postoperative respiratory failure (Arozullah), ARISCAT Score for Postoperative Pulmonary Complications, P-POSSUM and POSPOM. The outcomes analysed were in-hospital mortality; at 30 days: myocardial infarction (MI) or sudden cardiac arrest (SCA), pneumonia, pulmonary complications, morbidity and mortality; 6 month mortality.

Results and discussion: We collected data from 431 patients submitted to general surgery from March to May 2017. RCRI showed good discrimination in 30-day MI and SCA (AUC: 0.889; p-value: 0.007; CI: 0.742 – 1.000); GUPTA did not discriminate MI or SCA (curve crosses 0.5 and estimates may be biased); ARISCAT did not discriminate for pulmonary complications at 30 days (AUC: 0.846; p-value: 0.073); Arozullah showed reasonable discrimination for predicting postoperative respiratory complications (AUC: 0.704; p-value: 0.013; CI: 0.531 – 0.877); POSPOM showed good discrimination in in-hospital (AUC: 0.938; p-value: 0.009; CI: 0.880 – 0.998) and 30-day mortality (AUC: 0.902; p-value: 0.006; CI: 0.822 – 0.958), and reasonable discrimination for 30-day morbidity (AUC: 0.776; p-value: <0.001; CI: 0.680 – 0.872) and 6-month mortality (AUC: 0.730; p-value: 0.027; CI: 0.545 – 0.914); POSPOM showed good discrimination in in-hospital (AUC: 0.862; p-value: 0.031; CI: 0.747 – 0.977) and 30-day mortality (AUC: 0.873; p-value: 0.010; CI: 0.784 – 0.961), and did not discriminate at 6-month mortality (AUC: 0.653; p-value: 0.117).

Conclusion: POSPOM and POSPOM discriminated for the outcomes for which they were built, and they are an easy and fast tool to apply in risk assessment. RCRI showed good discrimination and is a simple and highly reproducible risk score. In the respiratory complications we had the most conflicting data: neither of the two scores showed good discrimination of postop pulmonary complications.

Preoperative malnutrition in the elderly – Who is at risk and its association with severe postoperative complications and prolonged hospital length of stay

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Background and Goal of Study: Malnourished elderly patients have longer hospital stays and more morbidities than those with normal nutritional state. Fortunately, malnutrition (MN) is potentially modifiable. To date, the prevalence of MN in the preoperative surgical population in Singapore is unknown. MN risk can be rapidly screened using the Malnutrition Universal Screening Tool (MUST). This study aims to assess the prevalence of MN risk in the preoperative elderly surgical population. We also examined factors associated with MN, and the association between MN risk and postoperative complications.

Materials and Methods: This is an audit of 1,033 elderly patients aged 65 years and older undergoing elective surgery at the Singapore General Hospital (SGH), a tertiary hospital, between January and March 2019. Patients were screened preoperatively for MN risk with MUST. Demographic data, comorbidities, operation details, postoperative complications and hospital length of stay (LOS) were recorded. Frailty was scored using the Edmonton Frail Scale; 30-day postoperative complications were scored using the Clavien-Dindo (CD) classification. Crosstabulation and multivariate logistic regression were done to determine the relationship between high MN risk (MUST ≥2) and high CD grade complications.

Results and Discussion: 11.9% of the patients were at risk of MN (MUST ≥1). Of this, 4.6% were at high risk (MUST ≥2). General surgery and gynaecological surgery had the highest prevalence of MN risk (22.3% and 22.3% vs 11.9%, p = 0.001). Higher ASA score, frailty (EFS ≥6), polypharmacy, and poor premed titration effort tolerance were associated with MN risk. Patients with high MN risk had higher odds of high CD grade complications compared to those with no risk (aOR 2.2, p<0.04) after multivariate adjustment for type and severity of surgery, presence of malignancy, presence of moderate to severe anaemia, CCI, EFS and ASA score. High MN risk was not associated with increased odds of infective complications.

Conclusion: MUST is validated for preoperative screening of MN. Patients with high MN risk have a higher risk of severe post-operative complications and longer hospital LOS. Patients with high comorbidity burden and frailty should be screened for MN so that nutritional optimisation can be sought.

Does the patient have normal nutrient score prior to digestive surgery anesthesia?

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Background and Goal of Study: Nutritive status assessment is one of the most important factors for post-operative recovery. On the other hand, the physiological stress of operation increases the risk of poor nutritional status which is related to poorer outcomes. The aim of this study is to estimate nutritional condition in pre-operative period and its relationship with other pre-operative factors like gender, BMI, ASA and Glasgow index in patient who undergoes gastrointestinal surgery.

Materials and Methods: Pre-operatively we collected general data of 75 patients who underwent gastrointestinal surgery like gender, ASA status, body weight, body height. The nutrition assessment was investigated with two nutritional screening tools: - Royal Marsden nutrition screening – Mini nutrition assessment short form (MNA-SF). In each patient we calculated Glasgow index which is ratio between CRP and Albumin value.

Results and Discussion: Out of 75 patients in total according to MNA-SF: - 21 (28 %) were detected with malnutrition; - 22 (29.3 %) patients were at risk of malnutrition; - 13 (17.3 %) patients had normal nutritional status; -19 (25.3 %) patients were at risk of undernutrition.
- 32 (42.66 %) patients had normal nutritional status. Most of the malnourished patients had RMMS ≥ 2 and significantly higher Glasgow score compared to patients with normal status and risk of malnutrition. According to BMI, 43 (57.3 %) patients in the group of patients with risk of malnutrition had normal BMI. Gender wise most of the patients in all three categories according to MNA-SF (males (13±18±14) × 43 (57.3 %); females (5±9±16) × 32 (42.6 %). According to ASA: Malnourished patients had higher ASA score compared with patients with normal status and the ones with risk of malnutrition.

Conclusion: Nutrition status determined with MNA-SF is strongly associated with BMI, Gender, ASA, RMMS score and Glasgow score, and could aid in pre-operative assessment of nutritive status. Future action is needed to optimize usage of MNA-SF and RMMS tools.

Materials and Methods: A retrospective analysis of data collected over a quality improvement program implemented during August 2018. The study was conducted in the National Taiwan University. Patients aged at least 20 years were included and classified according to surgery type. We excluded subjects who were unable to communicate or understand instructions clearly and those whose oral intake required strict restriction during the early post-surgical phase.

Results and Discussion: Moderate-to-severe thirst during the first PACU assessment was present in 675 (55.8%) patients. The use of glycopyrrolate during anesthesia was significantly more frequent in patients who experienced moderate-to-severe thirst. Notably, this variable was the only independent predictor of moderate-to-severe thirst identified (adjOR:1.46, p=0.013). A total of 900 patients entered into the thirst management optimization program. All of three management approaches (i.e., ice cubes, room temperature water, oral moisturizer) significantly decreased NRS scores over subsequent assessments conducted in the PACU (p<0.001). Adverse events occurred rarely and did not require specific interventions.

Conclusion: Moderate-to-severe post-operative thirst is commonly observed in the PACU and the use of glycopyrrolate is the main independent risk factor. Ice cubes or room temperature water are superior to an oral moisturizer for the management of post-operative thirst. From a practical standpoint, the supply of room temperature water every 15 min is a simple and safe strategy that may easily implemented in the early post-operative period in a high-volume PACU.

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Prevalence and risk factors for moderate-to-severe thirst in the post-anesthesia care unit: development of an optimized management protocol from a quality improvement program

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Background and Goal of Study: Post-operative thirst is common and may cause intense patient discomfort. Unfortunately, its clinical relevance is frequently downplayed, generally considered less distressing than other post-operative symptoms. Among various pathogenetic factors, preoperative fasting and fluid loss may lead to hyperosmolarity and hypovolemia. Moreover, certain drugs utilized in anesthetic practice may promote a thirst sensation, which can be further intensified by prolonged surgical and intubation times. We designed the current study with the following aims: (1) to examine the prevalence of moderate-to-severe post-operative thirst, (2) to identify the main risk factors for moderate-to-severe post-operative thirst, and (3) to develop an optimized protocol to maximize the efficacy and safety of thirst management.

Materials and Methods: This is a retrospective analysis of data collected over a quality improvement program implemented during August 2018. The study was conducted in the National Taiwan University. Patients aged at least 20 years were included and classified according to surgery type. We excluded subjects who were unable to communicate or understand instructions clearly and those whose oral intake required strict restriction during the early post-surgical phase.

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The role of Dexmedetomidine and Hyperbaric oxygen therapy in Ludwig’s angina- a case report

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Background: Ludwig's Angina is a rare, but potentially life-threatening, diffuse cellulitis of the neck and floor of the mouth, usually secondary to odontogenic infection. We report a case of a patient with Ludwig's Angina, along with a review on the potential benefits of dexmedetomidine and hyperbaric oxygen therapy (HBO) in the post-operative approach of these patients.

Case Report: A 36-years-old male, ASA II, diagnosed with Ludwig's Angina underwent uneventful surgical drainage under general anesthesia with standard ASA, BIS and TOF monitoring. Successful awake fiberoptic intubation with a nasotracheal tube (NTT) was performed as a method of induction due to trismus. After appropriate neuromuscular block (NMB) reversal, the patient remained sedated (propofol and fentanyl), keeping the NTT in situ due to periotic edema. In the Postanesthesia Care Unit (PACU), both propofol and fentanyl infusion doses were progressively reduced, and a dexmedetomidine loading (3 µg/kg) followed by maintenance 0.7 mcg/kg/h was infused. After 2 hours, the patient recovered spontaneous ventilation and a T-piece with oxygen was attached to the NTT. At time of discharge to Intermediate Care Unit (IMCU), he was hemodynamically stable, vigilant and collaborative. On day 1, HBO (anaerobic protocol) was initiated - 105' (60 at 2.8 ATA + 30' at 2.4 ATA) in two sessions and 90' at 2.4 ATA in the following sessions.

Discussion: This case demonstrates a successful example of articulation between different specialties, where dexmedetomidine and the hyperbaric chamber played a relevant role in the patient recovery.

References:

Learning points: This case demonstrates a successful example of articulation between different specialties, where dexmedetomidine and the hyperbaric chamber played a relevant role in the patient recovery.

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Analgesia group and Historical group regarding the duration of ileus (9,3±5,6 vs 9,5±4,4 days) and need of total parenteral nutrition (54% vs 42%). Length of hospital stay was shorter in Prehabilitation and Multimodal Analgesia group (11,9±8 days) than in the Historical group (16,7±9 days).

Conclusion: It is possible to decrease the incidence of postoperative ileus length of hospital stay by implementing a prehabilitation program and the use of perioperative multimodal analgesia for rectal cancer surgery.

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Effect of analgesia nociception monitoring during general anaesthesia with three different analgesia monitoring devices and clinical signs on remifentanil consumption and serum cortisol levels

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Background and Goal of Study: In recent years, analgesia monitoring devices estimating the effect of analgesia during general anaesthesia from different physiological variables have become available. The present study determined the effect of remifentanil titration by 3 different analgesia monitoring devices or clinical signs on remifentanil consumption and serum level of the stress hormone cortisol.

Materials and Methods: After obtaining ethics review board approval and informed consent, 96 patients undergoing radical retropubic prostatectomy with propofol / remifentanil anaesthesia were randomized into 4 groups to receive remifentanil either guided by 1 of 3 analgesia monitoring devices (Surgical Plinth Index [SPI], Pupilary Pain Index [PPI], Nociception Level [NOL]) or by clinical judgment (Control). The primary end point was intraoperative remifentanil consumption. Stress hormones were measured at 4 time points during the day of surgery. Data were analyzed by ANOVA with adjustment for inhomogeneous group variances with Bonferroni-adjustment for six primary group comparisons, mixed model and area under the curve (AUC) analyses for group comparisons of stress hormones.

Results and Discussion: The total amount of remifentanil administration (µg/kg/minute) differed between the groups: Control = 0.34 [0.32-0.37], SPI = 0.46 [0.38-0.55], PPI = 0.07 [0.06-0.08], NOL = 0.16 [0.12-0.21] (mean [95%CI]). All pairwise group comparisons P < 0.001, except Control vs. SPI P = 0.048. The AUC analysis indicated differences among groups in cumulative cortisol levels (µg/liter·minute): Control = 37846 [33263- 43067], SPI = 38576 [33712- 44142], PPI = 72030 [63068-82265], NOL = 54346 [47516-62136] (mean [95%CI]). Pairwise group comparisons Control vs. SPI P = 0.840, Control vs. PPI P < 0.001, Control vs. NOL P > 0.001, SPI vs. PPI P < 0.001, SPI vs. NOL P > 0.001 and PPI vs. NOL P = 0.005.

Conclusion: The analgesia–nociception balance was differently reflected by the analgesia monitoring devices and led to different amounts of intraoperative remifentanil consumption. Groups with lower levels of opioids administered were associated with higher serum cortisol levels.

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Prehabilitation and Multimodal analgesia to reduce postoperative ileus

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Background and Goal of Study: Rectal cancer surgery is associated with the development of postoperative ileus, among other complications. The implementation of preoperative prehabilitation and perioperative multimodal analgesia might decrease the incidence of ileus. The goal of the study is to confirm if the incidence and characteristics of postoperative ileus has improved in patients scheduled for rectum surgery after a prehabilitation-multimodal analgesia program.

Materials and Methods: Cohort study with 2 groups of patients scheduled for elective rectal cancer surgery after neoadjuvant therapy within an Enhanced Recovery After Surgery environment. Management of both groups was similar excepting: - Prehabilitation and Multimodal Analgesia group (2017-2019): Preoperative prehabilitation program (4 weeks) before surgery and perioperative multimodal analgesia (intraoperative analgesia with ketamine + lidocaine infusion); - Historical group (2014-2016): Patients without prehabilitation period nor intraoperative lidocaine infusion. Principal variable: incidence of postoperative ileus. Secondary variables: Length of ileus, need of total parenteral nutrition and hospital stay; demographic (age, sex, ASA) and intraoperative characteristics (duration, laparoscopy approach and fentanyl needed). Database included data from electronic medical records. Statistical analysis included Student’s t test or Chi-square to compare both groups.

Results and Discussion: A total of 96 patients were included (37 patients Historical Group and 59 Prehabilitation-Multimodal Analgesia Group). There were no statistically significant differences between both groups regarding demographic or intraoperative characteristics. We found a decrease of postoperative ileus (55% of Historical Group vs 29% Prehabilitation-Multimodal Group), p<0.05. However, there were no statistically significant differences between Prehabilitation and Multimodal

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The necessity of postoperative phosphates monitoring in patient treated with i.v. iron preoperatively

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Background and Goal of Study: Hypophosphatemia is defined as serum phosphate level below reference range of 0.79-1.42 mmol/L, but, in clinical practice, phosphates are supplemented at levels below 0.65 mmol/L. In literature, hypophosphatemia occurs in about 25% (10-80%) of patients admitted to intensive care unit (ICU). Even moderate hypophosphatemia may impair diaphragmatic contractility, reduce left ventricular stroke work and can lead to insulin resistance. High dosage intravenous iron therapy can potentially cause hypophosphatemia. In our prehabilitation program for surgical patients in an anaemia clinic, patients receive intravenous iron therapy, and those who are at a high nutritional risk (nonvolatile weight loss more than 10% during last 6 months, BMI less than 18.5kg/m2, NRS 2002 score more than 5 and albumin levels less than 30 g/l) are instructed to take nutritional supplements for at least 2 weeks preoperatively.

Materials and Methods: We analysed retrospective data of heterogeneous cohort of consecutive critically ill adult patient in 2 weeks in ICU in UHC Zagreb and compared them to data of patients who were treated by intravenous iron before the surgery through our anaemia clinic.

Results and Discussion: Compared to consecutive ICU patients, where 13 %
patients had hypophosphatemia on their 0. postoperative day (but only 3.3% below 0.65 mmol/L), patients from prehabilitation program treated with iron supplementation had greater degree of hypophosphatemia (44.4%, and 33% needed phosphates supplementation), regardless of the i.v. formula of high dosage iron. Concomitant management of phosphates levels should be checked and corrected perioperatively in all patients receiving i.v. iron supplementation before the operation since they demonstrate hypophosphatemia significantly more often then is baseline for the same population, despite nutritional supplementation.

6302

Complementing beta-blocker titration in the operating room - is it possible?

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Background: Cardiovascular complications (CC) are an important cause of morbidity and mortality after non-cardiac surgery. The use of peri-operative beta-blockers (BB) for cardiac protection is controversial1. The ESA guideline recommends considering pre-operative BB use in patients with ischemic heart disease, starting more than 1 day before surgery2. This report intends to present anesthetic management with supplemental dose of BB in the operating room (OR) for a patient with previous use of BB but with heart rate (HR) above target.

Case report: SCBS, female, 83 y.o., 1.50 m, 80 kg, with hypertension, diabetes mellitus, dyslipidemia, coronary artery disease and dilated cardiomyopathy, was hospitalized for a parotidectomy due to a malignant tumor. She reported use of metformin, losartan, trimetazidine, isosorbide, bisoprolol, ASA, atorvastatin and cilostazol. Dyspnea and angina were present on small exertion. Cardiac catheterization showed a patient with a 70% obstruction in anterior descending artery and total occlusion of the right coronary artery. Cardiology, Anesthesiology and Surgical teams decided to perform the procedure in a class IV cardiac risk patient considering the underlying disease. In the OR, with an initial HR of 83 bpm and blood pressure (BP) at 140/90 mmHg, esmolol was started with 50 mcg.kg-1.min-1 for the induction of anesthetic induction (aiming a HR around 60 bpm), and raised until 100 mcg.kg-1.min-1 in some moments. Surgery and anaesthesia were uneventful. She was discharged one week after surgery.

Discussion: BB treatment should be adjusted before surgery to achieve a resting heart rate of 60-70 bpm with systolic BP above 100 mm Hg. In this case, despite previous use of BB, the optimization of HR was not achieved and the main goal of the anesthesia team was to avoid tachycardia or hypotension. Starting BB during surgery is not supported by ESA guideline, but using intravenous (IV) complementation during surgery to tailor plasmatic concentration in a patient which previous BB use was not titrated may be of value.

References:
3. Learning points: HR control with BB is essential to prevent CC; Use of IV BB as complementation during surgery may be a strategy to adjust previous treatment.

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Implication of residual neuromuscular blockade on the quality of recovery after anesthesia and surgery

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Background and Goal of Study: Residual neuromuscular blockade (RNMB) is a well-known postoperative complication associated with the use of neuromuscular blocking agents, and causative of potential life-threatening events.1 The Quality of Recovery 15 (QoR-15) questionnaire is a validated, patient-reported form of evaluating the quality of recovery in patients who underwent anesthesia and surgery.2 QoR-15 evaluates 5 dimensions of health: patient psychological support, physical comfort, emotional state, physical independence and pain.2 The aim of this study was to assess the incidence of postoperative RNMB and its association with poorer quality of recovery.

Materials and Methods: After approval of the ethics committee, a prospective study was undertaken in 52 consenting adult patients who underwent scheduled surgery. The occurrence of RNMB was defined as an average train-of-four ratio (aTOF)r<0.9 after three measurements in the post-anaesthetic care unit (PACU), and quality of recovery was assessed using the QoR-15, recorded 24h after surgery. After dividing the population into two groups according to the aTOF and RNMB diagnostic, differences in the quality of recovery were assessed.

Results and Discussion: The overall incidence of postoperative RNMB was 16.3%. The median QoR-15 score recorded was 125.5. There were no significant differences recorded in the QoR-15 scores between the two subgroups (aTOF<0.9; aTOF≥0.9); p=0.859). Regarding the different dimensions evaluated by the QoR-15 questionnaire, the medians recorded between the aTOF≥0.9 and aTOF<0.9, respectively, were as follows: psychological support 8.5 vs. 10, physical comfort 9 vs. 8, emotional state 8.5 vs. 10, physical independence 7 vs. 7 and pain 8.5 vs. 9. No statistically significant differences were recorded within the dimensions.

Conclusion: RNMB occurred in 16.3% of the patients studied. Even though literature shows a greater incidence of complications in this population and an inferior quality of recovery, we could not demonstrate such an association, as assessed by the QoR-15 questionnaire, in the studied population.

References:
An investigation of the associations between epidural fentanyl consumption and oncologic outcomes of lung cancer after surgical resection

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Background and Goal of Study: The effect of epidural anesthesia and analgesia (EA) on recurrence of miscellaneous cancers after surgical resection remains controversial and the combination of epidural local anesthetics and opioids may offset the potential benefits of EA to outcomes after cancer surgery. This study aimed to investigate whether the amount of fentanyl used for EA was associated with recurrence and overall survival after surgery for non-small cell lung cancer (NSCLC) and explore influential factors of EA consumption.

Methods: We conducted this retrospective study to collect patients with stage I-II NSCLC undergoing primary tumor resection and postoperative patient-controlled EA in a tertiary medical center in Taiwan between 2011 and 2015. All patients received a solution of 0.1% bupivacaine with 1 ug/ml fentanyl for EA and the total amounts of EA consumption and epidural fentanyl dose were retrieved from the electronic medical recording system. Patient characteristics, surgical features and pathological findings were collected as well. Cox regression analysis was performed to evaluate the effect of epidural fentanyl dose on recurrence-free and overall survival. Restricted cubic spline functions were also applied to examine potentially non-linear effect. Linear regression analysis with a stepwise model selection strategy was employed to identify influential factors of the amount of EA consumption.

Results and Discussion: A total of 860 patients were included in the analysis and the mean epidural fentanyl consumption during the three-day course was 426.7 ug. No significant association was demonstrated between epidural fentanyl consumption and disease-free (p = 0.58) or overall survival (p = 0.32). Restricted cubic spline analysis did not find and non-linear dose-response effect either. Six independent factors were identified to affect EA consumption, including body weight (p < 0.0001), age (p = 0.001), anesthesia time (p = 0.007), history of stroke (p = 0.01), postoperative chemotherapy (p = 0.015), and sex (p = 0.018).

Conclusion: In the context of patient-controlled EA, epidural fentanyl consumption was not related to cancer recurrence or overall survival in patients receiving surgery for NSCLC. Judicious use of epidural fentanyl to improve analgesic quality could still be considered in these patients.

Effect of intraoperative magnesium on postoperative RASS score after endovascular repair of aortic aneurysm: a preliminary randomized controlled trial

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Background and Goal of Study: Intraoperative magnesium has the effect of reducing postoperative opiate requirement1 and pain2, and recently was also reported to decrease postoperative agitation3. Given that its effect on postoperative sedation and delirium is unclear, we investigated its effect on the postoperative Richmond Agitation-Sedation Scale (RASS) score and delirium.

Methods: The study was approved by the Institutional Review Board and registered at the Japan Registry of Clinical Trials (RCTs041190013). Written informed consent was obtained from all patients. Forty-five consecutive patients diagnosed with abdominal(33) and thoracic(12) aortic aneurysm who underwent endovascular repair of aortic aneurysm under general anesthesia were eligible. Patients were allocated randomly to the magnesium group (magnesium infusion of 30mg/kg-1 in the first hour followed by 10mg/kg-1h-1 until the end of surgical procedure) or the control group(0% saline at the same volume and rate). Primary outcome was difference in postoperative RASS score between the two groups. Secondary outcomes were incidence of delirium(Confusion Assessment Methods for the Intensive Care Unit: CAM-ICU), analgesia score (numerical rating scale; NRS score, CAM-ICU at 0, 1, 6, 12, and 24h and length of ICU stay) did not show a significant difference. Measured ionized magnesium was significantly different (0.68±0.08 vs 0.53±0.156 mmol/L, P=0.0001). During the observational period, no adverse events caused by magnesium infusion were recorded.

Conclusion: In this preliminary study, we could not show that magnesium reduces postoperative RASS score and delirium. We suspect one of the reasons to be the rare incidence of RASS score >0.

New insights for screening of etomidate analogues in the human H295R cell model

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Background and Goal of Study: Etomidate is a sedative hypnotic with excellent pharmacological effect, like rapid onset and hemodynamic stability. However, it has adrenocortical toxicity for binding to 11β-hydroxylase. Therefore, it is urgent to develop an approach for screening new etomidate analogues without endocrine disrupting. Here, the objective of this study was to better define the relationship between etomidate analogues and its adrenocortical inhibitory potency in vitro.

Methods: In our study, the adrenocortical tumor cell line NCI-H295R was used as an in vitro system for etomidate analogues screening and the values of ACTH in cells were detected by a HPLC-MS/MS-based method. The effects of different concentrations of etomidate analogues on the ACTH, corticosterone and aldosterone were recorded.

Results and Discussion: The H295R cell line, as a screening tool can be used to analyze the adrenocortical toxicity of etomidate analogue. Then dose-response curves of hormone release and the concentration of the individual compounds were fitted. Besides “Adrenocortical Inhibitory Index” was used for the evaluation of the adrenocortical inhibitory potency of each test drug, which may be used as a preliminary evaluation criteria for adrenocortical suppression. As we all know, etomidate bind with high affinity to 11β-hydroxylase, inhibiting the synthesis of adrenocortical steroids, which may considered as "off-target" affinities. Such incidents keep cropping up in both pre-clinical trials and clinical performance during drug development. To address the problems, there gradually rises a consensus that combining in vitro pharmacological profiling with traditional safety pharmacology, can make a positive influence on the success rates of first-in-human studies.

Conclusion: It would be beneficial to use the developed methods to screening etomidate analogues without suppressing adrenocortical function, especially when we combine in vitro system with in vivo animal tests.
induced by poly(I:C) was abolished (Fig.1f, g).

Conclusion: These results demonstrate that the poly(I:C) preconditioning yields a significant infarct-sparing effect, which is mediated through the TLR3/P13K/Akt-dependent signaling pathway.

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Health-related quality of life (HRQoL) questionnaire implementation in enhanced recovery after elective laparoscopic colorectal surgery (ERAS) protocol. Interim results comparing two different types of anesthesia

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Background and Goal of Study: ERAS protocols were designed to reduce perioperative stress and accelerate postoperative recovery and HRQoL. The most widely used preference-based EQ-5D-5L questionnaire (EQ-5D-5L-Q) is used to assess patients’ post-operative wellbeing, ability to perform routine activities and mobilization. The main aim of this study is to evaluate and compare satisfaction and HRQoL for consecutive patients undergoing laparoscopic colorectal surgery with different anesthetics using a standardized EQ-5D-5L-Q.

Materials and Methods: After approval of the Medical Ethical Committee the prospective randomized study during January-October of 2019 period was performed. The study was registered in ClinicalTrials.gov (NCT04091815). Patients were divided into two groups according to anesthetic types - general anesthesia (group 1,N19) and combined (spinal with intrathecal morphine 0.1mg and general anesthesia (group 2,N17). Multimodal analgesia protocol was applied using NSAIDS (Paracetamol and Diclofenac) for 2 days. Standardized EQ-5D-5L-Q (5 questions, 1-5 points’ value each), wellbeing (0-100%) assessment was performed: 1 day before surgery, 1 week, 1 month after surgery. All variable data were analyzed using SPSS version 23.0. Student t and Mann-Whitney U tests were used.

Results and Discussion: The study was registered in ClinicalTrials.gov (NCT04091815). Patients’ wellbeing 1 day before surgery was significantly better in women (17 men). The mean age was 64.61±3.90 years. The two groups were homogeneous. Patients’ wellbeing 1 day before surgery was significantly better in group 2 (80.00% vs 90.00%, p<0.05). Duration of surgery (2.54h vs 2.99h, p<0.50), anesthesia (3.30h vs 3.86h, p<0.50) and length of hospital stay (LOS) (9 vs 8 days, p<0.31) did not differ between groups. There was no difference in pain intensity between both groups in the early postoperative period (p>0.05). No difference concerning patients’ wellbeing 1 week (80.00% vs 70.00%, p<0.72), 1 month (78.94% vs 73.23%, p<0.14) after surgery were registered between groups.

Conclusion: There is no significant difference in short-term results (1 week, 1 month after surgery) using ERAS in colorectal surgery of HRQoL evaluated with EQ-5D-5L-Q between two different types of anesthesia. The study is in process and further data analysis and inclusion of a larger patient group are needed to confirm findings and to reduce the chances of discovery failure.

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Asymptomatic hyperCKaemia? Preanaesthetic finding of uncertain susceptibility to Malignant Hyperthermia (MH)

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Background: MH-related morbimortality is preventable and elevated CK may be the only alarm sign in susceptible patients. However, importance of preanaesthetic assessment and complementary tests in ASA I patients for elective ambulatory surgery is underestimated.

Case Report: A 20-y.o. patient undergoing preanaesthetic assessment for elective circumcision refers a history of elevated CK since the age of 2, and recurrent syncope thoroughly studied during infancy and adolescence (normal EEG, EMG, cerebral MRI, ECG Holter, echocardiogram and ECG). Discharged after a single normal CK result at 18 years of age diagnosed with recurrent vasovagal syncope and unexplained hyperCKaemia. No family history regarding general anaesthesia. A new preanaesthetic test showed elevated CK value of 518 U/L [reference interval 30-200 U/L] so the patient is referred for a genetic study of RYR1 gene revealing heterozygous c.7025A>G (p.N3242S), a genetic variant of uncertain clinical significance.

Discussion: RYR1 mutations are associated with MH in up to 86% of cases. Mutations reflect structural or functional alterations of the ryanodine receptor but do not provide information on their clinical effect. Uncertainty regarding these genetic variations requires further investigation. This mutation has only been reported in a few cases, some associated with MH, not allowing to exclude or confirm pathogenicity. Since association with recurrent syncope in our patient cannot be excluded, further evidence is needed. We report this case to highlight the importance of preanaesthetic assessment considering many medical specialists are often unaware of potentially life-threatening anaesthetic complications. Investigation of MH susceptibility is required in idiopathic hyperCKaemia where other causes have been excluded. However, a degree of clinical suspicion is needed to look for this phenomenon. Following existing guidelines might have resulted in earlier identification of potential MH susceptibility (1). Communicating genetic findings and sentinel cases is needed to generate data enabling future classification of mutations as pathogenic (2).

References:

Learning points: Thoracic preanaesthetic assessment including childhood past medical history is of key importance in all patients. Improved awareness regarding anaesthetic-related events among other medical specialists could allow earlier identification of MH susceptibility.
5080

Prevalence of undiagnosed and poorly controlled diabetes mellitus among elective non-cardiac surgical patients

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Background: Type 2 Diabetes Mellitus (DM) is a major morbidity affecting more than 11% of the Singapore population and is expected to increase in the next decade. Recently, local clinical practice guidelines approved the use of Hba1c as an alternative screening test for DM. Hba1c ≥7.0% is used to diagnose DM directly, while Hba1c <6.1-6.9% required further tests with FPG or OGTT where DM can be diagnosed if either FPG ≥7.0 mmol/L or OGTT ≥11.1 mmol/L or pre-diabetes if FPG 6.1-6.9 mmol/L or OGTT 7.8-11.0 mmol/L. Hba1c also offers a more convenient and acceptable form of DM screening. Currently, the epidemiology of DM among surgical patients in Singapore is unknown. DM increases the risk of microvascular and macrovascular complications which impact surgical outcomes. Furthermore, the perioperative period is an effective "teachable moment" for the control of chronic diseases. We aim to determine the prevalence of undiagnosed and poorly controlled DM among surgical patients to establish the utility of the Preoperative Assessment Centre (PAC) for DM screening and intervention.

Methods: We conducted a prospective observational study at the PAC in a Singapore tertiary hospital. Adult surgical patients (excluding cardiac surgery) scheduled for routine preoperative blood tests were recruited. We performed Hba1c screening to assess the prevalence of patients at risk of pre-diabetes (Hba1c ≥6.1%), diabetes mellitus (Hba1c ≥7.0%) and poorly controlled DM (Hba1c ≥8.0%).

Results: A total of 549 patients were recruited. The median age was 57 (IQR 42-67) and 49.6% were males. The overall prevalence of Hba1c ≥ 6.1% and ≥ 7.0% was 19.85% and 9.11% respectively. Out of 109 (19.85%) pre-existing DM patients, 19 (17.43%) had poorly controlled DM. Of those not diagnosed with DM, 21 (3.83%) had Hba1c ≥ 6.1 % and 2 had newly diagnosed DM (Hba1c ≥7.0%).

Conclusion: There is a high prevalence of undiagnosed and poorly controlled DM among selected surgical patients. Cohort screening of DM may be appropriate for selected surgical patients during their visit to the PAC. Further studies are needed to determine if preoperative interventions are effective in improving glycaemic control.

5212

Improving the accurate use of the American Society of Anesthesiologists physical status classification system

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Background and Goal of Study: The American Society of Anesthesiologists physical status (ASA) classification system was updated in 2014 [1] with new examples included for the first time. Previous studies have questioned the inter-rater reliability of ASA grading and found it moderate to poor inter-rater reliability, which has been attributed to the system’s inherent subjectivity [2]. The inclusion of examples and objective criteria, a retrospective audit was conducted to assess compliance with the updated ASA classification system and then an action plan instituted to improve its accurate use.

Materials and Methods: A retrospective audit to assess compliance with the updated 2014 ASA classification system was conducted at the Royal Liverpool and Broadgreen University Hospitals NHS Trust in England. All operations involving general anaesthesia between 02/07/2018 and 08/07/2018 were included. The ASA grade allocated by the anaesthetist was reviewed against the objective criteria in the updated classification system.

Results and Discussion: A total of 264 cases were assessed. Out of these cases 88% (n=232) were compliant with the updated classification system. However, 12% (n=32) were not compliant. 10.5% (n=28) were assigned to an ASA grade 1 class different and 1.5% (n=4) to an ASA grade 2 classes different. An educational session was delivered where anaesthetists took a test before and after the session consisting of 10 hypothetical patients they were asked to grade. The teaching session improved the average score from 4 to 9 out to 10. A subsequent audit assessing the accuracy of 55 ASA grades given to patients undergoing general anaesthesia between 24/06/2019 and 25/06/2019 found 95% (n=52) of cases were compliant with only 5% (n=3) assigned to an ASA grade 1 class different.

Conclusion: Use of ASA is a standard component of anaesthetic assessment worldwide. It is used to guide preoperative investigations and importantly in risk scoring models allowing shared decision making [2]. Accurately grading patients is therefore important for the provision of quality care.

References:

6081

Anescardiocat as a predictor of Major Cardiac and Cerebrovascular Events in multilevel spinal surgery patients

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Background: Multilevel spinal surgery is associated with important blood loss, potentially contributing to Major Adverse Cardiovascular and Cerebrovascular Events (MACCE). ANESCARDIOCAT score considers intraoperative transfusion and hypotension as independent risk factors for MACCE.

Goal of the study: To evaluate ANESCARDIOCAT score as a predictor of MACCE in Major Spinal Surgery.

Materials and Methods: We retrospectively analysed data obtained from electronic medical records of patients that underwent scheduled multilevel spinal surgery (3 or more levels) in Parc de Salut Mar between Jun 2017 and Jun 2019. We collected demographic data, preoperative cardiovascular risk factors and data related to surgery. Dependent variables were the occurrence of any MACCE (myocardial infarction, myocardial injury, angina, stroke/TIA, cardiac arrest, acute heart failure and new onset arrhythmias) as well as global mortality until hospital discharge. We also analysed if perioperative transfusion was related to MACCE. A chi-squared test was used to determine the relationship between ANESCARDIOCAT score and MACCE.

Results and Discussion: A total of 91 patients were included, mean age 67.9 years. Prevalence of ANESCARDIOCAT risk factors: 3.3% cerebrovascular disease, 14% coronary artery disease, 18.5% abnormal ECG, 6.5% kidney disease, 24% intraoperative transfusion and 49% intraoperative hypotension. Anescardiocat score was 0 for 26 patients (28.3%), 1 for 28 patients (30.3%), 2 for 24 patients (26.1%) and 3 for 15 patients (16.3%). Intraoperative mean blood loss was 866 mL and 28 patients (30.4%) received postoperative blood transfusion. MACCE incidence was 16% (15 patients). Most frequent MACCE were non-fatadic cardiac arrest (9.9%) and myocardial injury (MINS) (9.9%). MACCEs were more prevalent in patients requiring transfusion (p=0.02) and with higher ANESCARDIOCAT score (p=0.0004).

Conclusion: According to our results, multilevel spinal surgery is associated with a high prevalence of perioperative cardiovascular events. Higher Anescardiocat score and perioperative transfusion could help to identify patients at risk of MACCE.

References:
Use of myocardial perfusion imaging in bariatric surgery patients

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Background: Bariatric surgery is the most effective treatment for morbid obesity, with increasing numbers reported as the burden of obesity increases. A significant proportion of this population have very poor exercise tolerance, making it difficult to evaluate their cardiovascular function with significant risk factors for cardiovascular disease being common. There are currently no guidelines or consensus for preoperative cardiovascular assessment and risk stratification beyond a 12-lead ECG.

Materials and Methods: We report our experience using myocardial perfusion imaging (MPI) to assess subclinical myocardial ischaemia in poorly mobile, high-risk patients. We identified a cohort of 100 patients who had a myocardial perfusion imaging for pre-operative evaluation during a 2 year period (Jun 2016 – Jun 2018). Patients had MPI if they were poorly mobile (<4 METS), had exertional dyspnoea, additional risk factors (e.g. diabetes, hypertension, smoking) and minor changes on resting ECG.

Results: 71 MPI scans were reassuring and 29 had inducible ischaemia. These 29 patients underwent further cardiac investigations i.e coronary angiogram or CT angiography. Significant stenoses were found in 11 patients and 3 had interventional revascularisation. Widespread atheromatous disease with no target lesions for revascularisation was the most common finding. Four patients were considered too high risk for surgery; the rest were optimised with medical therapy with subsequent uneventful surgery.

Discussion and Conclusion: Overall our cohort study suggests that previously unrecognised atherosclerosis of the coronary vasculature, of clinical relevance, is not uncommon in the high-risk bariatric patients, warranting either coronary revascularisation (~3%), cancelling of operations (~4%) or medical optimisation (~10%). MPI can be a useful, accessible, non-invasive and effective way of screening this population and can help to guide further management.

5252

Hand grip strength predicts postoperative day 1 mobility following Total Knee Arthroplasty

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Background: Handgrip strength (HGS) is a simple, quick bedside assessment that correlates with a patient’s physical fitness and frailty. HGS is an independent predictor of prolonged postoperative length of stay (LOS) in other surgeries, but its utility in total knee arthroplasty (TKA) has not been established. Early postoperative mobility is one of the key determinants for suitability for outpatient or short-stay TKA.

Questions/purposes: (1) What are the factors associated with a low HGS? (2) Is there an association between HGS and short-term outcomes such as mobilization on postoperative day 1 (POD1), hospital LOS and discharge destination? Methods: This is a single-centre, prospective observational study. 385 patients undergoing elective total knee arthroplasty (TKA) were recruited. Preoperative HGS, demographic data, comorbidities, postoperative LOS, discharge destination and physiotherapy outcomes were recorded. Spearman correlation was performed to assess the correlation between HGS and demographic data. Mobility on POD1 was ranked in an ordinal likert scale from 1 to 10, with 1 being the best and 10 the worst, based on the gait aids and level of physiotherapist assistance required. HGS was categorized into gender-based quartiles. Multivariable logistic regression was performed to identify factors associated with better mobility (within the best mobility-rank quartile) on POD1, discharge to step-down facilities and hospital LOS ≤ 3 days (best quartile).

Results and Discussion: Majority of patients were discharged home (75.3%). Compared to patients in the lowest gender-based HGS quartile, patients in higher quartiles had higher odds of better mobility on POD1 (adjusted odds ratio (aOR) 2.4 - 3.5, P = 0.002 - 0.02). Patients with the best preoperative handgrip strength quartile had twice the odds (aOR 2.3, P = 0.01) of having a shorter hospital LOS (≤ 3 days), compared to patients in the lowest quartile. HGS was not independently associated with discharge to step down facilities. Taller, heavier, male patients were more likely to have higher HGS.

Conclusion: Preoperative HGS may be useful in predicting patients with better mobility on POD1 and shorter LOS after primary TKA.

5349

Validation of current risk indexes for prediction of cardiac and cerebrovascular events (MACCE) and myocardial infarction (MINS) in a risk population in non-cardiac surgery

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Background and Goal of Study: Myocardial infarction in non-cardiac surgery (MINS) is a new entity with short and long term prognostic implications. Several risk prediction scores for perioperative cardiovascular events have been described, some of them before the era of new cardiac biomarkers. The aim of the study was to validate current risk indexes for prediction of MACCE and its efficacy for prediction of MINS in a high-risk population.

Materials and Methods: Prospective, single cohort study (MINSMAR study) recruiting patients from May 2017 to May 2019. Eligible subjects were patients 45 years or older undergoing non-cardiac surgery: 1) high cardiac risk surgical procedures or 2) intermediate cardiac risk procedures in patients with clinical risk factors. All surgeries were elective and under general and/or neuraxial anaesthesia. Patients had Troponin T (TnT) surveillance: baseline (after anaesthesia induction), and postoperatively at 3 hours, 1st, 2nd and 3rd day. Dependent variables were MINS and any MACCE until 30th postoperative day. MINS was defined as at least a TnT value ≥ 30ng/L with a rise and/or fall +/- 20% regarding the baseline. We validated the Revised Cardiac Risk Index (RCRI), National Surgical Quality Improvement Program for Myocardial Infarction and Cardiac Arrest Calculator (NSQIP-MICA), ANESCARDIACAT score and the Surgical Appar Score (SAS). C-statistic was calculated for each score.

Results and Discussion: We recruited 746 patients, aged 72 (IQR 64-78) years, being 67% male. Patient comorbidities were: coronary artery disease 25%, heart failure 11%, diabetes with treatment 38%, peripheral artery disease 37%, previous stroke/TIA 16%, chronic kidney disease 23%. MACCE occurred in 78 patients (10.6%) and all-cause mortality was 2.6%. MINS occurred in 154 patients (20.6%). Results are shown in table.
Preoperative transthoracic echocardiography predictive analytics using machine learning for postinduction hypotension prediction

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Background and Goal of Study: Hypotension is a risk factor for adverse perioperative outcomes. Machine-learning methods can process large amounts of data to develop robust predictive analytics. We hypothesized that machine-learning methods can help predict the risk of postinduction hypotension.

Materials and Methods: Data were extracted from the electronic health record of a single quaternary care center between April 2014 and September 2019 for patients aged >15 years who underwent general anesthesia, without catecholamine use cases and intubated cases. Multiple supervised machine-learning classification techniques were used, with postinduction hypotension (mean arterial pressure < 55 mmHg from intubation to the start of procedure) as the primary outcome and 95 transthoracic echocardiography measurements as factors influencing the primary outcome. We used 10-fold cross-validation with the training set (70%) to select the optimal hyperparameters and architecture based on the mean cross-validation performance. These optimal hyperparameters and architecture were assessed using a separate test set (30%).

Results and Discussion: Of 1958 patients, 640 (34%) had postinduction hypotension. Area under the receiver operating characteristic curve using deep neural network was 0.57 (95% CI 0.51–0.63), gradient boosting machine was 0.55 (95% CI 0.49–0.61), random forest was 0.54 (95% CI 0.47–0.60), naïve bayes was 0.55 (95% CI 0.49–0.61), support vector machine was 0.52 (95% CI 0.46–0.59), and logistic regression was 0.56 (95% CI 0.50–0.62). Important factors influencing hypotension were left ventricular diastolic diameter, end diastolic volume, atrial diameter, e' wave, s wave, and ascending aortic diameter.

Conclusion: This technique was successful in predicting postinduction hypotension, demonstrating the feasibility of using machine-learning models for predictive analytics in perioperative assessments, with performance dependent on model selection and appropriate tuning.

New-onset atrial fibrillation in non-cardiac operations: prevalence, recurrent rate and long-term MACE (POAF-NCS Study)

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Background and Goal of Study: Post-operative new-onset atrial fibrillation (POAF) is common after cardiothoracic surgery but not much has been studied about its occurrence after non-cardiothoracic surgery. This study was conducted to examine the risk factors for the appearance of POAF, treatment strategy and onset of abnormal cardiovascular events (MACE) in the short and long term.

Materials and Methods: This is a retrospective cohort study that was conducted in Emek medical center, Afula, Israel. The study population consists of patients hospitalized in eight surgical wards from January 1, 2014 to the end of December 2018. Patients who met the inclusion criteria were divided based on the occurrence of POAF. Data was collected in accordance with International Diagnostic Code 10-ICD.

Results and Discussion: The mean age of the participants was 63.78 ± 11.50. The mean BMI of the participants was 28.89 ± 7.31. 67.1% of the participants were males. Smoking, CVA, diabetes, hypertension, hyperlipidemia, vascular dx, valvular dx, CHF and COPD were present in 23.1%, 20%, 69.2%, 36.9%, 55.4%, 30.8%, 20.0%, 7.7% and 9.2% of the patients. New onset of atrial fibrillation after non-cardiac surgery was significantly low compared to known cardiac related surgery (0.002 vs 0.287, p<0.001). From patients diagnosed with NOAF, prevalence was higher in general surgery ward (58.46%) and following laparotomy (36.92%). 60% of patients with NOAF were operated due to an acute situation. 29.23% of the patients were subjected to an anecualtive use. 40% of patients received rhythm control drug to control AF. Average length of hospitalization was 24 days. Rate of MACE at 1 year was 24.62%. Death at the same hospital stay was seen at 20% of patients. There was no significant association between occurrence of MACE and age, sex. fibrillation, smoking, CVA, diabetes, hypertension, hyperlipidemia, vascular dx, valvular dx, CHF and COPD.

Conclusion: The incidence of new onset AF seems to be low following non cardiac surgery yet, pose a significant clinical and outcome implication. NOAF is associates with longer hospitalization length, multiple drug use and high rate of MACE.
Bioreactance for fluid therapy guidance in the postoperative period of major abdominal surgery

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Background and Goal of Study: TFC (Thoracic Fluid Content) is a variable that provides Cheetham bioreactance cardiac output monitor, whose value has been studied in patients undergoing hemodialysis, finding a good correlation between changes in TFC and the volume extracted to patients with chronic renal failure undergoing hemodialysis. Our objective was to demonstrate that the variation of TFC in the first 24 h correlated with the postoperative water balance, and could be useful to guide fluid therapy during the postoperative period.

Materials and Methods: A prospective observational study was conducted with 50 patients undergoing scheduled abdominal surgery with a minimum admission of 24 h in Resusciation. Patients were monitored with Cheetham monitor from before anesthetic induction and for 24 h. The monitor data were collected at different stages of the perioperative period. Intra and postoperative information, such as water balance and complications, were collected. Data were analyzed using IBM SPSS Statistics program, applying Pearson and T-Student parametric tests.

Results and Discussion: Water balance in the first 24 h showed a correlation (r=0.437, p=0.002) with the variation in the value of TFC the morning after surgery, coinciding with our hypothesis that TFC increases as the balance becomes more positive. We observed a statistically significant difference (p=0.05) between the groups and if they were treated with IV iron. We study the changes in Hb levels immediately before surgery, minimal Hb during the postoperative period, at the time of hospital discharge and 30 days after hospital discharge. Mann-whitney U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.

Results: Thirty one percent of total patients had anemia, of which 47.6% had iron deficiency and 29.6% had normal serum ferritin (p=0.035).

Table 1. Relationship between Hb, serum ferritin and iron treatment (p < 0.001)

In patients with ID, the median Hb 30 days before surgery was 131 [109-146.5], immediately after surgery was 129 [116.7-129], minimal Hb during the postoperative period was 96 [86.2-106.7], at the time of hospital discharge was 96 [92.2-99.7] and 30 days after hospital discharge was 122 [110-132].

Conclusion: Our results show a low prevalence of anemia in patients undergoing RC enrolled in an ERAS protocol, lower Hb level in iron deficiency patients and illustrate the therapeutic potential of IV iron supplementation in patients with iron deficiency. We recommend aggressive management of iron deficiency anemia to improved haemoglobin level as a key component of prehabilitation prior to RC.

The effect of perioperative fluid balance on 30-day morbidity in women undergoing major surgery for advanced ovarian cancer

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Background and Goal of Study: Women undergoing cytoreductive surgery (CRS) for advanced stage epithelial ovarian cancer are susceptible to major fluid shifts during surgery which may increase risk for perioperative complications and prolonged hospital stay (1). Our objective was to determine the association between perioperative fluid balance and postoperative morbidity assessed by Clavien-Dindo classification (CDC) within 30 days after CRS.

Materials and Methods: This was an observational study from prospectively collected data and included patients who underwent CRS 2014-2016 at Karolinska University Hospital, Sweden. Women subjected for epithelial cancer were identified in an institutional database, variables were extracted from the database and electronic medical records of patients. Linear regression with 95% confidence intervals was used to study the association between 0-48 h perioperative fluid balance and CDC grade. Postoperative complications within 30 days were recorded.

Results: A total of 270 women were registered in the database and a total of 184 patients were finally analysed. There was no significant association
Prophylactic penehyclidine inhalation reduces postoperative pulmonary complications in high-risk patients: A double-blind randomized controlled trial

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Background and Goal of Study: Postoperative pulmonary complications (PPCs) is common in high-risk patients and is associated with worse outcomes. Inhaled muscarinic antagonists are the first line treatment for chronic obstructive pulmonary disease and have been used to prevent PPCs in these patients. We investigated whether prophylactic penehyclidine inhalation, a long-acting selective M1- and M3-receptor antagonist, could safely decrease the incidence of PPCs in high-risk patients.

Materials and Methods: This randomized, double-blind, placebo-controlled trial was conducted in a tertiary hospital in Beijing, China. We enrolled patients aged 50 years or older who were scheduled to undergo major upper abdominal or noncardiac thoracic surgery (≥2 hours) and had an expected ARISCAT risk score ≥ 3. Patients were randomly assigned to receive prophylactic inhalation of either penehyclidine or placebo from the night before surgery until the second day after surgery, in an effort to carefully monitor, and fluid overload avoided, specifically during 24-48 h postoperatively. A total of 409 patients were randomly assigned to either group. The incidence of PPCs was significantly lower in the penehyclidine group (18.9% [79/417]) than in the placebo group (24.6% [102/413]; odds ratio[OR] 0.651, 95% CI 0.469-0.905, P=0.010). Among the secondary outcomes, the incidence of bronchospasm was also lower in the penehyclidine group than in the placebo group (4.4% [18/409] vs. 4.4% [18/409]; 0.317, 1.025-0.807, P=0.016). Regarding safety, the incidence of high airway pressure during anesthesia (peak airway pressure >40 cmH2O) was lower in the penehyclidine group than in the placebo group (1.9% [8/417] vs. 5.1% [21/409]; 0.361, 1.058-0.826, P=0.012). Occurrence of delirium did not differ between groups.

Conclusions: For high-risk patients undergoing major upper abdominal or noncardiac thoracic surgery, prophylactic penehyclidine inhalation significantly reduces the incidence of PPCs. The therapy is safe.

Trial Registration: Chinese Clinical Trial Registry (www.chictr.org.cn, ChiCTR-IPC-15006603); ClinicalTrials.gov (NCT02644876).

References:

5765

Do blood lactate levels differ between cancer and non-cancer patients undergoing elective non-cardiac surgery? 

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Background and Goal of Study: Tissue lactate levels tend to be elevated in cancer patients due to the Warburg effect.1 Moreover, increased lactate levels were shown to be associated with high morbidity and mortality in critically ill patients.2 Blood lactate levels have also been used to risk stratify patients in order to determine prognosis and administer appropriate treatment.3 However, there is currently little evidence regarding the association between cancer and blood lactate levels. The aim of this study was to investigate a possible relationship between cancer and intraoperative blood lactate levels, by comparing arterial blood lactate levels between cancer and non-cancer patients.

Materials and Methods: We retrospectively review medical records of 80 adult cancer (n=80) and non-cancer (n=90) patients who underwent elective non-cardiac major abdominal surgery at our institution between April 2018 and December 2018. Collected data included demographics, ASA PS classification, the type of procedure performed, and the value of arterial blood lactate levels. Multivariable logistic regression was performed to investigate a possible association between cancer and elevated blood lactate levels.

Results and Discussion: Both cancer and non-cancer patients were stratified to normal (≤1.6 mmol/L) and high (>1.6 mmol/L) lactate levels. Without adjustment for demographics, there was no statistically significant association between blood lactate levels and cancer status for either the normal or high lactate categories. The odds of having a higher lactate level for cancer patients was 1.995 (95% CI: 0.703-1.408) times that of non-cancer patients (P=0.977). After adjusting for patient sex, age, and ASA level, the adjusted odds of having a higher lactate level for cancer patients was 1.076 (95% CI: 1.754-1.534) times that of non-cancer patients (P=0.688).

Conclusion: Our data did not show statistically significant higher blood lactate levels in cancer patients. Limitations to our study included a limited sample size, and the absence of co-morbidity analysis.

References:
does not appear to be advantageous in RRP to decrease immediate post-operative pain.

Conclusion: Spinal anaesthesia in addition to general anaesthesia for RRP was associated with higher opioid consumption in the PACU compared to general anaesthesia alone to achieve a comparable postoperative pain level. Post-operative opioid consumption decreased with the patient’s age.

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Forced warm air blanket attenuate redistribution hypothermia during induction of general anaesthesia

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Background and Goal of Study: Redistribution hypothermia is recently smaller than before, because some devices are used to warm patients during induction of general anaesthesia. However, there is no research investigating the impact of forced warm air blanket on developing redistribution hypothermia. Measurement of core temperature used to be difficult during induction, because thermal probe need to be placed in nose, rectum or bladder. New thermometer (3M™ SpotOn™) placed on skin surface can measure core temperature. It is possible to start measuring core temperature before induction of general anaesthesia. The aim of our research is to measure magnitude of redistribution hypothermia during induction of general anaesthesia, while patients are warmed with forced air blanket.

Method: We conducted prospective observational study. We measured core temperature using thermometer placed on skin surface in patients undergoing general anaesthesia. The thermometer was placed on patient’s neck just after arriving at operation room. The room temperature was set at 26°C. Patients were warmed with 40°C forced air blanket during the induction. The temperature was recorded on anaesthesia record. We investigated the association between the magnitude of hypothermia and patients' characteristics using multivariate regression models.

Results: We obtained body temperature data from 19 patients. Three patients were excluded because baseline temperature was not recorded. The body temperature significantly decreased during induction of general anaesthesia (baseline: 36.47 ± 0.49°C; lowest: 36.18 ± 0.34°C; p=0.012). The lowest temperature was recorded at 39.1 ± 9.9 min after the induction. Mean magnitude of hypothermia was only 0.29 ± 0.40°C. The magnitude was not statistically related to patients’ age, sex, body weight, or BMI.

Discussion: Patients’ body temperature decreased during induction of general anaesthesia. However, the magnitude of hypothermia was not as large as reported decades ago, that was 1 to 2°C (1).

Conclusion: Mean magnitude of redistribution hypothermia was only 0.29 ± 0.40°C. Forced warm air blanket can attenuate redistribution hypothermia during induction of general anaesthesia.


4608

A cohort study into intravenous drug provocation tests in perioperative allergy

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Background and Goal of Study: Perioperative allergic reactions are rare, yet dangerous complications of anaesthesia. Contemporary, skin testing (ST) is the most prevailing diagnostic in perioperative hypersensitivity reactions. However, STs are known to give false positive and false negative results. Therefore, intravenous (IV) drug provocation tests (DPTs) may deserve a more prominent place in perioperative drug allergy diagnostics. Solely performing skin tests for suspected perioperative allergy may lead to patients being re-exposed to the culprit drug or false allergy labels. Intravenous drug provocation tests for perioperative allergy are safe, provided that they are performed in a monitored setting with appropriate supervision from an anaesthesiologist.

Results and Discussion: We conducted a cohort study of 27 patients, referred to our Dutch Perioperative Allergy Center (DPAC) for assessing the culprit of perioperative allergic reactions from 2016 to 2019. All patients were subjected to a full allergological investigation including STs (skin prick tests and intradermal testing) and DPTs. The primary outcome measures were the culprit agent and discrepancies between STs and DPTs. In 7/27 (26%) patients, negative STs were followed by a positive DPT, whereas in 4/27 (15%) positive STs were followed by negative DPTs. Hence, over 40% of our patients would have received a false diagnosis based on STs alone.

Table 1: Discrepancies between STs and DPTs

<table>
<thead>
<tr>
<th>Patient</th>
<th>Per-operative reaction</th>
<th>Agent</th>
<th>ST</th>
<th>DPT</th>
<th>IDT</th>
<th>Provocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>Hypersensitivity to latex</td>
<td>Latex</td>
<td>Negative</td>
<td>Positive</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Patient 2</td>
<td>Hypersensitivity to latex</td>
<td>Latex</td>
<td>Negative</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
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Conclusion: In our cohort, intravenous drug provocation tests proved to be of added value in perioperative drug allergy diagnostics. Solely performing skin tests for suspected perioperative allergy may lead to patients being re-exposed to the culprit drug or false allergy labels. Intravenous drug provocation tests for perioperative allergy are safe, provided that they are performed in a monitored setting with appropriate supervision from an anaesthesiologist.

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Incidence of suspected perioperative hypersensitivity reactions in an Egyptian population

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Background and Goal of Study: Epidemiological studies of perioperative hypersensitivity reactions have estimated the incidence to be between 1:353 and 1:1,000 with clear geographical variability(1). Our aim was to estimate the incidence of suspected perioperative hypersensitivity reactions in an Egyptian population.

Materials and Methods: Our methodology followed that of a multicentre snapshot study in the UK(2) although this is a single centre study. Data were collected through a questionnaire completed by the responsible anaesthetist after each elective list in Assiut University Hospital over a 12 week period. They were asked to document the number of patients who had received general anaesthesia on the list and the number of those patients who had developed any of the following signs: unexpected unexplained hypotension, unexpected unexplained bronchospasm, angioedema, urticaria, widespread erythema or cardiac arrest. They were also asked their opinion on any likely culprit agent.

Results and Discussion: Data were collected from 1,092 general anaesthesias involving 16 different subspecialties, with 34 cases meeting our inclusion criteria. Widespread erythema was the most common presentation (n=26, 76%) while there was one cardiac arrest. Unexpected unexplained hypotension or bronchospasm were reported in 3 (8.8%) and 2 (5.8%) cases respectively. Urticaria was noted in 9 cases while angioedema was reported in only 2 cases. The reactions were graded according to the Ring and Mesmer scale(3). 28 were Grade 1 (skin manifestations only) and many of these may represent non-allergic reactions (tracheal and subcutaneous) or 4 (cardiac arrest) severity.

Conclusion: Even when excluding cases where erythema was the only feature there were 1:136 patients who met the inclusion criteria, which compares with 1:353 in the UK study with comparable criteria. The incidence of suspected anaphylaxis (Grade 3 or 4) was also high at 1:364 (95% CI 1:115 – 1:1,111). We emphasise that these cases do not have a confirmed diagnosis and further work is required.

References:
Non-intubated VATS under Thoracic Epidural Analgesia, Propofol, and Dexmedetomidine: an Opioid Sparing Anesthesia

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Background: The anesthesia of non-intubated video-assisted thoracic surgery (VATS) is composed of sedation and regional analgesia. Dexmedetomidine is an α2 agonist with effects of anti-anxiety, sedation, analgesia and lesser respiratory depression than Propofol. The application of Dexmedetomidine may reduce intra- and postoperative opioid consumption.

Materials and Methods: The data of this retrospective study was reviewed from patients treated with non-intubated VATS lung wedge resection with Propofol combined with opioid (Group A, n = 18) compared to Propofol combined with Dexmedetomidine (Group B, n = 12) between Jan. and Nov. 2019. Transnasal humidified rapid-insufflation ventilatory exchange was used in both groups to provide adequate oxygenation, prevent hypcapnia and acidosis which were usually occurred during non-intubated VATS. Thoracic epidural analgesia or paravertebral block was applied for intraoperative pain control. Alfentanil was administered through intravenous bolus to reduce respiratory rate and enhance sedation. Statistical analysis was performed using SPSS 17.0, Mann–Whitney U test and Pearson’s chi-squared test.

Results and Discussion: There are no significantly difference between two groups in all patient characteristics. Group B had significantly lower total (22.1 mg ± 27.6 vs 122.1 mg ± 112.8, p < 0.05) and postoperative average opioid consumption (1.9 mg ± 2.6 vs 1.3 mg ± 2.1) than Group A. The average postoperative chest tube retention time was shorter in group B (0.8 days ± 1.5 vs 1.1 days ± 1) (Figure 1). In addition, intraoperative CO2 retention status, surgical duration, the number of patients converting to thoracotomy, complications and perioperative mortality were similar in both groups.

Conclusion: Opioid sparing and multimodal analgesia are essential components of ERAS protocols. Dexmedetomidine use in non-intubated VATS with TIVA is not only effective in achieving opioid-free analgesia, but also noninferior to Propofol in anesthesia quality.

Fig. 1

Statistical analysis showed Dexmedetomidine may be beneficial to opioid sparing for non-intubated VATS with TIVA, due to mechanism of α2 agonist related analgesia.

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Adverse outcomes after cytoreductive surgery with hyperthermic intraperitoneal chemotherapy

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Background and Goal of Study: Peritoneal carcinomatosis (PC) is the end-stage of tumor dissemination from gastrointestinal, gynecologic or peritoneal tumor. Cytoreductive surgery (CR) and hyperthermic intraperitoneal chemotherapy (HIPEC) has demonstrated to be able to increase survival, but is often associated to complications, such as anastomotic leaks, sepsis, pancreatitis, intestinal fistula, kidney injury or hematological toxicity. We aim to evaluate adverse outcomes and mortality after this procedure and to identify risk factors associated.

Materials and Methods: After the approval of the Ethics Committee, we carried out an observational study, including patients scheduled for CR and HIPEC from March 2016 to May 2019. Following data were recorded: age, weight, ASA physical status, intraoperative temperature, length of surgery, intraoperative fluid therapy, outcomes and mortality. Postoperative complications and mortality were analyzed regarding different perioperative data. Results were analyzed using SPSS 24.

Results and Discussion: Thirty-one patients were evaluated (46.7% ASA 3), with a mean age 59.7±7.8yo. 43.2% of patients suffered from postoperative complications: acute renal failure (31.3%), respiratory failure (25%), ieuos (18.7%) and septic shock (18.7%). Overall mortality in study period was 22.58%. No statistical significant differences were found regarding postoperative complications and mortality and age, ASA, intraoperative temperature and hospital length of stay. Mortality rate was higher in patients who received less intraoperative fluid therapy (4644±2393 vs 1557±1816, p<0.003) and those with a lower preoperative hemoglobin (12.6±1.7 vs 10.5±1.9, p<0.001).

Conclusions: Acute renal failure and respiratory failure were the most frequently adverse outcomes in patients submitted to CR + HIPEC. We found a higher mortality rate compared to the literature, probably because these were the first cases of this type of surgery in our hospital. Optimization of preoperative hemoglobin parameters and intraoperative volume status could benefit patients outcome.

References:

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An observational study of perioperative anaesthetic considerations in cytoreductive surgery and hyperthermic intraperitoneal chemotherapy for peritoneal carcinomatosis

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Background and Goal of Study: Gastrointestinal and gynaecological cancers with peritoneal carcinomatosis were thought to be a terminal disease in the past. Cytoreductive surgery (CRS) combined with hyperthermic intraperitoneal chemotherapy (HIPEC) has shown promising results. CRS is followed by HIPEC where chemotherapy agents are infused in the peritoneal cavity at 42°-43°C to kill the microscopic metastatic tissues. CRS with HIPEC is a long and complex procedure with significant blood and fluid loss, haemodynamic alterations, electrolyte imbalance, temperature extremes (hypothermia during CRS and extreme hyperthermia during HIPEC phase) and coagulation abnormalities. Aim of this observational study was to find out the perioperative haemodynamic, blood gas parameters, temperature variations and outcomes in ICU stay and readmissions in ICU, re-exporation rate, 30 and 90-day mortality.

Materials and Methods: We analysed prospectively collected data of 110 patients who underwent CRS-HIPEC at a tertiary care cancer institute from April 2016 to Sept 2019.

Results and Discussion: Haemodynamic parameters measured in an interval of 30 min during the CRS and 10 min during HIPEC phase. Friedman test was used to test the change in the different parameters with repeated measures. A significant difference (p < 0.001) in the median heart rate, mean arterial pressure (MAP), temperature, central venous pressure (CVP), pulse pressure, cardiac output (CO), cardiac index (CI), stroke volume (SV), stroke volume variation (SVV) and urine output observed form start of the surgery to 240 minutes of CRS and at during average 70 min of HIPEC phase. Mean temperature during HIPEC
phase in °C was 34.8±0.96, 36.33±0.93, 37.07±0.76 and 37.02±1.32 at 10 min, 30 min, 60 min and 90 min of HIPEC respectively. Mean lactate level during CRS phase and HIPEC phase are 2.65±1.44 mmol/L and 5.90±1.44 mmol/L respectively. In the post-operative period, 6.4% (7), 62.7% (89) and 18.2% (20), of patients were extubated in operating room, postoperative day (POD) 1, and POD 2 respectively. Median ICU stay was 3 days (range from 1 to 52 days). 25.5% (28) patients were readmitted in ICU. 3.6% (4) patients were re-explored within 30 days. 30 and 90-day mortality was 2.7% and 5.5% respectively.

Conclusion: CRS-HIPEC is complex procedure and require intensive monitoring in perioperative period and leads to higher morbidity and mortality in postoperative period.

Results and Discussion: The AS of blood group O recipients was significantly longer than that of blood group B recipients (p=0.001). Correlation analyses revealed that recipient’s age (p=0.002), donor’s age (p=0.022), glomerular filtration rate(e-GFR) (p=0.005), human leucocyte antigen(HLA) mismatches(p=0.001), blood group O (p=0.0001), blood group B (p<0.0001), Drug cyclosporine A(CyA) (p=0.0001) and Drug sirolimus(p=0.032) were predictors of AS. Multivariate regression analyses indicated that group B (β = -0.618, p < 0.0001) and CyA-based immunosuppression (β = -0.924, p < 0.0001) were significant strong negative predictors, of AS.

Conclusion: We revealed that e-GFR, recipient age, donor age, gender and the number of HLA mismatch, were correlated with long-term AS, in contrast shorter AS was related with blood group B and CyA treatment. Also, the AS of blood group O recipients was significantly longer than that of blood group B recipients.

References:

5296

Assessment of estimated blood loss during surgery

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Background and Goal of Study: Estimating intraoperative blood loss is one of the major concerns of anesthesiologists and surgeons during surgery. This is because estimated blood loss (EBL) is arguably the most important factor when planning out fluid management for intraoperative hemodynamic stability. In addition, the decision to administer blood products is largely based on visual EBL and clinical signs. However, there is a lack of a standardized method to measure the amount of intraoperative blood loss. The purpose of this study is to find an accurate way of measuring the exact amount of blood loss during surgery.

Materials and Methods: This study was approved by the Institutional Animal Care & Use Committee (IACUC) of Korea University College of Medicine (KOREA-2019-0045). Three YLD crossbred pigs weighing 30-40kg were used in this study. Two sets of experiments were conducted on 500ml of blood taken from the pigs. A total volume of 50ml was used in the experiment through mixing the blood sample with normal saline and diluting the blood concentration to 0%, 25%, 50%, 75%, and 100%. There is a statistically significant difference in electrical resistance among the groups according to blood concentration.

Results and Discussion: There were no significant differences in weight among the groups according to blood concentration. The optical density was significantly higher in blood concentration 25% than 0% (Fig.1). Electrical resistance was respectively 4.61±0.03, 4.67±0.04, 4.66±0.02, 4.63±0.03, and 4.61±0.05 at blood concentrations 0%, 25%, 50%, 75%, and 100%. There is a statistically significant difference (P = 0.004). We found an inversely proportional relationship between blood concentration and electrical density.

Conclusion: With the results of our findings, EBL may be more accurately estimated by measuring the total weight and electrical density of the intraoperative blood accumulated in the suction containers.

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ABO blood groups and Renal allograft survival

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Background and Goal of Study: The effects of ABO blood groups on renal allograft survival (AS) are unclear. Allosensitized kidney transplant patients have a short AS. We evaluate the comparative allograft survival in different ABO blood groups kidney transplant recipients.

Materials and Methods: Of 239 renal transplant recipients who underwent transplantation in a single center, 84 (35.14%) patients were blood group O, 104 (43.51%) were blood group A. Because the blood group AB patients' number is low, the blood group B and AB patients were grouped at one group blood group B (51; 21.3%). The groups' variables were investigated and compared. Our retrospective study was approved by the institutional education planning board.
Neutrophil-lymphocyte ratio as predictor for the outcome of postoperative cognitive function in patients undergoing elective non-cardiac surgery

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Background and Goal of Study: Perioperative inflammatory response seems to play a major role in the pathogenesis of postoperative cognitive dysfunction (POCD). This study investigated the association of neutrophil to lymphocyte ratio (NLR) with the incidence of POCD in patients undergoing elective non-cardiac surgery.

Methods: The study included 162 consecutive patients undergoing elective non-cardiac surgery, under general anaesthesia with inhaled anaesthetic. NLR was measured pre- and postoperatively at 24 and 96 hours and the cognitive function was assessed preoperatively and at 10 days, 3, 6 and 9 months postoperatively. Statistical analysis of the acquired data was performed with Stata 14.1 software (StataCorp, College Station, TX).

Results and Discussion: At 10 days 22.2% of the patients were diagnosed with moderate POCD and 37.6% with severe POCD respectively. At 3 months 20.3% at 6 months 11.7% and at 9 months only 3.7% of the patients were diagnosed with severe POCD. Patients with POCD had statistically significantly higher mean values of NLR at 24 and 96 hours after surgery (t test, Mann Whitney U test). At 24 hours mean values of NLR were 2.5±0.63 at patients with moderate POCD at 10 days and 3.23±0.21 at patients with severe POCD at 10 days. Moreover, mean values of NLR at 24 hours were 3.2±0.23, 3.24±0.26 and 3.34±0.11 at patients with higher rates of severe POCD at 3, 6 and 9 months respectively. Additionally, mean values of NLR at 96 hours were 3.4±0.69 at patients with higher rates of moderate POCD at 10 days and 3.1±0.13 at patients with higher rates of severe POCD at 10 days. Last but not least, at 96 hours mean values of NLR were 3.16±0.22, 3.21±0.25 and 3.6±0.1 at patients with higher rates of severe POCD at 3, 6 and 9 months respectively.

Conclusion: Postoperative NLR may be a useful prognostic factor for the occurrence of short-term and long-term POCD in patients undergoing elective non-cardiac surgery.

Acute ischemic crisis of Raynaud phenomenon induced by terlipressine in a patient with scleroderma

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Background: Raynaud's phenomenon secondary to scleroderma can quickly progress to catastrophic ischemic events. Determining causes of a Raynaud's crisis can be difficult during an emergency, because local vasospasm and/or more widespread vascular disease can trigger the event. The efficacy of therapies varies widely. We report a case of a severe Raynaud phenomenon secondary to terlipressine therapy.

Case Report: A 57-year-old woman came to the emergency room with a history of cutaneous scleroderma, Raynaud disease and auto-immune hepatic cirrhosis with portal hypertension, classified as Child-Pugh A. She presented with upper digestive tract bleeding associated with hemodynamic instability. The patient was submitted to urgent upper digestive endoscopy (UDE) on the operation room which revealed acute active hemorrhage from esophageal varices, which were ligated and the procedure was uneventful. One hour after the first administration of intravenous terlipressine, she presented bradycardia, hypertension and severe acute rest pain on the left arm and paresthesias. Elevation of diaphragmatic domes, decreased pulmonar volume and bibasal atelectasis in chest radiograph, together with moderate/severe restrictive pattern in respiratory functional tests are complementary features that can help diagnosis. Eletromiography may help distinguish between neuropathic and myopathic causes. Ventilatory support is the basis of treatment of this disease and a good compliance can attenuate symptoms and play a key role in the recovery process.

References:

Learning points: This case report highlights that with proper perioperative management and optimization, patients with incomplete diaphragmatic paralysis can recover uneventfully following general anaesthesia.

Anesthesia for bilateral diaphragmatic paralysis - What we do not know?

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Background: Bilateral diaphragmatic paralysis is an uncommon cause of dyspnea which may lead to severe morbidity. Multiple etiologies are recognized as possible causes of diaphragmatic paralysis. However, even after an appropriate etiologic study, the causal factor may remain undetermined. We report the perioperative and anesthetic approach of this rare but very significant disorder.

Case Report: A 57-year-old man diagnosed with bilateral diaphragmatic paralysis was proposed to laparoscopic radical prostatectomy. He had no history of trauma, neurologic or neuromuscular disorder that could justify diaphragmatic weakness. No peripheral nerve block was performed. Bilateral diaphragmatic paralysis in the absence of nerve injury necessitated a preoperative assessment that was deemed appropriate. Preoperative assessment was made two months before surgery. As part of preoperative optimization, we ensured patient total compliance to non invasive ventilation (NIV) and supine position tolerability with acceptable oxygen saturations (>90%). During induction of anesthesia an adequate pre-oxygenation was accomplished, without difficulties in ventilation throughout the course of procedure. In the extubation period, patient’s trunk was elevated and maintenance of adequate ventilatory volumes was ensured. In recovery room, NIV was used to achieve good oxygen saturation in supine position. He was discharged after two hours of surveillance.

Discussion: Bilateral diaphragmatic paralysis can occur in the course of several diseases, being usually a serious or life-threatening condition. As anesthesiologists we should be alert to some characteristic signs - unexplained dyspnea that worsens in the supine position and abdominal paradox ventilation should not be overlooked. Elevation of diaphragmatic domes, decreased pulmonary volume and bibasal atelectasis in chest radiograph, together with moderate/severe restrictive pattern in respiratory functional tests are complementary features that can help diagnosis. Eletromiography may help distinguish between neuropathic and myopathic causes. Ventilatory support is the basis of treatment of this disease and a good compliance can attenuate symptoms and play a key role in the recovery process.

References:
Larger prospective studies may be necessary to confirm the results of current clinical practice were not associated with a higher incidence of POUR.

Methods: and mortality outcomes compared to the known diabetics and non-diabetics. population, and how undiagnosed diabetes affects both 30-day and 1-year morbidity to explore the prevalence of undiagnosed diabetics in our perioperative Asian In addition, a large proportion of patients with hyperglycaemia that present preoperatively may not be diagnosed as diabetics. This study was done primarily to explore the prevalence of undiagnosed diabetics in our perioperative Asian population, and how undiagnosed diabetes affects both 30-day and 1-year morbidity and mortality outcomes compared to the known diabetics and non-diabetics.

Methods: A retrospective cohort study of 2106 patients aged above 45 years undergoing non-cardiac surgery in a single tertiary hospital from January 2015 to July 2015 was performed. Undiagnosed diabetics were identified (defined by HbA1c ≥6.5% or fasting blood glucose ≥7.0mmol/L) and their relevant demographic, clinical and surgical data were analysed to elicit the relationship to adverse clinical outcomes and mortality. A univariate analysis was first performed to identify significant variables with p-values ≤ 0.1, which were then analysed using the multilevel logistic regression to calculate the adjusted odds ratio.

Results: The prevalence of undiagnosed diabetes was 7.4%. The mean and median HbA1c of known diabetics were 7.3% and 7.5%, while the mean and median HbA1c for undiagnosed diabetics were lower at 7.2% and 6.6% respectively. 36.4% of known diabetics and 20.5% of undiagnosed diabetics respectively had a random blood glucose >11.1 mmol/L. The undiagnosed diabetic group was more than three times more likely to die at one year (adjusted OR 3.46 (1.80-6.49) p<0.001). No statistically significant relationship was found between the known diabetics and 1-year mortality, however, they were at increased risks of new onset atrial fibrillation (adjusted OR 2.48 (1.01-6.25) p=0.047), infection (adjusted OR 1.49 (1.07-2.07) p=0.017) and readmission within 30 days (adjusted OR 1.62 (1.17-2.25) p=0.004), as well as 30-day mortality (adjusted OR 3.11 (1.16-8.56) p<0.025).

Conclusion: Although undiagnosed diabetics have a biochemically less severe form of diabetes than known diabetics at the point of testing, they are significantly more likely to die at the end of one year compared to known diabetics who were not found to have a mortality difference. This worrying trend highlights the importance of identifying and treating diabetics.
Implementation of ERAS Urology. Preliminary results and analysis

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Background and Goal of Study: Implementation of multidisciplinary approached ERAS programs results in a significant improvement of perioperative care in different surgical specialties. ERAS protocols result in a reduction of length of hospital stay (LOS), complications and improved outcome. ERAS was introduced in Urology in April 2018. The objective of this retrospective analysis is to evaluate outcome measures like LOS, compliance, complication rate and the pitfalls of implementing ERAS Urology.

Materials and Methods: Relevant data of a pre-ERAS and ERAS were extracted and analysed using the ERAS Interactive Audit System (EIAS) of the ERAS Society. Surgeries consisted of open partial nephrectomy and laparoscopic procedures including prostatectomy, nefrectectomy, nephrectomy and radical cystectomy. Outcome measures like LOS, compliance, complication rate (up to 30 days) were compared between the two groups. The implementation process was extensively evaluated by the ERAS-team and the pitfalls in implementing ERAS in Urology identified and discussed.

Results and Discussion: Results of 150 patients could be analysed. Data are presented in Table 1. The compliance increased from 45.2% to 62.4% respectively. LOS was 6.1 days vs 3.4 days for the pre-ERAS group and ERAS group. Total complications decreased from 54.5% to 24.2%. A significant decrease of postoperative pain was observed in the ERAS group compared with the pre-ERAS group, 2% vs 20%. Pitfalls of implementation were availability of staff and nurses for extensive education and training. Furthermore, several elements showed low compliance in the ERAS-group: mobilization on the day of surgery until discharge (20%-41.4%), use of carbohydrate loading (51.7%) and removal of the urethral stent (50%).

Conclusion: Preliminary results after introduction of ERAS Urology were promising. Implementation of ERAS Urology resulted in an increased compliance, a reduction of LOS, postoperative pain and complications. Availability of staff and nurses, takes more time and effort, in particular on mobilization and feeding. Further improvement is needed.

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The effect of the brochure of pediatric day surgery on the caregiver of the patient

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Background and Goal of Study: Caregiver’s anxiety has been reported to be associated with the fear that pediatric patients feel when inducing anesthesia. The increased perioperative anxiety may be associated with adverse outcomes such as increased pain and new onset negative postoperative behavioral changes. Therefore, active interventions should be provided to alleviate the caregiver’s anxiety. We hypothesized that a standard color brochure provided in the preoperative evaluation room can reduce anxiety and increase the degree of cooperation of a caregiver of pediatric patients.

Materials and Methods: Parents of the pediatric patients were randomly assigned into 2 groups. The parents or caregivers in control group received verbal explain of the day surgery process in anesthesia evaluation clinic before surgery (group C). In brochure group (group B), they get the brochure with picture and written information about day surgery process in anesthesia evaluation room can reduce anxiety and increase the degree of cooperation of a caregiver of pediatric patients.

Results and Discussion: A total of 20 caregivers were enrolled. The understanding of the whole day surgery course was significantly higher in group B than group C (P = 0.0025). But the information of postoperative care was insufficient. The anxiety level showed lower tendency in group B than group C although the result was not statistically significant. The satisfaction score of caregiver was not different between two groups but showed slightly increased level (Figure 2).

Management of a parturient with Posterior Reversible Encephalopathy Syndrome (PRES)

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Background: Posterior Reversible Encephalopathy Syndrome (PRES) is a condition linked to several diseases, such as pre eclampsia. In this case there is a rare presentation with severe paresis of a limb. Differential diagnosis was challenging, since this could also indicate a magnesium intoxication, complication of epidural placement or stroke.

Case Report: A G1P1AD 28 year old woman, known with preeclampsia is admitted to the recovery room after an urgent C-section due to foetal bradycardia. She is receiving a continuous magnesium infusion and has an epidural catheter in place. During recovery she develops a headache and oral paresthesias. Parameters at this point are normal. Lab tests, with special attention to magnesium levels, are taken. The patient is given paracetamol and diclofenac, with good result. An hour later the patient develops a clear paresis of the left arm and left facial muscles. After this the neurologist is called and the patient is brought to radiology for urgent MRI scanning. Lab tests show a magnesium level of 2 mmol/l (therapeutic range 2 – 3.5 mmol/l), a LDH level of 1015 U/l (normal range 313 – 618 U/l) and a moderate trombopenia (135,000). Glycemia is normal. MRI shows bilateral areas of diffusion restriction frontoparietal and parieto-occipital. An EEG is also taken, which comes back normal. The patient is admitted to the stroke ward. Trandate is started as hypertension treatment and intensive physiotherapy is prescribed. Symptoms gradually improve over several days. Eventually there is a total recovery.

Discussion: PRES is a syndrome characterised by symptoms of headache, confusion, visual changes, paresis and seizures in combination with typical MRI findings of vasogenic edema in the subcortical white matter, predominantly localized to the posterior hemispheres. It is linked to hypertensive disorders, (pre eclampsia and autoimmune diseases. The mainstay of treatment is treatment of hypertension, but antiseizure drugs and treatment of the underlying disease may also be necessary. Most patients have a complete recovery within two weeks. A small minority of patients have residual neurologic deficits resulting from secondary cerebral infarction or hemorrhage.

References:

Learning points: PRES can, in rare cases, cause paresis of the limbs. Differential diagnosis of magnesium intoxication (in case of preeclampsia), stroke and complications of epidural placement can be challenging.

Impact of a revised ERAS protocol for lower limb arthroplasty

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Background and Goal of Study: Forth Valley Royal Hospital performs ~400 primary hip and knee arthroplasties per year. Our aim was to introduce a new Enhanced Recovery after Surgery (ERAS) regime to improve patient outcomes and reduce length of hospital stay. As part of a local centre of excellence, reviewed their practice and adapted it to suit our hospital.

Materials and Methods: A standardised anaesthetic protocol was introduced, removing intrathecal diamorphine (ITD) and replacing it with a plain spinal for total hip replacement (THR) and a plain spinal, adductor canal block and local infiltration for total knee replacements (TKR). Oxycodeone MR 10mg is given in recovery.
followed by a further 2(THR) or 3(TKR) doses post operatively. During introduction of the new protocol, a prospective audit from Oct 2016-March 2019 was performed. The following short term outcomes were measured: Mobilisation on day of surgery; Pain preventing mobilisation; Post-operative nausea and vomiting (PONV); Urinary catheterisation; Hypotension requiring ephedrine; Median length of stay.

Results and Discussion: 64 patients had a THR; 68% were female, 56% had a plain spinal. Mobilisation increased and there was a reduction in pain, PONV, catheterisation and hypotension in the group without ITD. Median length of stay reduced from 3.5 days to 2 days (p= 0.031). 88 patients had a TKR; 57% were female, 58% had a plain spine with adductor canal block. Mobilisation increased, there was minimal change in pain, a reduction in PONV and catheterisation and a mild increase in ephedrine usage in the group without ITD. Median length of stay reduced from 4 days to 3 days (p=0.031).

Conclusion: The new ERAS protocol has shown improvement in short term outcomes for THR and TKR. In addition to the removal of ITD, staff education, increased physiotherapy and ERAS leaflets are further interventions that may have contributed to positive changes seen. It is thought the high pain scores seen in TKR patients is due to high opiate consumption in this group pre-operatively. Plans to improve this include increasing the dose of post-operative oxycodone, and the possibility of an adductor canal catheter.

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Time-trends and improvement strategies in fast-track hip and knee arthroplasty – a prospective multicenter study of 36,935 procedures from 2010-2017

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Background: Enhanced recovery or “fast-track” protocols have reduced length of hospital stay (LOS) and postoperative complications in total hip and knee arthroplasty [1]. However, the effect of continuous use and refinement of fast-track protocols has not been evaluated in detail.

Methods: Cohort study from Jan 2010 to Aug 2017 within a multicenter collaboration with continuous refinement of established fast-track protocols. Complete 90-day follow-up from The Danish National Patient Registry and medical records. Primary analyzes on monotonic time-trends in LOS and 90-day readmissions. Secondary analyzes on “medical” and “surgical” complications. Test for monotonic trends was done using the Mann-Kendall test.

Results: Median LOS declined from 3 [2 to 3] days in 2010 to 1 [1 to 2] day in 2017 (p=0.049). The fraction with LOS >4 days declined monotonically from 9.7% in 2010 to 4.6% in 2017 (p=0.004). The reduction in LOS >4 days due to “medical” complications (4.4% to 2.7%, p=0.108) showed no monotonic trend, in contrast to “surgical” (1.5% to 0.6%, p=0.035) and no recorded complications (3.8% to 1.3%, p=0.035).

Discussion: Our results are in contrast to a study from the U.K finding no time-independent benefits of national fast-track implementation on LOS and complications, but without details on perioperative care and a mean LOS of 3.7 days[2].

Conclusion: Continuous use and refinement of established fast-track protocols resulted in further monotonic reductions in LOS and morbidity. Mainly due to fewer patients with LOS > 4 days due to no “medical” complications and fewer readmissions due to disproven complications.

References:

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Macrophage Extracellular Traps Play Crucial Role in Ischemia/reperfusion Induced Liver Injury

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Background and Goal of Study: Hepatic ischemia/reperfusion (I/R) injury is a common complication in the clinical setting. macrophages were implicated in the disease pathogenesis of ischemia/reperfusion induced liver injury, but the precise molecular mechanism remains unclear.

Materials and Methods: Liver tissue and serum samples from patients undergoing partial hepatectomy with or without hepatic portal occlusion were used to evaluate the function of macrophage extracellular traps in I/R induced injury. Hepatic histology, serum aminotransferase level, and serum MPO, dsDNA, NE, LPO and MDA were used to examine the relationship between macrophage extracellular traps and liver injury.

Results and Discussion: In the present study, we find that macrophages released extracellular traps (ETs) comprising DNA fibers and granule proteins in patients underwent partial hepatectomy with hepatic portal occlusion (as shown in Fig. 1). Figure 2 Immunofluorescence image of macrophage extracellular traps from patients' liver section underwent partial hepatectomy with hepatic portal occlusion; the sections show staining for DNA (blue, bottom inset), CitH3 (green, top inset), and F4/80 (red, middle inset)

Conclusion: Macrophage extracellular traps maybe a novel regulator of hepatic I/R injury.
Medical utilization of Kiosk in the preoperative assessment of the ASA physical status: A pilot study

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Background and Goal of Study: The use of healthcare Kiosk is increasing in the medical community. However, there are scarce data on its use in a preoperative clinic. The aim of this pilot study was to validate an electronic questionnaire designed to assess the ASA physical status.

Materials and Methods: 323 adult patients undergoing noncardiac surgery were included. A questionnaire including 20 items (yes/no) was designed and inserted in the Kiosk. The ASA score was then retrospectively estimated by an anesthesiologist not involved in the preoperative visit, taking into account the total number of positive answers of the questionnaire inserted in the Kiosk. The answers to the questionnaire from the Kiosk were blinded to the anesthesiologist performing the preoperative visit. Agreement between both ASA scores provided from both anesthesiologists was analyzed using Cohen’s Kappa test (κ).

Results and Discussion: Table 1 shows patients’ characteristics.

Table 2 illustrates the ASA scores estimated by the Kiosk answers and by the anesthesiologist involved in the preoperative visit. Agreement between both was substantially good with κ=0.628 (P<0.001).

Conclusion: Our findings indicate that our electronic questionnaire is accurate in estimating patient’s physical status. A Kiosk can be used to detect ASA I patients in whom a preoperative visit by anesthesiologist may not be necessary.

References:

Accuracy of Rad-67 in measuring Non-invasive Pulse CO-Oximetry Hemoglobin (SpHb) as compared with Conventional Laboratory Analysis (LabHb) in Preoperative Evaluation Clinic (PEC)

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Background: In Preoperative Evaluation Clinic (PEC) hemoglobin (Hb) measurement is routinely performed by collecting blood specimen through venipuncture, which takes up to two hours to be processed. It causes a potentially avoidable painful and costly procedure as majority of the patients will have normal Hb values. Moreover, long waiting time for Laboratory Hb (LabHb) results may hinder timely treatment for underlying causes of anemia (Hb<13). A non-invasive spectrophotometry-based technology (Rad-67®; Masimo Asia Pacific Pte Ltd) could be used as an alternative point-of-care Hb measurement. However, there is no conclusive evidence on the accuracy of Pulse CO-Oximetry Hb (SpHb) in preoperative setting. In this study, we aim to determine the acceptable agreement between SpHb and LabHb in Asian pre-surgical population.

Methodology: This is a prospective, observational study conducted in PEC of a tertiary hospital in Singapore. SpHb and perfusion index (Pi) readings were obtained with Masimo Rad-67 Pulse CO-Oximeter and rainbow DCI-mini sensor. SpHb readings were only recorded when perfusion index was >0.75, and signal stability was high. Participant’s perioperative data and LabHb values were obtained from routine preoperative assessment. The acceptable agreement limits are set as ±1.0 g/dL. Pearson’s correlation coefficient and Bland and Altman plot were used to evaluate the agreement between SpHb and LabHb. Linear regression model was used to determine confounding variables.

Results: 396 participants out of 400 were analyzed, 4 were excluded due to nail polish. The Pearson correlation coefficient of SpHb and LabHb was r (392) = 0.759. Bland and Altman analysis showed a bias of 0.145 of the difference between SpHb and LabHb (95%CI: 0.25, 0.039) and standard deviation of 1.07. Assuming the acceptable difference of +/-1.0 g/dL, 132 (33.3%) were outliers, with 73 (18.4%) over estimating and 58 (14.6%) underestimating the actual value of LabHb. In predicting Hb<13, the sensitivity of SpHb is 74% and specificity is 90.2%. A linear regression showed that smoking (P<0.001) and gender (P<0.001) affect the accuracy of SpHb.

Conclusion: Non-invasive SpHb measurement with Rad-67 adequately predict LabHb value in only two third of the participants. However, it has a high specificity in predicting anemia (Hb<13). It could be used as a preliminary screening tool for low-risk pre-surgical population to minimize time-consuming, painful and costly LabHb analysis.
Feasibility study on Sarcopenia screening in preoperative patients with ultrasonographic assessment of muscle mass and functional assessment
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Background: Sarcopenia is associated with adverse health outcomes. Its diagnosis requires reduced muscle mass and function. Ultrasound (US) is a new modality for sarcopenia screening. It is advantageous as it does not require radiation and is portable and rapid. This is a feasibility study on the use of US and functional tests to screen for sarcopenia in the elderly population preoperatively. The primary aims of the study are to assess the feasibility of using US, in terms of time taken and inter-user correlation. Other secondary aims include speed of recruitment (number approached vs number accepted) and correlation between US and functional tests.

Materials and Methods: Prospective observational cohort study, involving preoperative elderly patients >= 65 years undergoing elective abdominal surgery. Patients undergo US measurement of rectus femoris (RF) muscle and distal forearm (DF) muscles by an anaesthetist and a radiographer separately on the same day. Upper limb strength was assessed via handgrip strength; lower limb strength was assessed via 6 meter gait speed and number of stands that the patient can perform while sitting from a sitting position within 1 minute (sit-stands). Spearman test was used for inter-rater correlation, and correlation between US and function.

Results: 31 patients were approached. 10 patients were recruited between 15 July 2019 and 10 November 2019. Mean time taken for US assessment was 9.9min for each assessor; inter-rater correlation between US measurements was excellent for RF thickness, R=0.996 (p<0.001), and cross-sectional area, R=0.985 (p=0.001); however, it was poor for DF muscle thickness, R=0.23. Correlation between US and function was not significant, likely due to small sample sizes. Recruitment rate was low – 31%. Often cited reasons for declining to participate in the study were patient fatigue and lack of time.

Conclusion: US measurement of RF thickness and cross-sectional area is the most reliable method of ultrasonographic measurement of sarcopenia. It is feasible within a busy clinical setting, as measurements require less than 10min to perform, and does not require skilled sonographers to perform. More patients are needed to assess the correlation between US measurement of muscle mass and function. This feasibility study will inform the design of a larger scale prospective study to determine the prevalence of preoperative sarcopenia using US and functional tests.

Surgeons' technical efficiency
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Background and Goal of Study: Surgeons’ experience certainly improves their technical efficiency although it also causes physiological changes with aging. We hypothesized that surgeons’ technical efficiency improves with increasing surgeon experience up to a point where it then decreases, which is modeled as a quadratic function of experience with a parabolic shape.

Materials and Methods: We collected data from all the surgical procedures performed at Teikyo University Hospital from April through September in 2013-2019. The dependent variable was defined as surgeons’ technical efficiency scores that were calculated using output-oriented Charnes-Coope-Rhodes model of data envelopment analysis. Inputs were defined as (1) the number of assistants, and (2) the time of surgical operation. The output was defined as the surgical fee for each surgery. Surgeons’ experience was defined as the number of years since medical school graduation on the date of surgical procedure. Six control variables were selected; surgical volume, gender, academic rank (full or associate professor), surgical specialty and the year of surgery. We modeled efficiency scores as a function of experience and the square of experience. We performed multiple regression analysis using random-effects Tobit model for our panel data. The efficiency score is a limited dependent variable that lies within the range of 0 to 1, and its distribution is best described by a censored normal distribution. The right censoring limit was set at 1. A p-value < 0.05 was considered statistically significant.

Results and Discussion: We analyzed total 20,375 surgical procedures performed by 264 surgeons in 42-month study period. Their mean experience (standard deviation) was 18.9 (8.8) years. The coefficients of experience and the square of experience were not significantly different from zero (p = 0.694 and p = 0.228, respectively). The coefficients of surgical volume, gender and academic rank were also insignificant (Table).

Conclusion: Surgeons’ technical efficiency is not significantly related to their experience.

Early removal of urinary catheters after colorectal surgery
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Background and Goal of Study: Early postoperative urinary catheter removal decreases urinary tract infection and accelerates patients mobilisation. However, early removal could lead to urinary retention. ERAS Society guidelines for perioperative care recommend routine transurethral catheterization for 1-3 days after colorectal surgery. This duration should be based on known risk factors for retention: male gender, epidural analgesia and pelvic surgery. Low risk patients should have the catheter removed on the first postoperative day after surgery. However, patients with moderate or high risk require catheterization for up to 3 days. The objective of this retrospective analysis is to investigate the need of recatheterization after removal of the urinary catheter in the recovery room due to retention.

Materials and Methods: We searched for patients in whom the urinary catheter was removed after colorectal surgery in the recovery room (early removal) or at the ward in the period between the recovery room and discharge home (late removal).

The primary outcome measure was recatheterization after early removal of urinary catheters due to urinary retention (> 450 ml). The secondary outcome measure was recatheterization after late removal.

Results and Discussion: Two hundred twenty six patients could be identified (in 6-month), mean age 67 y (range 22-94 y) for colon (n=132)and rectal surgery (n=94). Data are presented in table 1. Recatheterization after early removal of the urinary catheter was needed in 7.5% and 11.7% for colon and rectal surgery respectively. Recatheterization after late removal of the urinary catheter was needed in 4.5% and 5.3% for colon and rectal surgery respectively. No urinary tract infections were seen.

Conclusion: Early postoperative urinary catheter removal after colorectal surgery is associated with a relatively low incidence of recatheterization due to urinary retention. Early postoperative urinary catheter removal was not associated with urinary tract infection. Therefore, early removal of the urinary catheter in colorectal surgery is safe and enhances recovery after surgery.

Table 1. Characteristics of urinary catheter management in colorectal surgery

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<th>n°</th>
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Table 1. Characteristics of urinary catheter management in colorectal surgery
Effect of different time-periods of prewarming on preventing perioperative hypothermia in transurethral resection under spinal anaesthesia

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Background and Goal of Study: Perioperative hypothermia is the most common anesthetic complications, increasing the morbidity/mortality of our patients. Active prewarming with hot forced-air devices has demonstrated to be the most effective tool to prevent hypothermia, but it is only recommended in long-term surgeries and its optimal duration has not been elucidated. Both spinal anesthesia associated to the irrigation with liquids at low temperature instilled during transurethral resection (TUR) cause a decrease in the core temperature of the patient. Our aim is to assess the effect of different time-periods of prewarming on preventing perioperative hypothermia during TUR with spinal anesthesia.

Materials and Methods: Once the approval of the Ethics Committee was obtained, we carried out a double-blind randomised clinical trial in patients undergoing TUR under spinal anesthesia. Patients were randomised into four groups: those prewarmed for 15 (p15), 30 (p30) or 45 (p45) min and non-prewarmed patients (control). Prewarming was performed at pre-anesthesia room using a forced hot air blanket. Following data were recorded: age, Body Mass Index, ASA physical status, length of surgery, glycine instilled and operating room (OR) temperature. Core temperature was measured using a tympanic thermometer on arrival at pre-anesthesia room (PreT), at operating room (T0), at 15-min intervals during surgery and at the end of surgery (EndT). Results among groups were analysed using SPSS 24.

Results and Discussion: During 6 months, 215 patients were enrolled and allocated to control group (n=53), p15 (n=54), p30 (n=54) or p45 (n=54). No significant differences were found among groups regarding patient’s characteristics, duration of surgery, litres of glycine, OR temperature and PreT. T0 and temperature measurements throughout surgery were significantly higher in prewarmed groups than in control group (p<0.05). However, no significant differences were found among different prewarmed groups. Average EndT was 34.97ºC in control group, 35.66ºC in p15, 35.72ºC in p30 and 35.74ºC in p45, being this difference significantly higher in prewarmed groups when compared to control group. No differences were found regarding EndT among prewarmed groups.

Conclusion: Prewarming during 15, 30 or 45 min prevent the appearance of hypothermia in short duration TUR under spinal anesthesia. However, longer prewarming time-periods do not ensure higher perioperative core temperature.

Discrepancy in reporting of perioperative complications

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Background: Perioperative complications contribute to patient morbidity and high cost of medical care. Standardized reporting of perioperative complications supports decision-making regarding perioperative care. The aim of our study was to assess the discrepancy between perioperative complications, prospectively recorded within a cohort study, and a retrospective assessment based on available health records.

Methods: This observational study included 320 patients undergoing any type of surgery at the University Hospital Basel, who were included in the ClassIntra® validation study, a classification for intraoperative adverse events. All intra- and postoperative complications were prospectively graded by the treating physicians according to ClassIntra® and Clavien-Dindo. Additionally, two physicians independently recorded all intra- and postoperative complications based on health records, blinded for each other’s assessment and the prospective self-assessment. The number and severity of the retrospective recordings were compared with the prospective records.

Results: Inter-rater agreement between both physicians provided an intraclass correlation coefficient of 0.89 (95% CI 0.86, 0.91) for intraoperative and of 0.88 (95% CI 0.82, 0.93) for postoperative complications. The incidence rate in observing any intraoperative adverse event was almost twice as high after health records review than in the prospective study (IRR 1.97, 95% CI 1.50, 2.13). The grading of the most severe intraoperative complication was the same in 180 patients, higher in retro- than in the prospective data collection in 71, and lower retrospectively than prospectively in 69 patients. The incidence rate in retrospectively observing any postoperative complication was more than double than in the prospectively collected data (IRR 2.21, 95% CI 1.90, 2.58). The grading of the most severe complications was the same in 195 patients, while it was higher in 106 patients in the retrospective data collection and lower in only 19 patients.

Conclusions: There is a noticeable discrepancy in the number and severity of reported perioperative complications comparing retrospective with prospective data collection. Gold standard of data collection method remains uncertain. However, based on the double-blinded-assessment of two independent raters, our study renders prospective under-reporting in the ClassIntra® validation study more likely than over-reporting in the retrospective chart review.
Using HFMEA (Healthcare Failure Mode and Effect Analysis) to Improve Drug Administration Safety in Anesthetized Patients

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Background and Goal of Study: Drug-related adverse events accounted for most and as much as 35% of the total events in the Taiwanese Patient Safety Reporting System. The most reported causes were as the following: a lack of standard operating procedure, an incomplete prescription, overloaded work, and unclearly conveyed oral medical orders. Improving drug administration safety therefore was set as one of the International Patient Safety Goal (IPS). The average drug administration times for one patient was six in our unit. And there were two events of drug administration error in recent one year. This project used HEMEA as the tool and proposed an improvement program.

Materials and Methods: We used the Healthcare Failure Mode and Effect Analysis (HFMEA) as the tool, and finally decided whether an implantation of improvement measures was needed by decision tree. The targets were set as the following: 1. Drug administration error rate dropped from two events per year to zero event per year. Reason: Because the possibilities of causing severe injuries or death existed, no margin was allowed; 2. Rate of repeating medical orders during drug administration above 95%: We built a team in April, 2017. Then we drew the flow chart, and ran the hazard analysis. The hazard factors were calculated, and a decision tree analysis was done. The Risk Priority Numbers (RPN) was 489. The improvement measures were as the following: modifying the procedure protocol documents, establishment of an audit mechanism, education courses, making drugs icons and posts, a consistence of drugs placement, and an exclusive place for drugs and syringes.

Results and Discussion: We re-evaluated the RPN in February 2017, and it dropped from 489 to 365. A 25.6% decline was seen. And drug administration error events dropped from two events per year to zero event per year. The rate of repeating medical orders during drug administration was 100%. The rate of confirmation of doctor’s reply during drug administration above 95%.

Conclusion: Continuous implementation and auditing are necessary. HFMEA could be used as one of the teaching and training topics for new coming colleagues.

The first-time experience might be somewhat subjective. We believe strengthening the reliability of the analysis table is the future direction to work while using HFMEA.

Learning form Excellence as a basis to improve the quality of patient feedback to theatre staff

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Background and Goal of Study: Learning from Excellence builds on the theory of Safety II where there is a focus on how teams reliably get things right rather than a traditional Safety I focus on when things go wrong. Using this more Appreciative Inquiry approach to patient feedback we aim to test if this has a more positive effect on staff morale. Positive feedback is an important means to shift conversations to support teams to flourish, counter staff burnout and improve patient care.

Materials and Methods: Previous safety culture measurement in 30+ theatres of a 900+ bed tertiary hospital has demonstrated that only 37% of theatre staff receive positive feedback on the work that they are doing. Staff were asked to complete a baseline questionnaire asking specifically about patient feedback. Using questions previously tested in the maternity unit we iteratively tested the questionnaire to assess if patients gave more positive feedback that was attributed to a named staff member. We will also identify the best method to give this feedback to staff and understand the barriers to collecting the feedback and giving it to staff.

Results and Discussion: The safety culture data demonstrated that over 60% of theatre staff do not perceive that they receive meaningful, frequent or useful feedback about the work that they do. Further questioning of 2 specialist theatre teams identified that 47% were unaware of the current patient feedback mechanisms and only 20% had received any form of feedback. In September 2019 there were no named members of staff in the current patient feedback system. Using the new questions 25% had a named job role and 25% a named staff member. This allows more targeted feedback to individuals. We intend to test ways to increase the positive feedback to named staff members and the best way to feed this back to staff. We anticipate having full results for Euroanaesthesia 2020.

Conclusion: We believe that will demonstrate the feasibility of taking the principles of Learning from Excellence to improve the patient feedback to named members of staff and identify the best methods to achieve this. We hypothesise that this will improve the theatre teams’ culture by reinforcing positive behaviours, and has the potential to improve patient outcomes and experience.

References:
be distracting, impair effective communication and become a barrier to effective team working. Moreover, excessive noise on emergence from anaesthesia can affect the quality of patients’ recovery through post-operative delirium in addition to adverse neuro-humeral responses. The goal of this study was to survey noise during the induction and emergence of anaesthesia which typically occurs in the anaesthetic room and theatre room respectively.

**Materials and Methods:** Mean noise data was collected from 30 episodes of induction and emergence across a variety of surgical specialties. The anaesthetic team were blinded to the recordings to ensure normal practise was captured. Induction measurements commenced at pre-oxygenation and ended at transfer to theatre. Emergence recordings commenced as surgery ended through to transfer from theatre.

**Results and Discussion:** Noise levels were consistently lower (64.1dB) during induction when compared with emergence (78.5dB). Multiple simultaneous staff conversations, door slamming and manipulating surgical instruments were the main contributors. Mean noise recorded during emergence was loud enough to drown out effective communication between anaesthetist and assistant or patient. Furthermore, Peak noise generated was louder than that of an alarming anaesthetic work station. Noise during induction was largely generated by alarming monitors and patient focussed conversation between anaesthetist and assistant. Noise impacts on the quality of patient’s emergence leading to post-operative confusion, disorientation and cardiovascular stress responses. The anaesthetic room environment is culturally quieter.

**Conclusion:** The ‘sterile cockpit’ rule was evident during induction but not emergence from anaesthesia. An educational package focussing on situational awareness of the extended theatre team could help to mimic the induction environment for anaesthetists and their patients.

**4793**

**A step further from the WHO checklist-The importance of debriefing in managing a complex patient with Duchenne’s Muscular Dystrophy in a District General Hospital in the UK**

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**Background:** We would like to highlight how the effective use of debriefing and checklists helped manage a complex patient with Duchenne’s Muscular Dystrophy (DMD) for emergency endoscopic retrograde cholangiogram (ERC/P) in a District General hospital.

**Case Report:** A 23yr old boy with DMD presented as an emergency for the above procedure. Due to his condition it was decided by the Gastroenterology team for the procedure to be done in theatre. He was diagnosed with DMD at a young age, has been on steroids for the last 12 years and is wheelchair bound. His FVC was 1.92L, has mild cardiomyopathy and an ejection fraction of 60%. Due to severe upper and lower limb contractures prone positioning normally adopted for the procedure was unsuitable. The endoscopic team working in an unfamiliar environment of theatre with anaesthetists and theatre staff can pose clinical and nonclinical issues. Debriefing with team members, use of the WHO checklist improved communication, highlighted clinical, equipment and post procedure issues. Preparation for positioning, use of a vapour free machine, TIVA for inhalation avoiding muscle relaxants, arterial line insertion, having Dantrolene in case of unexpected signs of rhabdomyolysis can that compound the management of such a complex patient were some of the anaesthetic issues highlighted. The outcome was a successfully extubated patient at the end of the procedure who was discharged with outreach support to the ward.

**Discussion:** We would like to highlight the importance of debriefing as a team and the performance of the WHO checklist correctly in reducing human error and improving the care of patients with Duchenne’s Muscular Dystrophy. Evidence from National Audit Projects, NAP 5 specifically has reinforced that human factors, non-technical skills along with checklists reduce errors and improve patient safety. To improve the care of patients with DMD in a multidisciplinary setting.

**Learning points:** Debriefing highlights important clinical and nonclincial factors which are significant in the total care of a patient especially when presenting as an emergency with a rare condition as Muscular Dystrophy in a DGH.

**5058**

**Retrospective observational study on perianesthesia nurses in Japan and anesthesia-related complications**

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**Background and Goal of Study:** In Japan, anesthesia management has traditionally been performed exclusively by physicians. However, since 2010, postgraduate courses to train nurses in providing anaesthetic care have started. The graduates are called perianesthesia nurses (PANs). There are approximately 200 PANs in Japan, which 3 provide anaesthetic care under the direction and supervision of anesthesiologists at our hospital. This is the first study to evaluate the safety of anesthetic care provided by PANs.

**Materials and Methods:** This study was performed with the approval of our institutional ethics committee (B190100001). All patients aged 18 years or older that underwent surgical anaesthesia and had an American Society of Anesthesiologists physical status classification (ASA-PS) of 1 or II, including emergency cases in our hospital between May 2017 and November 2018 and who did not meet the exclusion criteria were enrolled. The patients were divided into two groups according to whether the PAN was involved. The frequencies of anesthesia-related complications were recorded based on the Patient Safety Indicators (PSIs) developed by the Agency for Healthcare Research and Quality in the United States (table 1). Critical accidents, intraoperative hypotension, and desaturation were also examined. The Mann-Whitney U test, χ2 test, and Fisher’s exact test were used for the comparisons.

**Results and Discussion:** Out of 3944 cases, 554 cases had PAN-involved (PAN group). The PAN group has significantly fewer cases with ASA-PS-III IE classified patients. The frequencies of anesthesia-related complications in the PAN group were similar to the not related group (table 1). Hypotension occurred in 2 cases (2/554=0.4%) in the PAN group and 14 cases (14/3390=0.4%) in the not related group. However, no statistically significant differences were found. No critical accidents and intraoperative desaturation occurred in either group.

**Conclusion:** The involvement of PANs in anesthesia management under the supervision of anesthesiologists did not produce a statistically significant difference in anesthesia-related complications. No serious complications, such as critical accidents, were observed.

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**5559**

**Survey to assess operating room personnel reported improved confidence and performance after In-Situ Interprofessional Operating Room Simulations**

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**Background and Goal of Study:** Following a 2-year period of In-Situ Interprofessional Operating Room Simulations (IPORS) for Anaesthesiologists, nurses and ancillary staff, we conducted a survey to assess the OR personnel point of view regarding this program.

**Materials and Methods:** In-Situ IPORS of crisis events were performed since 2016 in the Tel-Aviv Souraski Medical Center, Israel. The simulations were conducted weekly, duration–30 minutes, during working hours, with support from OR personnel and management. In-Situ IPORS took place in an actual OR, utilizing available equipment and setting. After a 5 minutes briefing, each simulation included a 10-15 minutes scenario depicting perioperative emergency with a mock patient. This was followed by 10 minutes debrief focusing on communication and non-technical skills (teamwork/ situation awareness). Over 90 In-Situ IPORS were conducted in a 2-year period. An anonymous electronic survey, 10-Likert scale questions, was sent by email to 200 OR personnel, including anaesthesiologists (n=89) and OR nurses (n=111).

**Results:** Survey responses were submitted by 48 OR nurses and 55 Anaesthesiologists (n=103, 51.5%). Among the responders, 80 (77.7%) have participated in > one In-Situ IPORS. Selected survey questions and results are presented in Figure-1. Thirty-six responders reported involvement in managing a real emergency after participating an In-Situ IPORS. When asked to assess the effect of In-Situ IPORS, most of the participants (25/36, 69.4%) stated that the simulation had improved teamwork and their personal performance during the subsequent emergency situation. The survey responses were similar between professions, seniority or age groups (data not presented).
Conclusions: In-Situ IPORS enhanced confidence and teamwork as reported by the participants, and strongly contributed their performance during real crisis. Most responders stated that routine In-Situ IPORS is important and should be mandatory for providers at all levels. In-Situ IPORS were implemented and highly acclaimed by our OR personnel. Weekly In-Situ IPORS are routinely conducted in our OR to the current date.

Background and Goal of the Study: During the last decades, in situ simulation has grown exponentially, improving clinical performances and outcomes. We describe a case in which we designed a simulation scenario consisting of a malignant hyperthermia (MH) episode. This was run in the operating room (OR) by a 7-member team that would be responsible, in a week, for a patient with a known ryanodine receptor mutation. We assessed if health professionals showed increased self-confidence in managing such an event after running this simulation scenario, for which we used high-fidelity SimMan® 3G simulation mannequin, by Laerdal.

Materials and Methods: All participants answered a pre-simulation questionnaire. Sociodemographic data and OR experience was recorded initially. Members were also asked to self-assess, using a 1-10 scale, their (1) competence, (2) assurance and confidence, and (3) knowledge on specific roles and duties, in case an MH episode occurred. They then run the simulation scenario and reassessed themselves on the same issues. Pre and post-simulation scores were then compared.

Results and Discussion: Team members were aged 24-52 years. 37% (42.9%) had > 10 years of OR experience but only 1 (14.3%) had been present in an MH episode before. Initial scores on self-perceived competence on MH, self-perceived comfort if in need of managing an MH case and self-perceived knowledge regarding each member’s specific roles and duties in case an MH episode occurred were 5.71±1.98, 5.14±2.45, respectively (1-10 scale). After simulation was run, scores increased by an average of 3.10 (p<0.01) – 8.71±1.03 (p<0.01), 8.57±0.43 (p<0.01) and 8.86±0.55 (p<0.025), separately. All members found in situ simulation useful (all scored 10/10) and changes in MH’s institutional protocol and emergency cart were proposed and applied.

Conclusion: In situ simulation increases health professional’s self-perceived competence and confidence when managing an MH episode and allows changes in MH’s institutional protocol and emergency cart, which may ultimately improve clinical outcomes when MH episodes occur.

References:

In situ high fidelity simulation for training and empowering an operating room team for an eventual malignant hyperthermia episode

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Background and Goal of the Study:

We develop a manikin model to study the influence of oxygen flow, degerming solutions, drying time, and the sterile field placement in the occurrence of fire and explosion.

Materials and Methods:

Pieces of pork meat covered the manikin's face, along with nasal cannula provided different oxygen flows (figure 1). The surgeon then applied the degerming solution over the pork meat and arranged the surgical fields. We then started to cauterize the meat, emulating a real facial surgery. The variables included the oxygen flow (from 3L/min to 6L/min), the degerming solutions (10% hydroalcoholic povidone-iodine, 10% aqueous povidone-iodine or 0.5% alcohol-chlorhexidine), the surgical field arrangement (covering mouth and nose or face uncovered), and the drying time for the solutions (30 seconds, one, two and three minutes). Two cameras on tripods shot all the experiments, on both sides of the manikin (two videos are available).

Results and Discussion:

We obtained flames on three occasions: using 0.5% alcohol-chlorhexidine (6L/min of oxygen flow and 30 seconds and one minute of drying time), and 10% hydroalcoholic povidone-iodine (6L/min of oxygen flow and one minute of drying time). There was no fire with aqueous povidone-iodine. The fire appeared only when the surgical field covered the mouth and nose. One of the videos shows fire inside the airway.

Conclusion:

Our findings represent some critical hazards the surgeons and anesthesiologists must consider when dealing with a real scenario of oculoplastic surgery.

References:
Background and Goal of Study: The implementation in recent years of ERAS protocols in abdominal surgery is supported by scientific evidence and it is very important for patient safety. In our hospital, a multidisciplinary work group was created since 2015 for the application of ERAS protocols in colorectal surgery. Our objective was to analyse in colorectal surgery, the average hospital stay, complications in colorectal surgery of the patient's own database were analysed. The differences in average hospital stays were compared with the calculation of the average cost in euros (2019) of standard hospital and critical care unit stay day.

Results and Discussion: The average total hospital stay was: Pre-ERAS Period (2010-2013) n=360, of 13 days (2 days critical care unit stay and 11 days of standard hospital stay). Initial ERAS period (2013-2015) n=519, was 11 days (1.5 day critical care unit stay and 9.5 standard hospital stay). Consolidated ERAS period (2016-2018) n=376, was 6.5 days (1 day critical care stay and 5 days of standard hospital stay). (59.8%) patients developed at least one complication in the Pre-ERAS group, versus (51.10%) in the Post-ERAS group. More patients in the Pre-ERAS group developed moderate or severe complications (31.9% vs. 22.26%, p = 0.009); and severe complications (15.5% vs. 5.3%; p < 0.0001). The estimated cost of the average standard hospital stay per day in 2019 was 256 euros; 1,637 euros for every day spent in the critical care unit per patient; was: Pre-ERAS group 5,090, initial ERAS 4,887.5 and consolidated ERAS 3,045 euros. What is a saving comparing the consolidated group with the pre-ERAS and initial ERAS of 3,045 and 1,842.5 euros respectively. The consolidation of ERAS protocols in colorectal surgery would mean an economic reduction of 50% compared to Pre-ERAS and an initial 38% ERAS attending only medium stays.

Conclusion: The consolidated application of the ERAS protocols based on scientific evidence had an important patient safety and economic impact on the health system.

Incidence of residual neuromuscular blockade and postanaesthesia care unit complications

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Background and Goal of Study: Postoperative residual neuromuscular blockade (RNMB) continues to be a prevalent problem in the postanaesthesia care unit (PACU) despite the use of short acting neuromuscular blocking agents, availability of appropriate monitoring and neuromuscular blockade reversal drugs. The incidence of RNMB is estimated at 26% in Portugal1. This study aims to assess the incidence of RNMB and its perioperative impact in our hospital.

Materials and Methods: After approval by the institutional ethics committee, a prospective observational study was conducted for 6 months, including consenting adult patients scheduled for elective surgery, requiring general anaesthesia and neuromuscular blocking agents. Upon arrival at the PACU, neuromuscular blockade was assessed with a TOF-Watch Sx® device. Three readings were made and the average train-of-four (aTOF) value was recorded. RNMB was considered when aTOF <0.9. The primary outcome was to assess the incidence of postoperative RNMB. The secondary aim was to investigate the association between PACU complications and the TOF ratio upon arrival at the PACU.

Results and Discussion: 104 patients were included in the study. RNMB incidence was 16.3%. Clinical signs of RNMB (failure to lift the head and inability to do tongue protrusion for 5 seconds) were associated with an aTOF < 0.9 (35.3% vs 8%, p=0.002). Patients with RNMB had more critical respiratory events, namely severe hypoxemia (hypoxyemia: <80% reliable peripheral capillary oxygen saturation <90%, 33.5% vs 3.4%, p=0.000). Hypothermia occurring intraoperatively and at admission at PACU was associated with an aTOF <0.9 (p=0.008 and p=0.000, respectively). Richmond Analgiesia and Sedation Score at admission and Aldrete Score upon discharge were good in patients without RNMB (p=0.011 and p=0.010). RNMB were longer in patients with RNMB (160 min vs 105 min, p=0.003; 6 days vs 3 days, p=0.002).

Conclusion: Despite the limitations of this study, it is evident that RNMB remains a common problem that must be prevented and treated promptly, since it is associated with important complications, such as severe hypoxyemia, with critical implications for patients. Moreover, it is associated with longer PACU and hospital stays, with its inherent risks and costs.

Guideline for managing Deep Brain Stimulators’ in the OT-‘Stimulating’ Safe anaesthesia

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Background and Goal of Study: The increasing use of Deep brain stimulators (DBS) for a variety of movement, pain and psychiatric disorders will inevitably result in them being encountered more frequently by the anaesthetist. The increasing prevalence of these devices among the general population poses a new challenge for the unfamiliar anaesthesiologist when such patients present for elective and emergency surgery.

Materials and Methods: Here we describe the management of a 63yo gentleman with Parkinson’s disease and an implanted DBS, who presented for an emergency reverse shoulder replacement having fractured his Humerus in a motor vehicle collision. The patient had a device to turn off the DBS however could not use it. The unfamiliarity of the clinical staff with the device resulted in the inability to deactivate the DBS for surgery. This resulted not only in patient monitoring issues, a risk in itself but also a potential risk to the patient with regard to diaphremal and damage to his Basal Ganglia. The lack of a formal guideline in our institution for such cases prompted a literature review and production of a local guideline. The aim of this is to provide the anaesthesiologist with a step by step guide in order to provide safe anaesthesia and decrease morbidity in this specific patient population.

Anaphylaxis drugs and equipment availability at Oxford University Hospitals NHS Foundation Trust: an audit

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Background and Goal of Study: The NAP6 audit of perioperative anaphylaxis (NIAA/RCoA) made recommendations for the drugs and equipment that should be immediately available in the event of anaphylaxis during anaesthesia1. We audited the availability of anaphylaxis equipment in 108 non-theatre locations across three major hospitals (John Radcliffe Hospital, Churchill Hospital, and Nuffield Orthopaedic Centre) and aimed to analyse how prepared each clinical area was in the event of anaphylaxis, with a view to creating a standardised high quality anaphylaxis kit based on the NAP6 recommendations, to improve its management.

Materials and Methods: A list of all 171 clinical areas equipped with a resuscitation trolley was generated and a visual audit undertaken during July 2019 in 108 locations (53%). Data were collected about: availability and form of anaphylaxis medications; availability of additional equipment recommended in NAP6; signposting and security of storage location; availability of a national anaphylaxis algorithm; and completion of daily checks.

Results: · 33(31%) were not storing anaphylaxis medications in a secure location; · 20(19%) had no signage to indicate the medication storage location; · 59(55%) did not keep anaphylaxis medications together in a marked box; · 9(8%) had no intramuscular Adrenaline available; and · 33(31%) did not stock second-line anaphylaxis drugs; · 21(20%) did not store the needles and syringes required for administering Adrenaline; · 78(72%) had no printed anaphylaxis algorithm; · 17(16%) had no equipment for collecting serum tryptase samples; · 51(47%) had not prompted the required daily check of anaphylaxis medication.

Conclusion: Few locations stored the drugs, equipment, and protocols required to rapidly manage anaphylaxis according to national guidelines, with a small but alarming number stock no Adrenaline, and the majority having no access to guidance for managing this time critical situation. This demonstrates a clear need for standardisation of anaphylaxis equipment across clinical areas, for example with a kit containing the drugs, equipment and guidelines recommended by NAP6. A kit proposal is currently being created, with the intention of a staged introduction.
Implementation of nursing care protocol in anaesthesia and its effect on safety and teamwork climate

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Background and Goal of Study: Using anaesthesia care protocols can organize and standardize operating room nurse's work, improve the exchange of information, highlight the importance of the operating room professional and contribute to patient safety and prevention of adverse events. This study aims to analyze the safety and teamwork climate of professionals involved in the anaesthetic procedure before and after the implementation of an anaesthesia nursing care protocol.

Materials and Methods: A quasi-experimental study with a pretest-posttest design, developed in three stages in the operating room of a private hospital in Sao Paulo, involving anaesthesiologists and assistants nurses. In the first and third stages, the “Safety Attitudes/Operating Room Version (SAQ/OR)” and the “Team Climate Scale (TCS)” questionnaires were applied to all professionals included in the study. In the second stage, the care protocol defined as a Patient Safety Checklist: Nursing in Anesthetic Procedure (PSC/NAP) was implemented by nurses for a period of six months, in surgeries of adult patients undergoing general anesthesia. Data were analyzed using descriptive statistics and linear mixed effects regression model.

Results and Discussion: Nineteen (30.1%) nurses and 44 (69.8%) anaesthesiologists participated in the study, with the implementation of the protocol, anesthesiologists participated in the study, with the implementation of the protocol, safety and prevention of adverse events. This study aims to analyze the safety and teamwork climate of professionals involved in the anaesthetic procedure before and after the implementation of an anaesthesia nursing care protocol. Data were analyzed using descriptive statistics and linear mixed effects regression model.

Conclusion: The implementation of the nursing care protocol CSP/IEPA generated changes in the perception of safety and teamwork climate of nurses and anaesthesiologists.
supervising, what list the trainee was covering and if they could assist if required. The 'starred' anaesthetist was also contacted to check if they were aware they were 'starred', if their pager was working, and if they could help if needed.

Results and Discussion: 17 theatre lists were audited. 100% of trainees knew who was supervising them and how to contact them. 1 supervisor could not be contacted via their pager as the battery no longer worked. 100% of supervisors knew who they were supervising and what list their trainee was covering. 94% were available to attend if there was an emergency. The 'starred' anaesthetist knew they were 'starred', had a working pager, and would be available if there was an emergency 100% of the time.

Conclusion: Compared to data presented at 'Anaesthesia 2019' (showing only 37% of independent trainee lists audited across 7 Trusts could answer yes to all above questions), we have an effective system in FVRH for supervision of non-consultant anaesthetists. Identifying a specific person allows trainees to discuss predicted issues/ concerns and to feel confident help would be available. Although a pager system may seem old fashioned, it avoids contact problems that could be associated with network/ Wi-Fi signal. We also have a Fast Page system to alert people to come directly to the theatre, minimising time wasting during an emergency.

References:

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Peer responders: the second victims' programmes clue

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Background and Goal of Study: The development of second victim programmes is paramount in line with the growing culture of safety and opening disclosure of adverse events. Experience from important groups such as that of Johns Hopkins demonstrate that a first effective and accessible support source to second victims is necessary. The so-called "peer responders", should have tools to help them emotionally and detect unusual second victims course. These skills are known as "psychological first aid". The aim of this study is to assess health professional's perception of the second victim phenomenon as well as the colleagues' capability to become peer responder.

Materials and Methods: Different health professionals (nurses, training residents, anaesthesiologists, paediatricians and clinical assistants) were invited to respond anonymously an online survey between 2017 and 2019.

Results and Discussion: 130 (28.44%) residents and 327 (71.56%) health professionals completed the survey. 84% of responders were women, mostly nurses and anesthesiologist (71% and 20.4%, respectively). When it comes to years of experience, 69% reported more than 10 years. Regarding the peer responder perception, almost 67% had faced a second victim situation as helpers. Despite 75% had actively sought ways to help them, 90.5% considered they did not have enough tools to help the second victim. Finally, only 39% believed their institution have an opening disclosure of adverse events, while the remaining 61% affirmed there is still a punitive, evasive or silent culture.

Conclusions: - Almost 2/3 parts of residents and professionals have faced a second victim situation. - Unfortunately, although most of peer responders sought to help second victims, they considered not to have enough skills. - Therefore, institutional training, educational and organizational programs are urged to enable their professionals to act effectively as peer responders for a second victim.

References:

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A virtual early warning score using “fuzzy logic” – MEDIWARN

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Background and Goal of Study: The regular measurement of vital parameters by nurses and evaluating them by using an Early Warning Scores (EWS) is crucial in detecting deteriorating patients. This allows a timely attempt at optimisation, reducing patients' morbidity and mortality and potentially sparing critical care beds. However, EWS use is limited by human factors such as availability, subjectivity, tiredness and costs. The aim of our project is to devise a wireless system which calculates a parameter severity score directly and alerts medical practitioners via common handheld devices. This system has been coined as `MEDIWARN`.

Materials and Methods: We reviewed data sets from ambulatory tests such a Holter ECG, sleep labs and monitored in-patients to analyse the variability of data and establish criteria for normal patient parameter ranges for heart rate, oxygen saturation, respiratory rate, blood pressure and temperature. We have also used real live values available on the MIMIC-III Clinical Database to corroborate our initial data set. We hence devised an algorithm based on "fuzzy logic" electronic principles that allow early detection and warning of patient deterioration. The results were compared statistically to traditional early warning scores to establish reliability and validity of this new system.

Results and Discussion: Purposely designed computer simulators indicate that the Mediwarn algorithm is a useful tool that can be used to detect early deterioration using common non-invasive parameters. We intend to use the MEDiWARN "fuzzy logic" in a future trial on patients in comparison to traditional methods.

Conclusion: This innovative project will be advantageous to traditional methods to detect timely intervention in deteriorating patients, in acute medical and surgical wards. This quasi automatic system will also help in reducing staff and medical costs.

References:

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Cappuccini Test for Clinical Supervision, its application in practice

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Background and Goal of Study: In October 2012, Frances Cappuccini, died from airway complication following Caesarean delivery of her baby. The coroner argued that “the supervision arrangements in respect of [the anaesthetist] were undefined and inadequate and no-one was aware who was supervising him and their availability”. In 2018, Cappuccini Test was proposed and four questions (Appendix) were directed at the trainees and SAS doctors working alone and at their supervisors (1). The aim of the audit was to ascertain the level of supervision of the trainees/SAS doctors (supervisees) and theatre activities awareness by the consultant (supervisor) during an on call duty.

Materials and Methods: In our department we have the CLWRota system in use. This makes it easy to access anaesthetics staff phone numbers and contact staff directly. All anaesthetic trainees and staff grade doctors (supervisees) on call were contacted via their phones or through hospital bleep system. In addition to the proposed four questions (1) we asked the supervisors further questions to gauge the level of situation awareness of the supervisee’s on call work activities. The audit lasted 2 weeks.

Results and Discussion: During the audit period we were able to contact 16 supervisees (5 trainees and 11 SAS doctors)and 8 consultants. During the audit period of the out-of-hours on call, 90% of supervisees (100% of trainees, 79% of staff grades) were able to correctly identify their supervisors. Similarily, 90% of supervisors correctly identified their supervisee (96% of trainees, 83% of staff grades). The supervisees were contactable immediately in 80% of the time. In 73% of the time, the supervisors have some level of awareness of what the supervisees were doing (80% for trainees, 65% for staff grades) in theatre.

Conclusion: Our audit highlighted areas of good level of supervision for our trainees and SAS doctors and a good supervisors’ awareness of theatre activities out of hours. However, we are still concerned with the small number of inability of trainees/SAS doctors to contact supervisors with potential serious patient safety issues. We have recommended a routine supervisor-supervisee ‘check-in’ at the start of duty.

References:

Acknowledgements: European Development Regional Funds, as part of the INTERREG V-A Italia – Malta collaboration.
Would the Surgical Safety Checklist Predict Anaesthesia Patient Safety Incidents?

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Background and goal of the study: The Surgical Safety Checklist (Checklist) has proved to reduce mortality and complications in surgical patients (1). Despite its proved benefits, Checklist implementation and compliance are variable and inconsistent (2). Aim: to describe the patient safety incidents (Incidents) avoidable through a well-executed Checklist. Describe the Incidents where the Checklist prevented or reduced the patient harm.

Materials and Methods: We retrospectively studied the Incidents reported during 2018 in the Spanish Anaesthesia Incident Reporting System (SENSAR). We selected those Incidents that had all corrective actions implemented (closed Incidents). From these, two authors performed a manual review of those reported from the surgical area (operating room or pre-anaesthesia space) searching for Incidents that could have been avoided through a Checklist or those that the Checklist could have prevented or minimized harm. In case of discrepancy, a third author participated in a discussion to reach a consensus.

Results and Discussion: In a database of 109 hospitals, 1427 Incidents were reported in 2018. Of these, 211 were closed Incidents that took place in the surgical area (Fig). Among this group, 67 (31.75%) were related to the Checklist (Table). The most common type of Incident related to the Checklist were those regarding equipment and medication.

Conclusions: Anaesthesia Incident reports are frequently related to Checklist and its better implementation could further reduce or avoid harm. Incident Reporting Systems can provide a qualitative description to highlight the Checklist success histories or its gaps.

References:

Incidence of Local Anesthetic Systemic Toxicity (LAST) in a high complexity hospital

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Background and Goal of Study: Local Anesthetic Systemic Toxicity (LAST) can occur in any situation local anaesthetic are used. The incidence of severe systemic toxicity varies, from 1:500 to 1:10000. In most adverse event reports, incidence of LAST is described as 1:10,000 for epidural anesthesia and 1:1000 for peripheral nerve blocks. Therefore, we wanted to describe LAST’s incidence in our institution surgical areas.

Materials and Methods: A retrospective analysis of 2018 was made using the clinical records and pharmacy records. We included all regional anaesthetic techniques found in the anaesthesia clinical records. Excluded were the cases where local infiltration or intravenous LA were used. From the pharmacy records we obtained the ID from patients who received lipid infusion as treatment. Then, a review of those clinical records to confirm the LAST event associated with regional techniques found in the anesthesia clinical records. Excluded were the cases where local infiltration or intravenous LA were used. From the pharmacy records we obtained the ID from patients who received lipid infusion as treatment. Then, a review of those clinical records to confirm the LAST event associated with regional.

We calculated the general incidence of LAST in 2018, per surgical area, and per regional anaesthetic techniques.

Results and Discussion: A total of 4964 regional anaesthesias were performed in year 2018; 2365 spinal, 1023 epidural, 1575 peripheral nerve blocks. Six patients required lipid infusion; 3 cases of LAST were associated to regional anesthesia (1 TAP Block in Central Operating Room (OR), 1 femoral nerve block in Orthopedics OR, 1 epidural anesthesia Obstetrics OR). The other three cases were: 1 case of lidocain venous continuous infusion, 2 cases of use by the surgeon (these cases were excluded). General incidence was 0.6 /1000. Incidence per regional anaesthesia was 0.9 /1000 per epidural anesthesia; 0/1000 for spinal anesthesia; 1.2/1000 per peripheral nerve block. We can say that our incidence of LAST is in concordance with other reports. As study limitations we believe that there can be subclinical complications, non diagnostic by anesthesiologists; being the data collection based on records, the incidence may be underestimated because of unreported and sub registry. However, with our method, we were able to detect case of LAST not reported by the anesthesiologist and not related to regional anesthesia.

Conclusion: Further investigation in this area is needed, and using LAST incidence as quality and safety indicator should be considered.

Failure-to-rescue as a contributor to high severity outcomes in anesthesia malpractice claims

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Background: Failure-to-rescue (mortality after a surgical complication) strongly contributes to surgical mortality. As anesthesiologists provide postoperative management and critical care, anesthesia care may be a factor affecting failure-to-rescue. We utilized the Anesthesia Closed Claims Project database (Anesthesia Quality Institute/American Society of Anesthesiologists) to study clinical factors associated with postoperative deterioration resulting in permanent, disabling outcomes or death.

Materials and Methods: Inclusion criteria were 1) patient sustained permanent disabling outcomes or death (injury severity score 6 to 9) after anesthesia for surgical, obstetric, or non-operating room procedures and 2) the event occurred from 2005 or later in the database of 11,034 claims. Failure-to-rescue claims, defined as deterioration event in the post-anesthesia care unit (PACU) after the first hour of care, the ward, or the intensive care unit, were compared to other high severity claims (comparison group) by chi square, Fisher's exact, or Mann Whitney tests.

Results and Discussion: Of 127 failure-to-rescue claims, the damaging event occurred in the PACU (n=119, 15%), ward (n=69, 54%), and intensive care unit (n=39, 31%). Compared to the comparison group (n=584), failure-to-rescue patients were sicker (ASA 3-5: 70% vs. 60%, p=0.044) and more often underwent orthopedic surgical procedures (35% vs. 25%, p<0.020). Sex, age, obesity, emergency procedures, and severity of injury were not different between the two groups. Inadequate ventilation/oxygenation, excessive blood loss, epidural/spinal hematoma, and patient condition were more frequent damaging events in the failure-to-rescue claims (Figure).

Conclusions: Nearly a fifth of claims for severe adverse events were associated
with a failure-to-rescue after postoperative patient deterioration. The types of damaging events in failure-to-rescue anesthesia malpractice claims highlight the importance of timely recognition and treatment of postoperative respiratory depression, postoperative surgical bleeding, epidural or spinal hematoma, and patient comorbidities to improve surgical patient safety.

4615

Intrathecal Morphine: When the unexpected happens

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2Patient Safety

Background: Esophagectomy is a major surgical procedure associated with severe postoperative pain. Thoracic epidural analgesia has been considered the gold standard for pain management after open esophagectomy. The patient’s medical history included recent upper digestive hemorrhage, mild anemia and chronic hepatic disease. A preoperative abdominal ultrasound revealed heterogeneous hepatic structure and mild signs of portal hypertension. After placing ASA standard monitors, 650 mcg lumbar intrathecal (IT) morphine were administered and general intravenous anesthesia ensued. Shortly after the beginning of the laparoscopic abdominal time it was realized that there were signs of micronodular hepatic cirrhosis and portal hypertension. After multidisciplinary discussion it was decided not to proceed with the esophagectomy.

Case Report: A 50-year-old man, classified as an ASA III physical status and diagnosed with esophageal adenocarcinoma was scheduled for an Ivor-Lewis esophagectomy. The patient’s medical history included recent upper digestive hemorrhage, mild anemia and chronic hepatic disease. A preoperative abdominal ultrasound revealed heterogeneous hepatic structure and mild signs of portal hypertension. After placing ASA standard monitors, 650 mcg lumbar intrathecal (IT) morphine were administered and general intravenous anesthesia ensued. Shortly after the beginning of the laparoscopic abdominal time it was realized that there were signs of micronodular hepatic cirrhosis and portal hypertension. After multidisciplinary discussion it was decided not to proceed with the esophagectomy.

Result and Discussion: Intrathecal (IT) morphine can be a powerful adjunct in a multimodal analgesic approach. Dosing consideration should take into account the expected noxious stimulus the patient will be subjected. In the context of a clear intensity reduction of such stimulus, careful observation is required for early detection and treatment of possible dose related side effects due to their high risk.

References:

4576

Extradural fentanyl overdose- experience from inadequately labeled drug practice

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Background: Mediation errors are a major safety issue in perioperative medicine, intensive care, emergency and pain medicine. Recent observation study has put it that one in 20.(1) Drug administration error case report could provide beneficial knowledge of correlation between single dose of extradural opioid and severity and duration of respiratory depression. Absorption and distribution from epidural space is difficult to measure.

Case Report: A 52 y old women was scheduled for elective colon cancer surgery. Due to anesthesia protocol,epidural catheter was placed before induction in OETA. After induction in OETA, administered a 4ml of 2% lidocain and monitored a vital sign,10 min later,anesthesia nurse replaced lidocain 10ml syringe with fentanyl. The anesthesiologist did not notice the switch since both syringes had white labels with hand written drug names which consequently led to inject 6ml of fentanyl into epidural catheter. Next 4 hours patient did not breath spontaneously, therefore we changed our anesthesia plan and postoperatively she was admitted ICU for prolonged mechanical ventilation and monitoring.

Discussion: Besides case reports, there is lack of information about correlation between neuraxial fentanyl single dose and extent and duration of respiratory failure in practice. Virtually the only mechanism for drugs to make their way into the CSF from the epidural space is by diffusion across the spinal meninges, a small minority of drugs will penetrate the systemic circulation and then appear in the CSF after diffusing out of the spinal cord.(2)Opioids have delayed effect. Extraduraly administered 100mcg fentanyl causes profound respiratory depression occurred 100 min later.(3)

References:
**4633**

### A Retrospective Register Study to Investigate the Influence of Neuromuscular Block Reversal on 30-Day Readmission Rates

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**Background and Goal of Study:** Unplanned hospital readmissions could be an indication of suboptimal clinical procedures and have been previously shown to cause increased costs to the society. Identifying sources of readmission is therefore important to improve patient safety and reduce hospital flow in a clinical setting. Muscle relaxants are routinely applied to facilitate endotracheal intubation, improve surgical working conditions and decrease respiratory adverse events. The aim of this study was to investigate whether reversal of neuromuscular block influences the rate of 30-day readmissions in a University Hospital setting.

**Materials and Methods:** This was a retrospective, non-interventional registry study that included all laparoscopic procedures conducted between 2013-2018, which involved the use of a neuromuscular blocking agent. Social registries were in addition used to define the use of primary care health services during a 30-day period after the surgery. The depth of neuromuscular block was estimated using the dose of rocuronium. Primary outcome was the rate of readmission during 30 days after the secondary outcomes were length of postoperative hospital stay, postoperative complication type and use of primary healthcare services.

**Results and Discussion:** 316 out of 3787 patients (8.3%) were readmitted within 30 days of their surgery. Of those patients, 11.8% were categorized as receiving a deep neuromuscular block based on their rocuronium dose. 59.1% of the 316 patients received a reversal agent. The postoperative hospital stay was significantly shorter (6.2 ± 1.7 days vs. 8.4 ± 4.1 days, p < 0.01) for patients who were categorized as having a deep block and were adequately reversed. There were no differences in hospital stay between groups that received a reversal agent vs. no reversal agent. The most common causes of readmission were postoperative pain or infection. The patients receiving a deep block and a reversal agent utilized less primary care services during the 30-day post-operative period in comparison to patients who received a moderate block (5.3% vs. 31.2%). Patients who received a reversal agent had less primary care visits than patients who were not reversed (10.6% vs. 25.4%).

**Conclusions:** The incidence of readmission was lower among patients who received a deep neuromuscular block and a reversal agent. The use of a deep block and a reversal agent were both associated with less primary care visits.

**5662**

### Postoperative residual curarization in recovery for surgical patients

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**Background and Goal of Study:** The recommendation for safe standards of monitoring during anaesthesia and recovery by the AAGBI (The Association of Anaesthetists of Great Britain and Ireland) is the use of peripheral nerve stimulators is mandatory for all patients receiving neumromuscular blockade drugs. The reliable guarantee of return of safe motor function is evidence by a Train-OF/Four Ratio >0.9. The goal of the study is to assess the incidence of post extubation residual curarization in recovery with use of a Quantitative NMJ monitor following Qualitative monitor use in theatres. The patients were extubated following clinical signs and TOF Ratio > 0.9.

**Materials and Methods:** We sent out a survey using an online tool with

**5652**

### Life after sugammadex: incidence of residual neuromuscular blockade in a post-anæsthetic care unit. A prospective, blinded study

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**Background and Goal of Study:** Neuromuscular blockers (NMBs) are used in everyday anaesthetic procedures to facilitate endotracheal intubation and optimize surgical conditions. Proper reversal of its effect is essential to prevent postoperative complications such as upper airway collapse and ventilatory impairment. This study aimed to determine the incidence of residual neuromuscular blockade (rNMB) in the Post Anæsthetic Care Unit (PACU) of a public hospital in Portugal.

**Materials and Methods:** The selected patients underwent general anaesthesia and antagonism of muscle relaxation according to train-of-four ratio (TOFr) at extubation with a muscle relaxant antagonist. Patients were monitored using TOF Scan® and TOFr measurements were performed upon admission and discharge from the PACU. The drugs and doses administered were sole responsibility of the anaesthesiologist in the room and there was no interference from those responsible for the study. The muscle relaxant and antagonist used, demographic and anthropological data, classification of physical status according to the American Society of Anaesthesiology (ASA PS), TOFr at the times of extubation, admission and discharge from PACU, as well as other complications at the PACU, were recorded and analysed with descriptive statistics.

**Results and Discussion:** 42 patients met the eligibility criteria. Mean (SD) age was 50.4 (21.6) years and 61.5% of patients were female. 45% were classified ASA PS II and 40% ASA PS III. In all patients, neuromuscular blockade was performed using Rocuronium and its reversal using sugammadex. There were no episodes of rNMB in the PACU as all patients presented TOFr > 90 % at admission and discharge. The mean TOFr was similar at admission (96.6%; range: 90% - 100%) and at discharge (97.5%; range: 90% - 100%). No postoperative complications were reported in the PACU. The absence of rNMB in our study is consistent with an international study and with the trend shown in others.

**Conclusions:** This study confirms that sugammadex is an agent that assures full recovery of neuromuscular blockade. Nevertheless, the possibility of rNMB occurrence, and the potentially fatal complications that may arise from it, cannot be excluded, stressing the importance of reversal according to TOFr.
Are preoperative fasting recommendations safe? About one case of unusual full stomach: peri operative haematemesis

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Background: The ESA guidelines recommend 6h of preoperative fasting (POF) for solids and 2h for clear fluids in adults. We present a case of perioperative haematemesis, which interfered with POF.

Case Report: This 34-year old patient scheduled for an outpatient surgical hysteroscopy, only had a history of asthma and atopic dermatitis, and no gastrointestinal symptoms. she had received instructions for POF preoperatively. On the day of surgery, while she was waiting to be transferred to the operating room (OR), 30 minutes before surgery, she drank 200mL of water. When arriving in the OR, this inobservance of the POF was detected during checklist. A 10mg intravenous dose of metoclopramide was administered and surgery was delayed for 2 hours. The patient was informed and the anaesthetic plan was changed. Two hours after, a spinal anaesthesia was performed uneventfully and the patient went through surgery without incident. At the end of surgery, the patient began to be agitated and complained of dizziness and nausea. 2mg of IV Midazolam plus 4mg IV ondansetron were administered. Surgery was finalized and she was transferred to the PACU. Few minutes after admission to the PACU, she presented an episode of haematemesis which did not require blood transfusion, even though her haemoglobin had dropped 3g/dL. A sclerosis of a bleeding gastric ulcer was performed, and she was admitted to the ICU. During her stay in the ICU, she developed a pulmonary embolism and a pulmonary infection. After a favorable evolution, the patient was discharged to the ward after 6 days, and home on day 14.

Discussion and Conclusion: The emergence of an haematemesis as the revealing sign of a gastric ulcer in the perioperative period is a very infrequent sign of full stomach. The respect of guidelines for POF does not guarantee that the patient has an empty stomach. The performance of preoperative stomach ultrasound screening might help to assess gastric content preoperatively 1. The checklist, which is recommended by the OMS and the ESA 2, permits to detect risky conductus of the patients, take corrective measures, to avoid further complications. Finally, stress ulcer prophylaxis might help to avoid this complication, even though it is not indicated in low risk patients 3.

References:
2. EJA 2010; 27: 592; 597.

Learning points: Gastric Ulcer can reveal in the perioperative period by an acute haemorrhage.

Bilateral tension pneumothorax with massive subcutaneous emphysema after diagnostic colonoscopy in a patient with ulcerative colitis: a case report

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Background: In previous reports, some patients suffer bilateral tension pneumothorax after colonoscopy. We report a case with ulcerative colitis(UC) also had catastrophic complications with bilateral tension pneumothorax after colonoscopy.

Case Report: A 44 years old man, with history of UC, was scheduled for diagnostic colonoscopy under monitored anesthesia care. His vital signs were stable. Before colonoscopy, we gave him propofol infusion under TCI, Cc: 4.0–7.0 µg/ml. The colonoscopy revealed diffuse ulcers, compatible with UC. A 4 cm polypeid mass impacted over the sigmoid colon. However, the operator suspected air leakage from the equipment because inadequate air inflation persisted during procedure. He took 40 minutes for biopsy. When the patient woke up, he complained of dyspnea, chest pain, neck pain, and abdomen distension. Physical examination found crepitus in bilateral neck and chest, and no breathing sound bilaterally. Meanwhile, HR increased to 124 bpm, SpO2 decreased to 87% under oxygen mask. Chest X-ray showed bilateral pneumothorax, needle decompression was performed bilaterally. A computed tomography scan showed as figure, so bilateral chest tube was placed. The patient was admitted to intensive care unit for conservative treatment. However, sepsis and peritoneal signs developed 3 days later, and the biopsy pathology reported adenocarcinoma. Total colectomy and protective ileostomy was performed. Finally, he was discharged 7 weeks after surgery. His pneumothorax and subcutaneous emphysema were resolved without any clinical sequelae.

Discussion: Ulcerative colitis is a risk factor for colon perforation during colonoscopy. Persistent inadequate air inflation during colonoscopy is a warming sign of colon perforation. The massive air entry via the colonic perforation leading to passage into the retroperitoneal space causing pneumoretroperitoneum, pneumomediastinum, pneumothorax, and subcutaneous emphysema.
Postural change-related movement of peripherally inserted central catheter’s (PICC) tip may cause potentially severe cardiac arrhythmias: A report of 2 cases.

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Background: Safety of peripherally inserted central catheters (PICCs) has been widely accepted and introduction of magnetic tracking and ECG-guided tip confirmation systems (TCS) has allowed PICCs to be inserted bedside even without confirmatory X-ray or floroscopy. The TCS relies on ECG signals collected from the catheter guide wire and facilitates positioning of the catheter’s tip near the cavo-atrial junction (CAJ), which is currently considered as the most optimal site for catheter tip placement. Notwithstanding reported safety of PICCs, complications related to tip placement have not been sufficiently studied. We present 2 cases of severe cardiac arrhythmias that occurred under general anesthesia upon changes in patient body position.

Case Report: Case 1. A 44-year-old woman, 155cm, 62kg, was scheduled for laparoscopic adrenalectomy. Following induction of general anesthesia, she was placed in the left lateral decubitus position. Frequent ventricular extrasystoles were detected on the ECG tracing and disappeared when the patient’s position was restored to supine. Case 2. An 86-year-old woman, 146cm, 55kg, was scheduled for VA shunt reconstruction. After induction of general anesthesia, a persistent type 2 atrioventricular block developed immediately after both patient’s arms were raised in the prone position. The AV block resolved after lowering the arms back to the previous position. Patients’ past histories did not include any arrhythmias and in both cases PICCs were inserted the day before surgery using the ECG-guided TCS with catheter tips placed near the CAJ. Informed concern statements were obtained. Each dosage of inhaled salbutamol contains up to 0.1mg of drug. Repeated adrenergic stimulation. Also activates the Na-K-ATPase pump that catalyzes the balance of patient comfort, safety and endoscopy unit efficiency.

Discussion: Anesthesia in a nonoperating room has always been risky. Some advocate that in patients at high risk for sedation-related adverse events undergoing ERCP, endotracheal anesthesia is associated with significantly lower incidence of adverse events, without impacting procedure duration, success, recovery or in-room time2.

References:

Postoperative ST depression caused by secondary hypokalemia to salbutamol overdose

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Background: Salbutamol is a frequently used bronchodilator drug not without adverse effects. We present a case of postoperative ST depression secondary to moderate hypokalemia due to salbutamol1.

Case Report: 39-year-old obese male presents bilious vomiting and bronchoaspiration with severe bronchospasm and secondary hypokalemia after anesthetic induction for drainage of a perianal abscess. Hydrocortisone and 100 mcg of intravenous salbutamol are administered during surgery associated with multiple administrations of inhaled salbutamol through the endotracheal tube. Once the intervention finished, is transferred to Anesthetics Intensive Care Unit for progressive withdrawal of mechanical ventilation. Upon arrival at the unit, presents sinus tachycardia, generalized ST depression and QT prolongation. Arterial gasometry shows mixed acidosis and moderate hypokalemia (2.7mEq/L). Potassium chloride is slowly administered with correction of kalemia levels and progressive correction of EKG abnormalities. There was no significant elevation of troponins and the ecocardiogram performed did not show signs of myocardial dysfunction. The patient was discharged to ward at 48 hours.

Discussion: Salbutamol has an important bronchodilator effect due to β2 adrenergic stimulation. Also activates the Na-K-ATPase pump that catalyzes the entry of potassium into the cell, decreasing plasma levels. Each dosage of inhaled salbutamol contains up to 0.1mg of drug. Repeated administration associated with intravenous infusion can produce toxic plasma concentrations and increase the risk of side effects2,3.

References:
important to prevent recurrence.

Case Report: We report an intraoperative anaphylaxis caused by ceftriaxone in a 65 year old male, ASA IV, with elevated cardiovascular risk (risk class IV in the RCRI of Lee2), recently referred for implantation of CRT-D. The patient was submitted to combined anesthesia for a nephrectomy due to severe kidney cyst bleeding refractory to conservative measures, with history of previous uneventful general anesthesia. After induction and ceftriaxone administration, patient presented with sudden low etCO2, followed by rapid onset hypotension, tachycardia, desaturation, with cardiorespiratory arrest within 1 minute with PEA. Immediate removal of surgical drape unveiled discrete erythematous papules in the upper limbs. The patient recovered after immediate and successful approach in the OR, comprising a total of 3mg of adrenaline and 4 cycles of ALS, and was discharged after 27 days in good health with CRT-D. Unfortunately, and despite the application of several alert strategies after the event, the patient died nearly two months after discharge, due to cardiac arrest after re-administration of ceftriaxone in the same hospital in the emergency department.

Discussion: The undesirable outcome of this case should lead to improvements in the drug allergy alert system. This case could also raise the discussion about the prescription management system itself, proposing that it should alert and prevent the prescription of drugs to patients that are being studied for possible allergic reactions.

References:

Learning points: This case report exposes the difficulties of predicting and diagnosing periorpaeative anaphylaxis during intraoperative period, but it also shows that it is necessary to rethink notification and alert strategies for suspected allergies.

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Case report: Could the notion of allergic contact dermatitis caused by newspaper ink have foreseen a double cardio-pulmonary arrest following the induction of anesthesia?

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Background: The occurrence of an anaphylactic reaction is a great concern, because it may be potential life threatening 1. Case report: A 74-year old ASA II patient was scheduled for an operation under general anesthesia (GA). She has had two uneventful interventions under GA in the past. Anesthesia was induced with sufentanil, lidocaine and a TCI of propofol. Within 30 sec after administration of rocuronium the patient developed severe bronchospasm with cardiovascular collapse and a generalized erythema. Tracheal intubulation was performed. Bolus doses of epinephrine up to 500 µg, promethazine 50 mg IM, methylprednisolone 1000 mg IV, ranitidine 50 mg IV and fluid resuscitation were administered. As the patient developed an asystole, CRP was initiated. After 30 min CRP and a total dose of 3 mg epinephrine the patient regained a "Return of Spontaneous Circulation" (ROSC). A continue infusion of norepinephrine was started, ivatropium bromide and salbutamol aerosols were given, Suggamadex was administered as antidote and surgery was postponed. For transfer to ICU, 5 mg epinephrine was given. An echocardiography showed a Takotsubo syndrome. Plasma tryptase levels were positive. Skin tests, performed 4 weeks later showed a positive response to rocuronium and cis-atracurium. Afterwards the patient mentioned a contact dermatitis for newspaper ink and difficulties with detergents. 6 weeks later patient was operated under locoregional anesthesia.

Discussion: Quaternary ammonium groups are ubiquitous epitopes contained in many drugs and chemicals.3 Many patients with allergic disorders have elevated levels of total IgE 2. Recognition of these ubiquitous epitopes may account for the occurrence of anaphylactic reactions.

Learning points:
- The presence of protocols in the surgical area for emergency management reduces errors in drug administration and increases patient safety.

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Case report of an anaphylactic cardiac arrest in perioperative period caused by ceftriaxone – a challenging diagnosis and an ineffective allergy notification

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Background: The diagnosis of perioperative anaphylaxis is a difficult challenge, since the patient is often under general anesthesia, with anesthetics that can mask anaphylaxis cardiovascular effects, covered by surgical drapes that hide mucosal and cutaneous signs. After anaphylaxis, notification of the event, is extremely important to prevent recurrence.

Case Report: We report an intraoperative anaphylaxis caused by ceftriaxone in a 65 year old male, ASA IV, with elevated cardiovascular risk (risk class IV in the RCRI of Lee2), recently referred for implantation of CRT-D. The patient was submitted to combined anesthesia for a nephrectomy due to severe kidney cyst bleeding refractory to conservative measures, with history of previous uneventful general anesthesia. After induction and ceftriaxone administration, patient presented with sudden low etCO2, followed by rapid onset hypotension, tachycardia, desaturation, with cardiorespiratory arrest within 1 minute with PEA. Immediate removal of surgical drape unveiled discrete erythematous papules in the upper limbs. The patient recovered after immediate and successful approach in the OR, comprising a total of 3mg of adrenaline and 4 cycles of ALS, and was discharged after 27 days in good health with CRT-D. Unfortunately, and despite the application of several alert strategies after the event, the patient died nearly two months after discharge, due to cardiac arrest after re-administration of ceftriaxone in the same hospital in the emergency department.

Discussion: The undesirable outcome of this case should lead to improvements in the drug allergy alert system. This case could also raise the discussion about the prescription management system itself, proposing that it should alert and prevent the prescription of drugs to patients that are being studied for possible allergic reactions.

References:

Learning points: This case report exposes the difficulties of predicting and diagnosing periorpaeative anaphylaxis during intraoperative period, but it also shows that it is necessary to rethink notification and alert strategies for suspected allergies.

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Transient spinal cord injury without radiographic abnormality (sciwora) after laparotomy nephrectomy surgery in lumbotomy position: a case report

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Background: The acronym SCIWORA describes clinical symptoms of traumatic myelopathy with no radiographic or computed tomographic features of spinal fracture or instability. Based on reports, SCIWORA is responsible for 6-19% of cases of spinal injuries in children and adults, respectively.1 Recent findings underline the prognostic role of early Magnetic Resonance Imaging (MRI) for adult patients with SCIWORA (2). We describe a case of SCIWORA after nephrectomy surgery.

Case Report: A 34-year-old patient with xanthogranulomatous pilonephritis underwent left nephrectomy surgery by subcostal laparotomy in lumbotomy position, which lasted four hours. We performed a general anesthesia with invasive blood pressure monitoring and the patient maintained an optimal gas exchange, hemodynamic stability and spontaneous diuresis > 0.5 ml/kg/h. After extubation in the operating room, the patient manifested bilateral lower limb pain, tactile and thermoalgesic sensory deficit and motor deficit below L1, compatible with an anterior spinal cord syndrome. An urgent MRI was performed in which there was no evidence of medullary radiological alteration and the patient began to recover the sensory and motor deficit 60 minutes after the end of the intervention, reaching full recovery at 90 minutes.

Discussion: SCIWORA is a clinical-radiological condition in which the injury to the spinal cord is caused by a contusion or ischemia due to temporary occlusion of vertebral arteries followed by a spontaneous return of vertebrae to their original position. The objective of this case report is to describe, for the first time in the literature, a transient spinal cord injury secondary to surgical aggression that includes lumbotomy position and possible compression of the vertebral arteries secondary to the size and manipulation of the kidney.

References:

Learning points: SCIWORA is a rare clinical condition that can occur after external aggression, among which we must take into account surgical aggression secondary to the patient's position and / or medullary ischemia secondary to a temporary occlusion of spinal vascularization.
Anaesthetic implications of a patient with cold urticaria – a case report

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Background: Cold urticaria consists of an allergic immune response after cold exposure with symptoms ranging from pruritic wheals to life-threatening angioedema, bronchospasm or anaphylactic shock.1 This case report focuses on the anaesthetic implications of a patient with cold-induced urticaria with systemic reactions who had been advised to carry an adrenaline autoinjector.

Case Report: A 45-year-old man, ASA III, underwent partial glossectomy for early warning sign that something might be wrong. Moreover, most tubes are placed in the anesthetized patient, making impossible an early warning sign that something might be wrong.

Learning points: Cold urticaria is a rare and potentially deadly disease; alcohol-free solutions are better for skin preparation in these patients; maintenance of normothermia is crucial to avoid any kind of complications in patients with cold urticaria.


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Nasogastric tube placement - are we doing it wrong?

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Background: The placement of a nasogastric tube is a very common procedure in the anaesthesiologist's clinical practice. However, even though there are several aspects described in the literature, the common practice continues to be placing it using blindly and not monitoring its final position with proven tests. Moreover, most tubes are placed in the anesthetized patient, making impossible an early warning sign that something might be wrong.

Case Report: A 45-year-old man, ASA III, underwent partial glossectomy for early warning sign that something might be wrong. Moreover, most tubes are placed in the anesthetized patient, making impossible an early warning sign that something might be wrong.

Learning points: Cold urticaria is a rare and potentially deadly disease; alcohol-free solutions are better for skin preparation in these patients; maintenance of normothermia is crucial to avoid any kind of complications in patients with cold urticaria.

References: 1. Sanaie S, et al. Nasogastric tube insertion in anaesthetized patients: a method to accurately verify the positioning of the tube.2 It's the authors opinion there are several papers describing ultrasonography as a fast, simple and sensitive method to accurately verify the positioning of the tube.2 This case report highlights that many procedures which may not typically be considered harmful to patients, may have serious and potentially life-threatening implications for a patient with cold urticaria.


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Opioid-induced respiratory depression in patients monitored by capnography and pulse oximetry during fentanyl-based intravenous patient-controlled analgesia

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Background and Goal of Study: Opioid induced respiratory depression (OIRD) is one of common adverse effects of opioid in the surgical patients during the postoperative period. Some reports have shown that continuous capnography and pulse oximetry monitoring reveals frequent desaturation and bradypnea during intravenous patient controlled analgesia (IVPCA). One of the risk factors for postoperative OIRD is background opioid infusion. The aim of this observational cohort study was to assess the incidence of respiratory depression (RD) using continuous capnography and pulse oximetry monitoring during fentanyl-based IVPCA.

Materials and Methods: After IRB approval and written informed consent, 122 subjects were enrolled in the study in a prospective cohort study. They received fentanyl-based IVPCA with background infusion after surgery. We monitored nonsedative end-tidal CO2, RR and SpO2 with Capnostream™ respiratory monitor (Medtronic) after operation until next morning. Each subject was clinically monitored per standard of care. The monitor was blinded and alarms silenced. We investigated RD episodes during respiratory monitoring and its total time. Data suggestive of RD episodes included any of the following: 1) CO2 > 60 mmHg for ≥2 minutes, 2) RR > 5 breaths per minute (BPM), or 3) SpO2 < 95% for ≥2 minutes. We defined RD as the incidence of oxygen desaturation > 30 seconds. Data comparison between patients with and without ≥1 OIRD episode was performed. Variables collected included gender, height, weight, operating time and STOP-BANG score.

Results and Discussion: 93 of the 122 patients (76%) were included in the study. The incidence of OIRD was 25.8% (24/93). The average age for the RD group (69 ± 9) was significantly higher than the average age for the non-RD group (58 ± 16) (P = 0.004). There was no difference in BMI, operating time, STOP-BANG score or between the two groups. Onset of the incidence of OIRD was high. There was one patient who required clinical interventions for suspected RD. OIRD occurred not only within 2 hours after discharge from the recovery room but also frequently within 2 hours after discharge from the recovery room. There were no episodes of hypoxia (88 episodes). The fall in SpO2 only occurs after a few minutes when respiratory stops. With capnography, CO2 waveform ceases as soon as hypoxia occurs. CO2 monitoring provides early detection of airway obstruction.

Conclusion: Continuous of capnography and pulse oximetry can aid in patient management and safety for fentanyl-based IVPCA.

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Chronic pain therapy with opioids in non-cancer patients may be associated with cognitive impairment

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Background and Goal of Study: Brain - Derived Neurotrophic Factor (BDNF) is one of the newest markers of regenerative abilities and neurodegenerative disease of human brain, which can be also used as biomarker in clinical practice. Its reduced plasma concentration is associated with cognitive impairment, addiction and opioid tolerance. The aim of the study was to investigate the impact of chronic pain therapy with opioids on cognitive functions and BDNF level of non-cancer patients.

Materials and Methods: The project was approved by Ethical Committee of Medical University in Bialystok (Poland). Group of 36 patients suffering from chronic low back pain and treated with opioid therapy (study group) and group of 14 healthy volunteers (control group) were included in our study. Both groups had anthropometrical parameters taken, as well as information about duration of opioid therapy, type of opioid, total dose and form of application were registered from study group. In both groups measurement of BDNF were performed using Enzyme-Linked Immunoabsorbent Assay (ELISA) test. Data were analyzed using non-parametric tests.

Results and Discussion: The median BDNF value in study group was 9.56 – 14.73 ng/ml and compared to control group with median BDNF value 23.89 – 29.61 ng/ml. Data were analyzed using non-parametric tests.

with buprenorphine or tramadol, (p<0.005). Levels of BDNF serum concentration were positively correlated with age and daily dose of opioid. Opioid use may result in decrease of cognitive function, addiction and increasing opioid tolerance. Correlation between different opioid analgetics used in non-cancer patients and the gradual narrowing of the carotid artery cannot be completely imitated. This paper aims to establish a model of bilateral carotid stenosis with mild cognitive dysfunction and mild white matter changes to simulate patients with vascular dementia.

**Materials and Methods:** Aged (18 months) Wistar rats underwent bilateral common carotid artery stenosis (BCAS) or occlusion (BCAO) surgery or were sham-operated (control group). Cerebral blood flow (CBF) in the frontal cortices was measured using Doppler flowmetry. Cognitive function impairments were detected with the Morris water maze test on day 30 after surgery. Cerebral magnetic resonance imaging (MRI) detected changes in fractional anisotropy (FA) to assess the white matter injury in rats on day 30 after surgery. Additionally, histological studies were performed at 30 days after surgery.

**Results and Discussion:** The mortality was 11% (30/34) in the BCAS group. At 2 h, the CBF values (ratio to preoperative values) were significantly decreased to 77.3 ± 13.4% in the BCAS group but to 73.7 ± 12.5% in the BCAO group. In the BCAS group, the microscopic structure of the hippocampal CA1 region changed slightly after 30 days. The difference between the escape latencies in the BCAS model and control groups was significant less than that in the model group (P < 0.05). The hnrRNPA2 and GABAR-α1 expression levels were significantly decreased in the hippocampus of BCAS rats compared to that of control animals. Fluorescence stainings for glial fibrillary acidic protein revealed that the space of injured neurons was filled by Astrocytes in the brain of BCAS rats, and this phenomenon was even more pronounced in the BCAO group. In MRIs, the FA values in the hippocampus and cortex of BCAS rats were slightly decreased, and these changes were more pronounced in BCAO rats.

**Conclusion:** Severe bilateral carotid stenosis induced mild cognitive dysfunction and slight structural changes in the brain of aged rats. This study established successfully a chronic cerebral hypoperfusion model.

**Effect of the administration of Hydroxyethyl starch on the recovery of renal function in laparoscopic living donor nephrectomy**

**Background and Goal of Study:** Currently, the use of hydroxyethyl starch (HES) solutions has been restricted due to their potential association with the development of renal failure in certain clinical settings. In this sense, its administration as a perioperative strategy to avoid hemodynamic compromise during laparoscopic living donor nephrectomy (LLDN) is questioned. The main objective of this study is to compare the recovery of renal function in patients undergoing LLDN with and without perioperative administration of HES.

**Materials and Methods:** Retrospective single-center observational study (January 2010 – December 2017) of patients undergoing LLDN. Two groups were defined: group H includes patients who received 6% HES 130 / 0.4 within 24 hours of the perioperative period and in group N those who did not receive it. The main variable is the recovery of renal function by compensating the remaining kidney one year after the nephrectomy. We evaluated this compensation using the renal compensation rate [RCR = (eGFR per year of nephrectomy / eGFR predonation) * 100], with eGFR being the estimated glomerular filtration rate. Other variables collected: demographic data, amount of HES administered (ml / kg weight) and eGFR using the CKD-EPI equation at different times (predonation, discharge, 1 month, 3 months 6 months and one year). Quantitative variables are expressed as mean and standard deviation; categorical variables as a percentage. Comparisons were established between the groups described by Student's t-Test for continuous variables.

**Results and Discussion:** A total of 89 donors were included (group H = 65 / group N = 24). Demographic characteristics were similar in both groups. In group H, the amount of HES administered was 17.24 ± 5.6 ml / kg, in any case exceeding the maximum recommended dose (30 ml / kg). No statistically significant differences were found between both groups in the eGFR measured at the different time intervals (p > 0.05). The RCR (%) in group H was 67.7 ± 8.72 vs. 65.1 ± 7.3 in group N (p > 0.72).

**Conclusion:** Perioperative administration of HES in patients undergoing LLDN does not appear to compromise the recovery of renal function one year after surgery.
Use of oxygen therapy in the Postanesthesia Care Unit and neuromuscular blocking agents monitoring and reversal in the OR in a tertiary hospital

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Background/Goal of Study: Transient arterial hypoxemia is one of the most common postoperative complications after anesthesia that is usually treated with oxygen therapy (OT). Incomplete recovery of neuromuscular function may impair pulmonary and upper airway function and contribute to adverse respiratory events in the postanesthesia care unit (PACU). Aim of the study was to analyse the use of OT in the PACU and neuromuscular blocking agents (NMBS) and reversal in the OR in a tertiary hospital.

Materials/Methods: This was a prospective, descriptive, observational study. After obtaining institutional Ethics Committee approval and written informed consent, all consecutive adult patients scheduled for any type of surgery under general anesthesia (GA) or sedation were included during 3 months (August-October 2019). Data recorded were: demographics, comorbidities and variables according to the ARISCAT criteria, type of surgery and anesthesia, use of NMBS monitoring/reversal, SpO2 at different times and postoperative use of OT signs. Students’ t-test and Chi-square test were used for analysis using SPSS®. Data are presented as absolute numbers and/or percentages. A p-value<0.05 was considered to be statistically significant.

Results/Discussion: A total of 101 patients were included (57.4% women, mean age was 63.8±14 y, ASA16%, I62%, II33%, GA 69.3%, smokers 23.8%, respiratory comorbidities 24.8%), 64.4% underwent thoracic or abdominal surgery (mean duration 2 h in 48.5%). Mean preoperative SpO2 was 96±16.8%, median 92 at arrival to PACU was 95,1±3.1%. In the PACU OT was given in 61.4% of the cases using nasal cannula; it was maintained 1 h in 53% and in 24.8% when discharge to ward. We observed that in 34% of the patients coming from OR arrived to PACU with a SpO2<96% and oxygen therapy was not given, while in 56.3% of the patients presenting SpO2<96% oxygen therapy was administered. On the other hand, NMBS were used in the OR in 63.4% of the GA; neuromuscular reversal with sugammadex was performed in 61.4% of the patients while only in 32.7% of the GA a neuromuscular blockade monitoring was performed intraoperatively.

Conclusions: In our setting, an inappropriate use of OT in PACU and an inadequate use of NMBS monitoring and reversal in OR were observed. It is crucial to design specific protocols of oxygen therapy administration in our PACU and neuromuscular monitoring and reversal in the OR in order to improve patients outcome.

5808

Postoperative coagulation disorder in major hepatectomies: safety of epidural catheter for perioperative analgesia

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Introduction: Coagulation disorders can appear after liver surgery. In major resections, these disorders appear more frequently. Accidental withdrawal of an epidural catheter in these conditions could increase spinal haematoma incidence. The aim of our study is the evaluation of epidural catheter safety, having into account the evolution of coagulation parameters in major and minor hepatectomies.

Materials and methods: We performed a retrospective review of a prospective, unicenter, observational database including all patients who get hepatic surgery from January 2015 to November 2019. Patients were classified into major hepatectomy or minor hepatectomy groups. Demographic preoperative data, bleeding and transfusion requirements, fluids administration and evolution of coagulation parameters (prothrombin time [PT], partial thromboplastin time [aPTT] and platelets count [PC]) were analysed. For safety analysis, we considered the institutional laboratory thresholds and the accepted in some hepatic surgery centers. Statistical analysis included Student’s t-test or Chi-square to compare both groups (level of significance, p<0.05)

Results: 73 patients were recruited, 15 of them were excluded for missing coagulation data. The 58 included were classified into major surgery (19 patients) and minor surgery (39 patients) groups. There were no statistically significant differences in demographic data (age, body mass index, sex, ASA status, preoperative coagulation parameters) and intraoperative data (bleeding, fluid administration) between the two groups. All patients in major surgery group presented at least one coagulation parameter out of normal laboratory range (PT>0.4, aPTT>32 seconds, PC<150.000/mm3), compared to 64% of minor surgery patients (p=0.001). Regarding the thresholds accepted in some hepatic surgery centers (PT>43%, aPTT>40 seconds, PC<80.000/mm3), 21% of patients in major surgery group presented at least one coagulation parameter affected, compared to none of minor surgery patients (p=0.009).

Conclusion: According to our results, the worsening of coagulation parameters in the postoperative period of major hepatectomies, makes unsafe the insertion of an epidural catheter for pain control.


6005

Accuracy of iThermonitor Wireless Thermometer in Intraoperative Temperature Monitoring

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Background and Goal of Study: Intraoperative hypothermia is one of the most common anaesthesia related complications. iThermonitor is a new type of electronic thermometer, which has advantages of noninvasive, continuity, simple operation and could be used for conscious patients. This study aimed to analyze the consistency between iThermonitor and esophageal.

Materials and Methods: Patients undergoing lower abdominal surgery in West China Hospital from September 2018 to February 2019 were included. The esophageal temperature and iThermonitor were continuously monitoring under the condition of upper body external heating blanket. The consistency between iThermonitor and esophageal temperature monitoring was compared. Bland-Altman analysis was used to assess the consistency between core temperature and iThermonitor. P<0.05 was considered statistically significant.

Results and Discussion: A total of 10304 temperature points were recorded of 79 patients. Difference value between esophageal and iThermonitor temperature was 0.19±0.30°C and correlation between the two temperatures is 0.842 (P<0.001). The proportion of difference value less than 0.5°C between the two temperatures is 84.71%, and the accuracy is ±0.5°C. In subgroup analysis, group A (operative time<120min, n=23), group B (operative time:120-180min, n=38) and group C (operative time>180min, n=18), the correlation coefficient between esophageus and iThermonitor are 0.70 (P<0.001), 0.85 (P<0.001), and 0.85 (P<0.001), respectively. The differences between esophageal and iThermonitor temperature within ±0.5°C is 80.86%, 87.75% and 87.47%, and Bland-Altman analysis shows accuracy are ±0.66°C, ±0.59°C and ±0.54°C for the above three groups, respectively. This result may suggested that iThermonitor need a measurement stabilization process.

Conclusion: When temperature sensor is covered by the external heating blanket iThermonitor was not affected. The accuracy is significantly lower when operative time less than 120min. iThermonitor were stable and well consistent with esophageal temperature when operative time is longer than 2 hours.

Acknowledgement: We thank the Chinese Evidence-based Medicine Center West China Hospital, Sichuan University for providing statistical consultation.

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Comparison between open source and trained neural network model in face detection for critical ill patients

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Background and Goal of Study: Rapid response system is one of the strategies to prevent in-hospital emergency. This early intervention is known to improve patient’s prognosis, but medical staffs are required triage to activate the system. For triage, pulmonary and upper airway function and contribute to adverse respiratory events in the postanesthesia care unit (PACU). Aim of the study was to analyse the use of OT in the PACU and neuromuscular blocking agents (NMBS) and reversal in the OR in a tertiary hospital.

Materials and methods: We prospectively collected data of patients who were admitted to ICU in Yokohama City University Hospital from July 2018 to March 2019. We thank the Chinese Evidence-based Medicine Center West China Hospital, Sichuan University for providing statistical consultation.

Comparison between open source and trained neural network model in face detection for critical ill patients

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Conclusion:

References:


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Comparison between open source and trained neural network model in face detection for critical ill patients

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Results and Discussion: Randomly selected 25 images of 25 patients were used for comparison. Accuracy of face detections were 16% with haar cascade, 40% with MTCNN, and 84% with SSD. In addition, accuracy of eye detections were 4% with haar cascade, 36% with MTCNN, and 48% with SSD. These results indicate the efficacy of trained CNN, especially based on ICU. ICU patients are often in quite unique situation, such like oxygen therapy, intubated patients, extracorporeal circulation, and more. When it comes to face detection, devices around the face can be obstacle. Thus, it makes sense that SSD, a trained CNN based on ICU, can be more clinically accurate. More detailed training about, for example, face direction, illumination, and types of oxygen therapy devices, will be required for higher accuracy.

Conclusion: The trained neural network model based on ICU images was able to detect 3 patient’s face with higher success rate than other detecting models. If the face detection model become able to recognize patient’s eye opening too, it can lead to possibility of automatic system to calculate EWS and be a continuous monitoring, warning system not only for patients, but also for medical staffs.

5425

A feasibility study of simultaneous and accurate measurement of all vital signs of a remote wireless monitoring system

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Background and Goal of Study: Continuous wireless monitoring systems are developed to earlier detect patient deterioration on the ward. Previous studies showed that specific vital signs were accurately measured by these systems >50% of time.1-3 We investigated the feasibility of measuring respiratory rate, heart rate and temperature simultaneously using Sensium Vital®. Feasibility was defined as simultaneous and accurate measurement of all three vital signs together in at least 50% of time.

Materials and Methods: SensiumVital® was installed at a surgical ward. After informed consent, patients undergoing non-cardiac intermediate of high-risk surgery were included. The SensiumVital®-patch was fixed on the patient’s chest using standard ECG electrodes, and patch data were send to a server. In case measurement of any vital signs was interrupted, an error message is generated and send to the server.

Results: Data from 32 patients were analyzed: in 90% of all data points there was appropriate connection of the ECG-electrodes to the patient. Of these 90% of data, the system registered in a mean of 37% (32.685 from 89.437) time points valid data for all three parameters simultaneously, with a range of 4-73%. Heart rate had an availability of 90% (range 53-99%), temperature of 71% (range 8-98%) and respiratory rate of 54% (range 25-86%). Differences were found between daytime and nighttime, with more availability during the night for all measurements (fig. 1).

Discussion: In only 37% of valid measurements, all three vital signs were available. There is little clinical evidence that determines the minimum simultaneous availability in order to identify patient deterioration. Using trends of vital signs has been suggested to identify deteriorating patients, but with only one third of the data constantly available, it will be difficult to discriminate trends.

References:

4944

Incidence and risk factors of postoperative delirium after orthopaedic surgery in the Irish population: a cross-sectional study

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Background and Goal of Study: Postoperative delirium is associated with increased risk for morbidity, cognitive deterioration and delayed rehabilitation. The incidence of postoperative delirium after orthopaedic surgery has been reported to be between 28-52% (1) and its aetiology remains poorly understood and is believed to be multi-factorial (2). The objectives of the study are to determine the incidence of immediate postoperative delirium after orthopaedic surgery and to identify preoperative and perioperative characteristics in older adult patients undergoing elective or emergency orthopaedic surgery that predisposes them to developing postoperative delirium.

Materials and Methods: Design: This single-centred prospective observational study was conducted at the preoperative unit and post-anaesthesia care unit at Cork University Hospital. Patients: 43 participants were included in the study. Inclusion criteria: 1) Sixty years and older; 2) Scheduled for elective or emergency orthopaedic surgery; 3) Possessed the ability to provide informed consent; and 4) Proficient in English. Exclusion criteria: 1) Patients with a history of delirium. Primary outcome measurement: CAM-ICU was used pre- and post-operatively to assess for delirium.

Results: The incidence of immediate postoperative delirium in the study population was 7%. Risk factors for the development of postoperative delirium included an increased level of previous psychiatric history (p = 0.003), whether isotropic support or reversal of neuromuscular blockade was required intraoperatively (p = 0.018 and p> 0.019, respectively).

Conclusions: Elderly patients undergoing orthopaedic surgery are at considerable risk of developing postoperative delirium. Risk factors included individuals with a previous psychiatric diagnosis or diagnoses, the requirement of intraoperative intropes, and general anaesthesia. In order to prevent the development of postoperative delirium, it is critical for older patients to be assessed regularly for psychiatric conditions and cognitive status prior to orthopaedic surgery. Care should be taken to minimise blood pressure fluctuations and periods of hypotension intraoperatively.

References:

5953

Establishment of Preoperative Predictive Model for Postoperative Delirium in Elderly Patients Enduring Non-cardiac Surgery

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Background and Goal of Study: In order to identify high-risk patients early and improve the prognosis of patients with POD, this study aimed to establish a preoperative predictive model of POD in elderly patients enduring non-cardiac surgery.

Materials and Methods: Delphi method and literature analysis were used to design a POD risk prediction model. For establishing the model, the POD risk index of patients was evaluated according to the score, and prospective cohort study was conducted. A total of 545 patients aged over 65 underwent the non-cardiac surgery were recruited. Demographic data, clinical history and risk factors of delirium were collected within 48 hours before operation. Patients were followed up daily from 1-3 days after operation to evaluate the occurrence of POD and record other important clinical outcomes. And then, the patients were followed up by telephone at 7 days, 1 and 3 months after operation to evaluate the long-term cognitive function and prognosis. The discrimination of the model was tested by drawing the receiver ROC and calculating the AUC. The calibration of the model was evaluated by Hosmer-Lemeshow goodness-of-fit test.

Results and Discussion: The model consisted of 9 item and was expressed by POD risk index with 11 points. In the validated study, 489 patients were included in the model and the overall incidence of POD was 6.13%, including 2.75% in orthopaedics, 2.44% in gastrointestinal surgery, 10.48% in hepatobiliary and cardiothoracic surgery.
pancreatec surgery, and 10.95% in thoracic surgery. Postoperative delirium was associated with low preoperative cognitive function score and a history of delirium (P=0.05). The POD risk index was significantly correlated with TICS-m score on the 7th and 1st month after surgery, ICU admission, length of stay and hospitalization expenses (P<0.05).

Conclusion: Postoperative delirium risk predictive model established in this study can effectively predict the occurrence of delirium in elderly patients undergoing non-cardiac surgery, and high POD risk index is associated with lower postoperative cognitive function score, higher ICU admission, longer length of stay and increased hospitalization costs.

4876
Change in biomarkers of postoperative cognitive decline in elderly under general anaesthesia using isoflurane or desflurane

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Background: PODC was attributed to the inflammatory stress response which can lead to synthesis of multiple cytokines mainly interleukin –1 (IL-1), interleukin -6 (IL-6) and tumor necrosis factor –a (TNF –a) from the activated fibroblasts and endothelial cells. The amyloid β (A-β) concentrations in the hippocampus and amygdala were found to be associated with memory and learning disturbances and Isoflurane was shown to increase the concentration of amyloid β by altering Amyloid Precursor Protein. Hypothesis: Due to different pharmacokinetic profiles, there might be a difference in PODC in elderly under GA with Isoflurane and Desflurane.

Goal: The objectives of this pilot study were to assess change in biomarkers of PODC in elderly patients receiving isoflurane and desflurane like IL-1, IL-6, TNF alpha, amyloid β and S100.

Material and Methods: The Prospective observational parallel group study was carried out in 40 patients of age between 60 to 80 years without any previous psychiatric illness undergoing open abdominal surgery under general anaesthesia and epidural of anticipated duration of more than 2 hours were included in the study.

Results and Discussion: Data from 35 patients, 18 in isoflurane group and 17 in desflurane group were analysed. Changes in the biomarkers of PODC in patients who received isoflurane or desflurane is tabulated (1&2).

Conclusion: We cannot substantially conclude that Isoflurane nor Desflurane is a better inhalational agent. We recommends future studies with more sample size exploring the various aspects of PODC in a more uniform population with a fixed protocol of anesthesia and surgical procedures.

References:
1. Paradies S, Cortinez L, Conteras V, Silbert B. POCD at 3 months in adults after cardiac surgery, and high POD risk index is associated with lower postoperative cognitive function score, higher ICU admission, longer length of stay and increased hospitalization costs.

4993
Validation of The Telephone Interview for Cognitive Status and Montreal Cognitive Assessment against neuropsychological assessment for postoperative cognitive dysfunction in the elderly (The TINMAN study)

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Background and Goal of Study: Increased aging and (multi)morbidity will ultimately result in more surgery in the elderly. Postoperative cognitive dysfunction (POCD) in older adults occurs frequently and has been related to both postoperative morbidity and mortality1. Extensive and time consuming neuropsychological assessment (NPA) of patients is still the gold standard for diagnosing POCD. This requires time consuming face-to-face administration, which is not always feasible. The Telephone Interview for Cognitive status (TICS) and The Montreal Cognitive Assessment (MoCA) have since been used3 for detecting POCD but have not been validated in this context. We aim to validate the TICS and MoCA questionnaires with NPA as gold standard.

Materials and Methods: This is a single centre prospective cohort study. 120 patients will be included. The study population consists of patients of 65 years and older without previously diagnosed cognitive impairment, undergoing elective surgery in the Amsterdam UMC, location AMC. Main study endpoints are clinimetric evaluation (reliability, validity) of the TICS and MoCA. Bland–Altman plots and Spearman rank correlation analysis shall be performed to examine agreement and pre- and postoperative relation for the TICS, MoCA and NPA. The area under the curve, sensitivity and specificity will be determined.

Results and Discussion: Up until now 48 patients are included. At time of the conference we will present our data on the entire cohort of 120 patients. Conclusion: The results of this validation study will potentially lead to the availability of two additional validated PODC screening tools. These screeners can be used in the preoperative evaluation of older adult patients to screen for both pre-existing and postoperative cognitive dysfunction.

References:
Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is considered as a severe postoperative complication among elderly patients. Here we probed differentially expressed circRNAs using microarray assay in POCD patients, aiming to find potential key circRNAs related to the occurrence of POCD.

Materials and Methods: Patients over 65 years of age scheduled to undergo cardiac surgery under general anesthesia and cardiopulmonary bypass were enrolled. By neurocognitive evaluation, they were divided into two groups, non-POCD (NPOCD) and POCD group. The patients’ blood sample was obtained 3 days after surgery. Neuropsychological tests were conducted on the day before and 3 days after surgery. The protocol consisted of the MMSE, Digit Span Test, Trail Making Test, Word Memory Test, Brief Visuospatial Memory Test-Revised, Symbol-Digit Modalities Test and Verbal Fluency Test. The incidence of POCD was defined by a deterioration of one standard deviation of baseline score in at least two tests. For circRNA microarray analysis, 3 POCD and NPOCD serum samples were randomly selected. CircRNAs having fold changes >2 and p-values <0.05 are considered as significantly differentially expressed.

Results and Discussion: The distribution of log2 ratios were similar in the tested samples (Fig. 1A). The results of hierarchical clustering showed distinguishable circRNA expression profiling, indicating circRNAs have a different expression pattern in POCD (Fig. 1B-C). The Volcano plot was performed to visualize the significant differences between POCD and NPOCD group (Fig. 1D). Besides, the distributions of differentially expressed circRNAs in human chromosomes showed that most circRNAs were transcribed from chr1, chr2, chr5, chr10, chr11, and chr16 (Fig. 1E). The microarray data showed 210 circRNAs were differentially expressed in POCD group. Among them, 133 circRNAs were upregulated and 77 were downregulated. The top 5 upregulated and downregulated circRNAs were presented (Table 1).

Conclusion: Our study revealed the expression profile of circRNAs in POCD, suggesting their potential involvements in POCD pathogenesis and use as biomarkers for POCD diagnosis.

Identification of the Potential Key CircRNAs in Elderly Patients with Postoperative Cognitive Dysfunction

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Combination of anaesthesia and surgery decreases glutamate-mediated excitatory synaptic transmission in pyramidal neurons of the mouse anterior cingulate cortex

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Background and Goal of Study: Postoperative delirium (POD) is an acute syndrome of inattention and disordered cognition. Although there are some prevailing pathophysiological hypotheses, its neuropathogenesis remains largely unknown. One of these hypotheses is neurotransmitter imbalance, such as excessive dopamine or reduced acetylcholine availability. Glutamate is the major excitatory neurotransmitter in the human brain and is thought to affect cognition control. Therefore, we hypothesized that glutamate transmission in the brain sites involved in cognition would be changed in POD. The anterior cingulate cortex (ACC) plays important roles in attention and cognition. In this study, we investigated how glutamate-mediated excitatory synaptic transmission was changed following anaesthesia and surgery (Anaesthesia/Surgery) in pyramidal neurons of the ACC.

Materials and Methods: Under isoflurane anaesthesia, laparotomy was performed in 2-3 months old mice. We used a battery of behavioral tests (buried food test, open field test, and Y maze test) at 24 hours before and at 6, 9 and 24 hours after Anaesthesia/Surgery and calculated composite Z scores to evaluate the severity of behavior impairment. After the behavioral tests, we performed whole-cell patch-clamp recordings from pyramidal neurons in the ACC of brain slices and recorded spontaneous excitatory postsynaptic currents (sEPSCs). Statistical significance was determined using unpaired t-test.

Results and Discussion: The mean value of composite Z scores in Anaesthesia/Surgery group was significantly higher than in control group at 6 and 9 (but not 24) hours, suggesting worse performance in Anaesthesia/Surgery group. Therefore, we used Anaesthesia/Surgery group as animal models of POD. Pyramidal neurons in the ACC had a resting membrane potential of ~70 mV in control and anesthesia/Surgery groups. Under the voltage-clamp mode, they exhibited spontaneous EPSCs in both groups. The frequency of EPSCs in Anaesthesia/Surgery group was significantly lower than that in control group. The amplitude, rise time, and decay time were not different between both groups. The present results suggest that glutamate synaptic transmission in pyramidal neurons of the ACC decreased following anaesthesia and surgery.

Conclusion: Excitatory synaptic transmission in pyramidal neurons of the ACC in the POD model is presynaptically decreased without changing any functions of postsynaptic glutamate (AMPA) receptors.

Frailty assessment in planned surgery

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Background and Goal of Study: Frailty is associated to a higher risk of perioperative complications, increasing mortality, hospital length of stay and worsening postoperative quality of life. To successfully care frail patients during the perioperative period, it is necessary to identify them and to assess frailty degree. We aim to evaluate the prevalence of frailty in planned surgery population and its association with perioperative morbidity and mortality.

Materials and Methods: Once the approval of our Ethics Committee was obtained, we carried out a prospective observational study including 55 patients older than 65 years old submitted to planned surgery. Following data were recorded: Charlson Index (CI), ASA physical status, postoperative complications, hospital length of stay, unplanned admission to ICU, need for hospital readmission, and mortality. Geriatric assessment was performed using MiniMental Test (MMT), Barthel Index (BI) and Edmonton Scale (ES). Data were analyzed using SPSS 24.

Results and Discussion: From patients enrolled (41.8% female, 58.2% male), 54.5% were older than 75 years old and 20% older than 80. ASA physical status distribution was: I 11.8%, II 58.2%, III 40%. Average CI, BI and ES were 5.3±2.1, 8.61±25 and 5.8±3.7, respectively. A statistically significant relationship was found when performing Pearson Correlation among different geriatric assessment scores: ES and BI (r=0.67 p=0.001), ES and MMT (r=0.67 p=0.001), BI vs CI (r=0.3 p=0.027), BI vs MMT (r=0.76 p=0.001) and CI vs MMT (r=0.32 p=0.019). A statistically significant relationship was found between a higher number of postoperative complications and higher values in ES (r 0.49 p=0.0001).
lower values in MMT (r = -0.41 p=0.002) and lower BI (r = -0.52 p=0.0001). However, we did not find any significant association between postoperative complications and CI (p=0.09). A higher value in ES was statistically associated to delirium (p<0.0001), respiratory failure (p=0.004) and postoperative infection (p=0.011) in patients suffering from any type of postoperative complication. We did not observe any significant association comparing postoperative mortality or unplanned admission to ICU and different geriatric assessment scales no significant association was found.

**Conclusion:** Preoperative frailty is associated to a higher number of complications and hospital length of stay. The use of frailty scales like ES is more appropriate than morbidity scales in these patients to predict complications.

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**Fragility in geriatric patient and pneumothorax under general anesthesia**

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**Background:** Spontaneous pneumothorax is a rare and vital complication that can develop during general anesthesia. We share our experience in a geriatric patient with primary spontaneous pneumothorax in the postoperative period.

**Case Report:** A 70-year-old male, 166 cm, 69 kg, ASA II class patient with no history of smoking and coronary artery pathology was operated. Following the standard anaesthesia induction, he was intubated with a 5.5 number spiral intubation tube. Anaesthesia was maintained with 2% MAC sevoflurane and remifentanil infusion, and ventilation was provided by VCV (total volume: 350mL, frequency: 20 / min, FIO2: 50%). ETCO2: 40-42mmHg and SpO2:97-98% were observed during the operation. Hemodynamics remained stable. The operation lasted 35 minutes. The patient was extubated 3 minutes after the surgery. In the postoperative period, the patient with SpO2:97-98 complained of dyspnea and chest pain. His ECG was normal; respiratory sounds decreased in his right lung, and chest radiograph confirmed pneumothorax in his right lung. Air was aspirated from the right hemithorax using an intravenous catheter; tube thorocostomy and CSAD were inserted. SpO2: 99-100% was observed after the procedure. The patient with tube thorocostomy was observed for 5 days and it was removed on the 6th day. He was discharged on the 7th postoperative day.

**Discussion:** High-volume low-pressure cuffed intubation tubes are used as an anaesthesia technique in laryngeal microlaryngoscopy to provide good surgical vision and manipulation. The use of a small endotracheal tube enables ETCO2 monitoring, positive pressure ventilation, preservation of the trachea, but causes increased end-expiratory pressure. Although monitorization shows vital parameters within normal limits in geriatric patients, patient complaints should not be ignored. Chest pain and dyspnea in geriatric patients should not only suggest coronary events; increased fragility in the elderly should be remembered and pneumothorax should be kept in mind.

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### 5943

**How to reduce geriatric patients colon surgery mortality in 4 times**

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**Background and Goal of Study:** Indications and contraindication to laparoscopic approach in geriatric patients with high comorbidity are controversial. Low abdominal pressure (7-8 mm Hg) during laparoscopic colon resection surgery is supposed to reduce hemodynamic and ventilation changes and reduce number of complication. Goal. To compare an immediate and distant outcomes of surgical treatment in conditions of low intraabdominal pressure by colon cancer geriatric high risk group patients.

**Materials and Methods:** 400 colon cancer geriatric patients were include and divided on control (n=184) and investigation (n = 216) groups. Median age 75 [69; 80] years. 219 patients (54,8 %) older than 75 years. All cases were high risk group: ASA II – 284(71,0 %), ASA III – 116(29,0%) and operated laparoscopically. Cardiovascular complications risk were high in 301(75,25 %) and very high in 99(24,75 %) cases. Median Charlson comorbidity index was 8[7; 9]. Median CR-POSSUM was 17[15; 21]. Operations in investigation group have been made in low intraabdominal pressure (less than 8 mm Hg), in condition of deep neuro-muscular block (NMB) by rocuronium (PTC 1-2). In the end of operation before NMB-reversion performed by Sugammadex (4 mg/kg) in this group. In control group intraabdominal pressure was not less than 12 mm Hg, in condition of moderate neuro-muscular block (TOF 1-2) and reversion by Neostigmine. Patients in perioperative period exposed to ERAS protocol.

**Results and Discussion:** In investigation group were less complications by Clavien-Dindo classification (n=42 – 19,4%), than in control group (n=79 – 42,9%) (p<0,001), HR 0,32(95 % CI 0,21– 0,50). The Clavien-Dindo severity class of complications was significantly lower in investigation group too (p = 0,019). Clavien-Dindo V (death) in investigation group was in 5 (2,3%), in control – 15

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### 6106

**Continuous spinal anaesthesia – A suitable technique for the frail and uncooperative patient**

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**Background:** Elderly frail patients are a growing population often presenting for surgery and constituting a challenge for the anaesthesiologist. We report a case in which continuous spinal was safely used in an uncooperative patient due to dementia.

**Case Report:** An 84-year-old woman, ASA IV, was admitted for urgent reduction of a femoral diaphysis fracture. The patient was bedridden, dependent and unable to communicate due to late stage dementia. Conservative treatment was discussed but the femur fragment was at the point of perforating the skin. Because of her frailty, we considered general anaesthesia to be a less than ideal option and were worried about the hemodynamic effects of a full-dose single-shot spinal anaesthesia. Thus, a continuous spinal was performed and small doses of bupivacaine (up to 4mg bolus) were administered throughout the procedure (total 9mg). The challenge was assessing the onset and efficacy of the block. We used facial expression, vocalization and upper limb movement as indicators of pain, along with vital signs. Additional boluses were administered when small behavioural changes were noted. Nonetheless, she did not become agitated or visibly uncomfortable at any point and did not require sedation. The patient was discharged home 4 days later with no complications and apparently adequate pain control.

**Discussion:** Continuous spinal anaesthesia is a safe technique in elderly patients with multiple comorbidities, such as dementia.1 However there are no recommendations on how to monitor block onset and quality. Several scores for pain assessment in non-communicative patients have been described, the behavioural pain scale in non-intubated patients (BPS-NI) is easily applied and has been used in patients with delirium.2 The evaluation of facial expression, upper limb movement and vocalizations allows pain assessment in these patients.2 In conclusion, this scale could be useful to monitor pain in frail patients with dementia under spinal anaesthesia.

**References:**


**Learning points:** Continuous spinal anaesthesia is a safe and effective technique for lower limb surgery in frail uncooperative patients. BPS-NI could be useful to assess pain in patients with dementia under spinal anaesthesia.
(8.1 %) patients (p < 0.001). Chemotherapy realized in 44 (20.4%) (95% CI (15.5, 26.2 %) investigation group patients, that are significantly more than in control – 8 (4.3%) (p=0.001). Distant outcomes show that 5-year OS and DFS were higher in investigation group (p=0.001).

Conclusion: Implementation new method of laparoscopic operation realization allow to reduce number and severity of complications, mortality rate, expand indications to minimivasive treatment, chemotherapy and improve distant outcomes in high risk geriatric patients.

Background and Goal of Study: Emergency laparotomy (non traumatic) has a mortality rate of 11% in the UK and higher in the US and the rest of Europe. Patients over the age of 70 have a mortality rate of 20% but in some centres is as high as 50%. How do we improve this? Lessons from orthogeriatric care, looking at preoperative frailty scores, nutritional status and planning discharges early can all help with improving care. Improving care form emergency laparotomy and implementing a very successful and proven care bundle approach is also discussed.

The first cost effectiveness study examining the benefits of a gerontologist sharing care with the surgeon for emergency abdominal surgery patients is also discussed. Materials and Methods: Baseline data was collected all patients undergoing emergency abdominal surgery (non-traumatic) over the age of 70 in four general hospitals in the UK, identifying patient demographics, cognitive function, frailty index and nutritional score and level of pre and post operative social needs. A gerontologist was then introduced into the care of the next cohort of patients, where they introduced a comprehensive geriatric assessment plan in these four hospitals. Ongoing interventions (drug review, multi-disciplinary team reviews and social needs assessment) were recorded together with post-operative outcomes. In addition an assessment on the quality of life in the post-operative period has been recorded using EQ-5D-5L up to six months following discharge from hospital. This is mapped to healthcare costs and can be related to Quality of Adjusted Life Years and cost-effectiveness of the intervention.

Results and Discussion: The results showed that the introduction of a gerontologist reduced length of stay statistically significantly. In addition, post operative complications were reduced. The health status study showed that patients reported a better health state with the intervention than without. Quality of Adjusted Life years (QALY) was improved so the intervention was shown to be cost-effective. Conclusion: In an ageing world, it vital we ensure older patients return to their baseline functional state as quickly as possible after surgery. Patients undergoing emergency abdominal surgery over the age of 70 should have shared care with both gerontologists and surgeons to decrease length of stay and improve quality of life post discharge from hospital.

### Pre-operative metabolic state in hip fracture patients

Pre-operative metabolic state in hip fracture patients

#### 6113

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Background: Hip fracture is a common injury in the elderly with high peri-operative morbidity and mortality. The common practice to operate within 24-48 hours after the injury reduces mortality. Increased peri-operative troponin levels are associated with mortality regardless of the presence of ischemic signs or symptoms. We aimed to test for possible association between increased pre-operative troponin levels and postoperative complications in adults undergoing hip fracture repair.

Methods: Medical records of patients undergoing surgical repair of hip fractures in the Tel-Aviv Medical Center between 04/2018-03/2019 were reviewed. High-sensitivity troponin T concentrations were routinely measured during anesthesia induction. The associations between patients’ troponin level and mortality and intensive care unit (ICU) admission were assessed using Pearson correlations. Association between time from hospital admission to surgery and troponin levels was also assessed. P<0.05 was considered statistically significant.

Results: The medical charts of 360 eligible patients were reviewed (52.1% American Society of Anesthesiologists Physical Status [ASA-PS] 3, 71% female, mean [SD] age 82 [9] years). Median [IQR] time from hospital admission to surgery was 28 [21, 45] hours. Overall in-hospital mortality was 4.6% (n=16) and 30-day mortality was 3.6% (n=13). Mean (SD) troponin level was 63.2±10.6 ng/L, with 52 patients (14.4%) having abnormally high troponin levels (>50 ng/L). No association between the time from hospital admission to surgery and troponin level was found. Increase in troponin levels was associated with 30-day mortality (Pearson 0.12, p=0.014), but not with the risk for ICU admission.

Conclusion: Most of the hip fracture patients have normal troponin levels when arriving the operating room, regardless of the time from hospital admission to surgery. Nevertheless, preoperative increased troponin levels are associated with 30-day mortality. The correlation we found was not very strong and of questionable clinical significance, but our study was presumably not well-powered to correctly estimate the magnitude of the association, and should be followed by larger studies.

#### 5210

**Mortality rate one year after hip fracture surgery**

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Background and Goal of Study: Hip fracture is the most common fracture in the elderly, being an important cause of morbidity and mortality in this population with multiple comorbidities. Mortality [IQR] time from hospital to surgery is 4–14%. Most of these fractures need urgent surgical treatment, requiring an accurate anesthetic management. The aim of this study is to evaluate survival and postoperative evolution of patients who had undergone surgery for hip fracture and its association to perioperative management.

Materials and Methods: After obtaining the approval from the Ethics Committee of our hospital, we conducted a retrospective study including all patients undergone surgery for hip fracture from January 1st 2018 to October 30th 2018.

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Following data were collected: age, gender, duration of surgery, anesthetic management, perioperative variables, postoperative evolution and mortality. Statistical analysis was performed using SPSS 25.0.

Results and Discussion: During this period, 181 patients (74% women) were collected, with an average age 79 ± 11 years. Average waiting time from arrival at the emergency room to surgery was 45 ± 37 hours. The average duration of surgery was 75 ± 27 min, being performed 50.3% under spinal anesthesia and the rest with general anesthesia. Intraoperatively, 40% had a TAS <100 mmHg during an average time of 29 ± 22 min. Intraoperative bleeding was 132 ± 101 ml, requiring blood transfusion during the perioperative period 54.7% of the patients. The mean Red Blood Cell package transfusion was 1.2 ± 0.1. The length of stay in PACU was 445 ± 60 min and in-hospital stay 7.7 ± 1.2 days. Mortality rate at 30 days and one year after surgery was 4.4% and 16.6% respectively. We found a significant association between hospital and PACU stay and mortality at one year (p <0.005). However, we did not find a statistically significant association between mortality at one year and other studied variables, such as preoperative haemoglobin, ASA physical status, waiting time prior to the intervention or length of surgery.

Conclusion: Hip fracture is increasing in last years, associated with a high preoperative waiting time and a high mortality rate. Early optimization of these patients could reduce the length of hospital stay and postoperative mortality.

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Ultrasound-guided neuraxial anesthesia in elderly: A systematic review

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Background and Goal of Study: Neuraxial ultrasonography is a recent development in the field of regional anesthesia, which allows the successful insertion of a spinal or epidural needle; this technique is called neuraxial blockage guided by ultrasound. Subarachnoid anesthesia is the technique of choice in elderly patients, 60% of the severe and long-lasting neurological complications after central neuraxial blockade, involve patients over 50 years old, among which are anatomical anomalies, including stenosis of the lumbar canal and spinal arachnoid cysts. The purpose of this study was to describe whether the neuraxial approach guided by ultrasound allows to perform successful needle insertion.

Materials and Methods: A systematic and comprehensive search will be performed using MEDLINE, OVID, EMBASE, LILACS and the Cochrane central registers of controlled trial databases through November 2019, without restriction of time or language. The protocol for this review has been registered in the PROSPERO registration number: CRD42019112382. The primary outcome was successful lumbar puncture in the first attempt of needle insertion and the accuracy of the lumbar puncture site.

Results and Discussion: Six articles were included, for a total of 530 patients, age ranges between 61 and 85 years. The subarachnoid anesthesia was the most common type and only one study included epidural anesthesia. A randomized controlled trial, in the US group compared to the control group the difference was statistically significant for successful lumbar puncture in the first attempt of needle insertion for subarachnoid anesthesia. The most frequent lumbar puncture site was the L3-4 space in neuraxial approach guided by ultrasound. In the studies where an ultrasound approach is performed, it was important to measure the depth to determine the size of the needle in the puncture, this is important to perform fewer punctures in the patients. The depth of ultrasound measurement of the intrathecal space was related to the depth of the needle insertion. Failure to measure the depth may lead to needle changes and a higher number of punctures.

Conclusion: The ultrasound guide for the lumbar puncture it improves the identification of the puncture site and the success rate at the first attempt, however the time required is longer compared to the anatomical approach.

6075

Intra-Operative Hypothermia in non-elderly, elderly and super-elderly populations; Where can we still improve?

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Background: Hypothermia is a common peri-operative condition known to be associated with numerous complications. Although several risk factors for peri-operative hypothermia were identified, the association between age and hypothermia is not well-described in the peri-operative period. We therefore aimed to assess the impact of aging on the risk of peri-operative hypothermia by comparing the incidence of hypothermia in non-elderly (40-65), elderly (65-80) and super-elderly (>80) patients.

Methods: In this single-center retrospective cohort study, demographic, clinical, and surgical data were collected for surgical patients >40 years old who underwent surgery in 2017 and spent>2 hours in the operating room (OR). Several key temperatures were assessed: 1. Baseline (before arriving OR); 2. First temperature recorded after anesthesia induction; 3. Lowest temperature measured in the OR; 4. First temperature in the post-anesthesia care unit (PACU); 5. Calculated area under the curve (AUC) for temperature<36°C during surgery.

Results: Data of 3647 eligible patients were analyzed, of whom 1891 (52%) were 40-64 years old [mean(SD) age 54(7) years], 355 (10%) were 65-80 [mean(SD) age 72(4) years] and 401 (11%) were >80 years old [mean(SD) age 86(4) years]. The super-elderly and elderly groups had significantly more co-morbidities than the non-elderly group [median (IQR) sum of active co-morbidities; 1 (0-2), 2 (1-3) and 0 (0-1), respectively, p<0.001]. Hypothermia (<36°C for ≥5 minutes) rates were not different between the groups (78%, 80%, and 75% for non-elderly, elderly and super elderly, respectively, p=0.12). Similarly, the incidence of severe hypothermia (<35.5°C, 25 minutes) was also comparable (48%, 50%, and 50%, respectively, p=0.62). The AUC of temperature<36°C was significantly higher in the elderly group than that of non-elderly and super-elderly groups [3.1(5.7), 2.7(4.9), and 2.4(4.1), p=0.036].

Conclusion: While intra-operative hypothermia remains a common surgical complication in all age groups, our data suggest that the scope of hypothermia...
is more profound in the elderly group compared with the non-elderly and super-elderly groups. The direct implications of this are still to be investigated. A possible explanation for our findings could be that while we rely on natural stamina of the non-elderly and meticulously care for the super-elderly, our care of the elderly group can still improve.

The hemodynamic effects of low-dose dexmedetomidine on anti-hypertensive medication at endotracheal intubation in elderly patients

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Background and Goal of Study: Dexmedetomidine is highly selective alpha 2 adrenergic agonist and preoperative administration of dexmedetomidine reduce sympathetic panic and maintain hemodynamic stability. Especially hemodynamic instability is more risky in elderly patients and then in elderly, preanesthetic 0.5 µg/kg single dose of dexmedetomidine effectively suppressed hemodynamic responses to endotracheal intubation. This study was investigated for the effect of a single low-dose preoperative dexmedetomidine(0.5µg/kg) on anti hypertensive drug(b-blocker, ca-channel blocker) at endotracheal intubation(reports of data collection).

Materials and Methods: Total 42 patients aged from 65 to 85, American Society of Anesthesiologists physical status II, either sex, undergoing elective noncardiac surgery were enrolled in the study. H-group had been treated with anti-hypertensive medications and N-group was normotensive patient with no medication. Patients who attempted endotracheal intubation more than two times were excluded. Morbidly obese patients who had BMI over 35 kg/m2 also excluded. All patients were not premedicated. Anti-hypertensive medications were maintained until the day of surgery. At the arrival of the patients at the operating room, patients were attached to an ECG, pulse oxymeter, and NIBP monitor. All patients were received 0.5 µg/kg of dexmedetomidine (Precedex; 200 µg/two ml; Hospira Inc., Lake Forest, IL, USA) for 10 min. After completion of premedication injection, fentanyl 1.5mg/kg, rocuronium 0.6 mg/kg was administered. After two minutes endotracheal intubation was performed with a laryngoscope, and all intubation was performed within 30 seconds by one anesthesiologist. Anesthesia was maintained with sevoflurane in nitrous oxide/oxygen 50:50 mixture. vital signs (MBP, Pulse) were recorded at ward (baseline value), immediately after drug administration (after drug), 1, 3 and 5 minutes after endotracheal intubation.

Results and Discussion: The demographic data of the two groups showed in Fig. 1. There were no significant differences in demographic characteristics between groups. The MBP and Pulse changes of 2 groups were recorded in Fig. 2. There were no significant differences in cardiovascular changes between two groups.

Conclusion: The low-dose Dexmedetomidine was not showed the synergistic effects on cardiovascular depressive changes of anti-hypertensive drug at intubation.

Airway Management in Geriatric Patient with Airway Obstruction

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Background: Tumors located in the facial region, especially around the mouth and nose, and previous radiotherapy and surgical procedures in this region make mask ventilation and airway management difficult. We report a case of tracheostomy in a geriatric patient who needed airway patency and proved difficult to be ventilated through mask due to lower alveolar arch injury involving the mandible.

Case Report: An 85-year-old, 153 cm, 45 kg, ASA 4E geriatric female patient underwent surgery for tracheostomy under emergency conditions because of airway obstruction. She had chemotherapy 7 months ago and radiotherapy 1 year ago and underwent total hip replacement surgery with epidural anesthesia 20 days ago. Mallampati score being 4, pronounced macroglossia was present and there was no area to place the mask on the face due to spreading cancer. Difficulty with mask ventilation was foreseen in the preoperative examination where intubation would prove difficult. For this reason, C-MAC videolaryngoscope, tracheostomy set, intubation tubes and styles of different sizes were prepared beforehand. After standard anesthesia monitoring (HR: 110 / min TA: 170 / 120mmHg SpO2: 92), preoxygenation was performed. During induction, 1 mg/kg 1 2% lidocaine hydrochloride, 2 mg/kg-1 propofol and 1 mcg.kg-1 remifentanil were administered, and the patient was quickly and serially intubated with C-MAC videolaryngoscope with endotracheal tube no 5. Anesthesia was maintained with 6% MAC desflurane, 50% oxygen and 50% air mixture. The operation lasted for 30 minutes. 5 minutes after the surgery, the patient's spontaneous respiration returned and sufficient tidal volume was reached in 10 minutes.

Discussion: Neoplastic tumors are often fragile and tend to bleed. Mask ventilation and tracheal intubation may cause marked edema and hemorrhage, leading to increased airway obstruction. In this case report, we emphasize the importance of rapid serial intubation with videolaryngoscopy without the use of nondepolarizing muscle relaxant in the provision of airway patency in a geriatric patient whose mask ventilation is quite difficult.

Learning points: Geriatric patient, airway management, videolaryngoscopy

Anaesthesia for pilonidal sinus surgery in a patient with Dilated cardiomyopathy. A case report

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Background: Dilated cardiomyopathy (DCM), is a myocardial disease of varied causes characterized by dilatation of one or both the ventricles, impaired myocardial contractility, decreased cardiac output and increased ventricular filling pressures [1]. These patients are often at a risk of dysrhythmias or sudden cardiac death.

Case Report: We report the anesthetic management of a 70 year-old patient with DCM undergoing for pilonidal sinus surgery under spinal anesthesia. Previous medical records revealed that patient was a diagnosed case of DCM since 9 years and his symptoms were well controlled with Tbl Cardiopirin, spironolactone 25 mg, Carvedilol 2.5 mg, Lisinopril 2 mg, Losartan 40 mg. Preoperative 12 lead ECG revealed Left bundle branch block. Echocardiography showed global hypokinesia of left ventricle and ejection fraction of 40 %. Patient was monitored with ECG, intermittent blood pressure measurement and pulse oximetry. The heart rate was 80 min and regular. The blood pressures were 120-70 mmHg. Spinal anaesthesia was administered, the patient received 2.5 ml of Bupivacline 0.5 %. Dural puncture was done in an aseptic technique at the L3-L4 level. The 22G spinal needle was used. Intravenous sedation with propofol 1.5 mg.kg-1, midazolam 0.2 mg.kg-1, and fentanyl 0.1 mg.kg-1 was given. The induction was smooth. The 22G spinal needle was used. Intravenous sedation with propofol 1.5 mg.kg-1, midazolam 0.2 mg.kg-1, and fentanyl 0.1 mg.kg-1 was given. The induction was smooth.

Discussion: Anesthetic management of patients with cardiomyopathy can be challenging and may be associated with high morbidity and mortality. Both general and regional anaesthesia have been used. The goals of anaesthetic management are avoidance of myocardial depression, maintaining norvolemia, avoiding overdose of drugs during induction as the circulation is slow and to avoid sudden hypotension when regional anaesthesia is the choice [2].

References:

Learning points: In summary, the factors which ultimately favored the good outcome of this high-risk patient, were a thorough preoperative assessment, optimized cardiac status, anesthetic plans, postoperative monitoring and management of the complications.
A case of an elderly developed pulseless electrical activity intraoperatively after a short course of low-dose steroid

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Background: Anesthesiologists encounter the complexity of multiple comorbidities in geriatric anesthesia. We present a case with no prior diabetes mellitus history developed catastrophic hyperglycemic hyperosmolar nonketotic coma after 3 weeks of low-dose steroid supplement.

Case Report: An 82-year-old male, weighing 74kg was diagnosed with hypertension, paroxysmal AF, congestive heart failure NYHA III and prostate cancer status post CCRT. He had ever undergone T9-T10 Laminectomy due to Tuberculous spondylitis with cord edema 3 weeks ago, and then received further anti-TB therapy and low-dose steroid supplement. However, low-grade fever and pus formation developed so he was scheduled for debridement surgery. Initial vital sign in OR were as followed, BP:139/65mmHg, HR:120bpm, SpO2:97%. After induction agents with fentanyl 50mcg, lidocaine 60mg, etomidate 10mg and rocuronium 30mg were administrated intravenously, the patient had refractory bradycardia along with PEA. Resuscitation was performed for 1 minute and then ROSC. ABG revealed hyperosmolar hyperglycemic state (HHS) with blood sugar: 970mg/dL. The surgery was held and we transferred the patient to ICU after stabilizing vital signs.

Discussion: The patient had no prior history of diabetes and blood sugar was within normal range about 3 weeks ago. However, he received low-dose steroid without blood sugar surveillance since then. He got steroid induced hyperglycemia and it emerged into HHNKC insidiously 1. According to his past medical history, initial diagnosis for circulation failure included septic shock, spinal shock, adrenal insufficiency and cardiogenic shock. However, the patient responded to steroid, inotropes and vasopressor poorly but restored hemodynamic stability after fluid resuscitation. Further treatment for HHNKC was given accordingly.

Learning points: The outcome of hyperglycemic crisis relies on early diagnosis and management. However, high mortality rate was still reported. 2 Very few cases were ever reported that HHS was induced after receiving steroid supplement without previous DM history. 3-4 Anesthesiologist should remain high index of suspicious when patients are administrated steroids and management. However, high mortality rate was still reported.2 Very few cases were ever reported that HHS was induced after receiving steroid supplement without previous DM history.3-4 Anesthesiologist should remain high index of suspicious when patients are administrated steroids and management. However, high mortality rate was still reported.2

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Acknowledgements: The authors would like to thank the twelve advisory board members from the involved departments for their great support in conducting the study.


discovery
Introducing crisis resource management in trauma team: the human Factors Attitude Survey results

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Background and Goal of Study: The current management of trauma patients in a level 1 hospital requires the Trauma Team (TT) coordinated work. Although specific courses like ATLS or ETC to teach physicians how to resuscitate these patients are necessary, Crisis Resource Management (CRM) training programs are highly necessary to train all the team in non-technical skills for an optimal management of these patients. Despite this, the perception of non-technical skills importance among professionals is unknown.

Materials and Methods: During three CRM in trauma care editions performed in our institution Simulation Center and conducted by Anesthesiology Department between January and November 2018, an education survey before and after the training of all TT members was conducted. We developed a modified Human Factors Attitude Survey (HFAS), a 23 question survey regarding trauma resuscitation teamwork and communication. HFAS has been used to evaluate CRM in medical setting and is based on similar work by the NASA and the aviation industry. The surveys were formulated in a standard 5-point Likert scale ranging from strongly agree to strongly disagree. Statistical analyses by Chi-square and Fishers exact test were conducted.

Results and Discussion: 80 students answered the surveys between January and December 2018. Significant improvement was noted in 18 of 23 questions in the post-CRM survey, improvement was noted in five main areas: exchange of information from pre-hospital providers to TT, role of the team leader, the role of briefing, comfort of staff with communication in the trauma bay and importance of situation awareness during attention to severe trauma.

Conclusion: The CRM training has been utilized in high risk hospital environments, enhancing team dynamics, communication and ostensibly impacts patient safety. Philosophy and culture of CRM should be compulsory components in organization enhancing team dynamics, communication and ostensibly impacts patient safety. Institutional involvement in supporting the development of this type of training is necessary.

References:
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Ukrainian Trauma Life Support Course - what can we change in systems that are not set to act?

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Background and Goal of Study: Traumatic injury in Ukraine accounts for more than 40 thousand deaths annually and remains the leading cause of mortality. In spite of War, in Ukraine, the fatality rate in motor vehicle collisions is 2 times higher than the combat mortality (WHO, 2018). NGO Patriot Defence changes the Ukrainian medical system one hospital at a time, by delivering the Ukrainian Trauma Life Support (UTLS) course to emergency response teams in hospitals throughout Ukraine. Each individual trained becomes an advocate for change, having a cumulative effect on the standard of care in their hospital and beyond.

Materials and Methods: UTLS is an intensive 6-day course designed to augment the critical thinking capacity of medical professionals in trauma management. UTLS introduces relevant and recognized concepts to support high-frequency practical skills required for a minimum acceptable standard of care. A deliberate focus on crew resource management and capacity building throughout the course prepares every candidate to support their hospital in the management of individual trauma victims or mass casualty events.

Results and Discussion: Primary test (before course): anesthesiologists - 82,6%, surgeons - 71,9%, traumatologists - 62,3%, emergency medicine - 69,3%.

Conclusion: There was no difference in the success rate when the students intubated the manikin using the non-dominant eye, the dominant eye, or both eyes. However, the students spent the shortest time for intubation when they relied on both the eyes. It is a crucial finding since some people may believe the dominant eye is superior in performing visual tasks such as tracheal intubation.
Interactive algorithms AKUTNĚ.CZ: Open access database of more than 100 virtual patients focused on acute medicine

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Background and Goal of Study: The educational platform AKUTNĚ.CZ (meaning Emergent), is a unique project in Czechia implementing virtual patient (VP) based learning in the 4th to 6th-year medical students curriculum. This world's biggest free access Czech-English database of VP cases focused on emergency, intensive care medicine and anesthesiology, was created by students under clinician supervision. The aim was to 1) engage students in creating VP cases themselves to enhance their learning 2) implement new teaching methodology.

Materials and Methods: Author teams of students, supervised by a senior clinician, are responsible for literature overview, case description, VP creation and production of original audio-visual multimedia. VP cases are reviewed by a content expert and published on https://www.akutne.cz/index-en.php?pg=education-interactive-algorithms in the form of interactive multimedia algorithms. They are used for self-study and the problem-based learning/ team-based learning (PBL/TBL) sessions in clinical subjects First Aid and Intensive Care Medicine.

Results and Discussion: Since 2010, 109 VPs were created by 218 people (177 students and 41 mentors; 11 current mentors were recruited from formal students working at the creation of VPs). Out of all students 163 (90.5%) had already graduated and from those 55 (33.7%) work in the Anaesthesia and Intensive Care Medicine. The interactive algorithms are covering topics in Anaesthesia, Intensive care, Emergency Medicine, First Aid, Gynaecology and Obstetrics, Internal Medicine, Traumatology, Paediatrics, Surgery, Neurology and Stomatology.

Conclusion: Both creating and using the bilingual VP algorithms as teaching material was successfully implemented in the curriculum. It represents not only study material for medical students, but also highly motivational experience of the enquired. To the question if the event affects clinical practice, 84% answered in participant´s confidence in T2, even with the techniques that they were more self-perceived confidence evaluation, the results showed a significant increase in comparing all Medical Schools of our country.

Acknowledgement: Supported by a Specific University Research provided by MSMT (MUNI/A/0966/2019).

Discussion:

6229

Novel 24/7 HybridLab® learning system for airway management

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Background and Goal of Study: Higher public and patient expectations have both encouraged the development and use of innovative educational methods. HybridLab is a distance learning and algorithm driven self-directed peer to peer medical simulation that allows learners to train 24/7 without direct presence of the instructor, while the training sessions are reviewed online by the experienced instructors. The first courses built on HybridLab platform is focused on the specific technical skills like advanced airways management. Conventional learning is a teaching and learning process that focuses on live lectures with faculty guided pre-clinical demonstration and practice. The goal of the study is to test the efficiency of a hybrid learning technique versus conventional learning technique in teaching endotracheal intubation among medical students.

Materials and Methods: The students were randomly assigned into two study groups to be taught endotracheal intubation (EI) using conventional learning technique (Group C) and hybrid learning technique (Group H). During first week after teaching process both groups performed endotracheal intubation on real patients under supervision by trained instructors - doctors. 5 stages of EI (preparation, preoxygenation, laryngoscopy, endotracheal tube (ET) insertion, verification) were evaluated in both groups using statistical analysis. The stage was described as completed when student performed all actions correctly. Data was assessed for normality and found to have a non-parametric/parametric distribution. The level of significance was defined as p<0.05.

Results and Discussion: 77 students were enrolled into study. 34 in Group C and 43 in Group H (p=0.05). There were no statistically significant differences between the patients in both groups with respect to demographic characteristics, ASA physical status and Mallampati score. Preparation was completed by 55.9% in Group C and 88% in Group H (p=0.003). Preoxygenation - 26.5% in Group C and 69.5% in Group H (p=0.001). Laryngoscopy - 73.5% in Group C and 97.7% in Group H (p=0.056). ET insertion - 64.7% in Group C and 81.4% in Group H (p=0.97). Verification - 8.8% in Group C and 58.1% Group H (p=0.001).

Conclusion: The study showed more efficient effect of HybridLab learning approach on endotracheal intubation skills than conventional learning technique. This training method can be useful model for teaching healthcare providers with limited faculty availability.

5474

Knowledge of Resuscitation among Greek medical students

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Background and Goal of Study: Several studies report the importance of the knowledge of the life support algorithm and the optimal treatment of the intra-hospital and out-of-hospital cardiac arrest. In this study, we sought to investigate the knowledge regarding the Resuscitation among Greek medical students and the comparison of all Medical Schools of our country.

Materials and Methods: Questionnaires, including demographics, consisting of 7 questions regarding Resuscitation were distributed to the medical students who attend the 23rd Annual Congress of the Greek Medical Students.

Results and Discussion: Two hundreds and ninety-seven students completed the questionnaire. Most of the students (80%) reported that they have adequate knowledge of Basic Life Support (BLS) algorithm and the use of Automatic External Defibrillator (AED), with the University of Crete and the University of Ioannina in the first place. Regarding the ABCDE approach the results are quite different based on
the Medical School, with the University of Crete in the first place, followed by the University of Patras, while the University of Ioannina is in the last place. Moreover, a big heterogeneity was observed as far as the knowledge of the Advanced Life Support algorithm is concerned. More specifically, the University of Crete was at the first place (70%), followed by the University of Thessaly (59%), while the University of Patras was at the last place (15%). Last but not least, it should be noted that 64% of our students reported that their knowledge for the BLS algorithm and the use of AED was obtained from a European Resuscitation Council course, 18% from some optional course of the Medical School and only 16% from a mandatory course/rotation of their school.

Conclusion: It seems that a large heterogeneity exists regarding the knowledge and the training of Resuscitation among the 7 Medical Schools of our country.

Background and Goal of Study: Simulation is used to familiarize physicians and trainees with new practice protocols. Commercialized simulation is available for 2 drugs, but often three drugs are used clinically. The need for multidrug simulation prompted the development of complex three-drug models. In this study, we applied a published three-drug model and a new bispectral index (BIS) model to simulation.

Materials and Methods: We obtained a sample three-drug protocol for combined gastroscopy and colonoscopy using midazolam, alfentanil and propofol from literature search. The protocol is shown in Figure 1. Pharmacokinetic profiles were calculated with TriAtRainer. Two models were used to simulate the protocol: The Modified observer’s assessment of alertness and sedation (MOAA/S) scale2 and bispectral index (BIS) model. The models were built with the NLMAZ model (Non-linear mixed amount with zero amount) using engineering software Matlab. For the MOAA/S model, we define loss of response (LOR) if the probability is greater than 50%.

Results and Discussion: MOAA/S model was excerpted from a published research. A new BIS model was built from 1176 data sets of the three drugs. Strongest interaction was at the propofol-alfentanil arm in the BIS model. The simulation protocol drug concentrations ranged from 0-50 mcg/mL, 0-31 ng/mL, and 0-2.63 mcg/mL for midazolam, alfentanil and propofol respectively, which were within the modeling conditions. At the end of colonoscopy the simulation had 91% chance of LOR, 45% at return of consciousness, and 8% at time of discharge (Figure 2). The results matched the clinical observation reported by the original protocol. The MOAA/S < 2 model predicted the time course of a sedation regimen reported by another group.1 BIS remained between 50 and 80 throughout the examination and rose above 80 during recovery. There were no BIS data in the selected report.

Conclusion: This is a demonstration of a simulated protocol for gastrointestinal endoscopy. Commercialized simulation software commonly contains two-drug region. Three-drug model adds flexibility and offers variety to simulation for users. We believe it is beneficial to training sessions.


Three-drug simulation of bispectral index (BIS) and modified observer’s assessment of alertness and sedation (MOAA/S) scale model during gastrointestinal endoscopy

5562

Inspiring the next generation of anaesthetists in Zambia through a novel, structured clinical skills programme for medical undergraduates

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Background and Goal of Study: Anaesthetists are well-placed to develop medical student knowledge and skills.1 The Zambia Anaesthesia Development Programme is an international healthcare partnership which aims to improve safe anaesthesia provision in Zambia. Final year students undertake a 2-week placement in anaesthetics at University Teaching Hospital, Lusaka. Local education leads identified a gap in practical experience obtained by students during their placement. We sought to understand whether a structured programme for the assessment of the critically unwell patient improved confidence, skills and satisfaction, and increased awareness of anaesthesia as a career.

Materials and Methods: A novel programme introducing students to the A-E assessment, Basic Life Support including cardiopulmonary resuscitation, and airway management from simple manoeuvres to placement of a laryngeal mask airway, was introduced. Teaching was delivered with a combination of group discussion, workshops with hands-on experience, and simulation. High and low-fidelity simulation manikins, resuscitation equipment and bespoke simulation scenarios were used. Feedback, using Likert scales (out of 5) and free text, was collected and analysed using quantitative and qualitative methods.

Results and Discussion: Students received the programme with enthusiasm, finding it enjoyable (median score 5, [interquartile range 5-5]) and relevant to their learning (5 [5-5]). The programme improved their confidence in managing the critically ill patient (4 [3-5]), providing a structured approach to patient assessment (4 [4-5]), and improved practical skills (5 [4-5]). The programme was considered interactive and trainers approachable. Following the programme, students were inspired to pursue a career in anaesthetics. Challenges included cultural barriers to participation, lack of familiarity with simulation, and perceived low status of anaesthesia in Zambia.

Conclusion: A structured programme for the management of the critically unwell patient, run by anaesthetists for medical students, is well-received, improves confidence and practical skills. Such a course can inspire the next generation of physician anaesthetists while providing skills relevant to newly qualified doctors. Involvement of local education leads to improve the next iteration of the course is suggested.


5620

An Evaluation of operating room staff’s awareness of environmental sustainability and medical waste knowledge

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Background and Goal of Study: The healthcare sector contributes a big amount to carbon emissions. According to a study, the healthcare industry is accountable for 8% of the US’ total greenhouse emissions.1 Hospitals annually accumulate 5.9 million tons of waste and 21% of this waste is created by operating rooms (OR).2 The aim of this study was to assess the knowledge of our OR staff on medical waste as well as their attitudes about the management of it.

Materials and Methods: We created a 20 questions survey to assess the knowledge. This survey was given to all OR staff (surgeons, anesthesiologists, nurses, cleaning staff). Pearson Chi-square/Fisher exact test with p values <0.05 are accepted as significant.

Results and Discussion: Data of 112 participants were analyzed. The median age was 28 [20-54]. From all the participants, 56.2% expressed that the OR have an important effect on global warming and 73.6% stated that they were trying to separate the wastes according to the regulations. When evaluating the anesthesia practice in a subgroup of anesthesia team, most of the anesthesia nurses (%52) falsely stated that the safest practice was low flow sevoflurane while 85% of the anaesthetists stated that low flow sevoflurane was the safest. Also, 40.9% of doctors and 76.9% of nurses didn’t attend any educational course about the effects of ORs on the environment and the management of ORs related to this issue. Most of the participants reported that obstacles for a good management of OR wastes were inadequate knowledge (92%) and inept organization (44%). Overall 96.4% of all participants stated that education about waste management was necessary.

Conclusion: Nearly half of participants had no idea about environmental effects of ORs and stated that this was due to a lack of education. While most participants stated that they were separating wastes accurately, it might not always be the case. We think that a well organized education, adequate organization and follow up of the OR waste management is required for a better future.

First On-Line Assessment (OLA) Experience European Society of Anaesthesiology in Russian Federation in 2019

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Background: On-Line Assessment (OLA) is an online computer-based test similar to the first part of the European Diploma in Anaesthesiology and Intensive Care Exam (EDAIC Part I) created by the Examinations Committee of the European Society of Anaesthesiology (ESA). Russian Federation (RF) offers the EDAIC Part I in two centres (Moscow and St. Petersburg). However, to date OLA has never been conducted in RF. We describe our experience and the results of the first OLA in RF in 2019. Purpose: To present the analysis of the results of the first OLA in RF in 2019.

Materials and Methods: In 2019 OLA was held on April 12 in 127 centers, 113 cities, 33 countries around the world, counting 1,481 candidates who sat it in 11 languages. In the same year in Russia OLA was held for the first time at the Krasnoyarsk State Medical University named after Prof. V.F. Voino-Yasenetsky. 37 second year residents in the specialty “Anaesthesiology and Intensive Care” took OLA between the hours of 16.00 and 19.00 local time simultaneously with all European countries. All examination conditions were created in accordance with the regulations set by Examinations Committee of the European Society of Anaesthesiology for OLA.

Results and Discussion: OLA results are presented in table.

<table>
<thead>
<tr>
<th>Centers</th>
<th>RF (n=37)</th>
<th>All (n=1481)</th>
<th>European (n=1237)</th>
<th>non-European (n=244)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper A</td>
<td>57.85 ± 4.21</td>
<td>55.15 ± 5.71</td>
<td>55.21 ± 4.14</td>
<td>55.63 ± 7.95</td>
</tr>
<tr>
<td>Paper B</td>
<td>55.73 ± 5.13</td>
<td>57.75 ± 7.13</td>
<td>67.99 ± 7.08</td>
<td>67.00 ± 7.31</td>
</tr>
</tbody>
</table>

The results are comparable with the results of OLA for European and non-European centers. OLA is held annually in April and, therefore, is an excellent test for all candidates who want to assess their knowledge at the end of each year of study, and those who plan to take the EDAIC Part I exam in autumn.

Conclusion: The first experience of conducting an online test showed that OLA allows beginners to evaluate their knowledge gained during the residency period. It also allows individual departments, based on an analysis of the test results to identify problematic areas of knowledge gaps and make the relevant corrections to the specialist training programmes. Our future plans include organising OLA in Russia Federation again on April 17, 2020 and register Krasnoyarsk as EDAIC Part I centre to start from 2020.

5082

Self-reported and perceived professionalism in anaesthesia residents: an observational study

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Background and Goal of Study: professionalism is recognized as a core competency for anaesthetic training. The aim of this study is to determine our anaesthesia residents’ perception of their own professionalism and compare it with the perception they have of the staff’s.

Materials and Methods: 20 anaesthesia residents of a high complexity hospital were sent a survey with 10 professionalism attributes adapted from Chestnut1: Humility, Servant leadership, Emotional intelligence and self-awareness, Kindness, Altruism, Physician's well-being, Responsibility, Lifelong learning, Self-regulation, and Honesty. Participation was voluntary, not incentivized nor subject to evaluation. They were instructed to rate themselves and the staff on each attribute from 0 to 10. Ratings were compared individually, as a dichotomy (<7:improvable, ≥7:appropriate) and globally.

Results and Discussion: 13 answered the survey. Table 1 shows demographic data and Table 2 shows the significant results. Residents considered themselves better than the staff on humility, self-awareness, and honesty. They rated themselves lowest on service leadership and highest on self-awareness and honesty. They rated the staff lowest on altruism and highest on responsibility and lifelong learning.

4810

The key Anaesthesia Non-Technical Skills (ANTS) necessary for anaesthesia senior residents to practise with distant supervision - a mixed methods analysis

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Background and Goal of Study: ANTS describe cognitive, social and personal resource skills that complement technical skills, contributing to safe and efficient patient care. Deficiencies increase the risk of an adverse event. ANTS system is a resource skills that complement technical skills, contributing to safe and efficient patient care. Deficiencies increase the risk of an adverse event. ANTS system is a taxonomy and behavioural rating comprising 4 categories and 15 elements which encompass the domains of Situation Awareness, Task Management, Decision Making (balancing risks and options) and Teamwork (coordinating activities). In addition, other skills identified were assertive leadership and stress/conflict management. Stakeholders reported that role modelling is important to imbibe these skills, the practice of which can be influenced by hierarchy and culture. Certain key elements in the ANTS system were deemed more crucial than others for the entrustment of distant supervision by key stakeholders. Further work is required for the teaching and assessment of ANTS.

Materials and Methods: A survey was sent to key stakeholders (faculty, nurses and residents) of Singapore's largest anaesthesia residency training programme, asking them to select the three most important elements in the ANTS system needed for distant supervision. Respondents were subsequently invited to focus group discussions. The interviews were transcribed and analysed utilising an interpretative approach and phenomenological perspective.

Results and Discussion: The survey response rate was 55.6%. The key elements identified from the ANTS system for entrusting distant supervision from both the survey and focus groups were sub-stratified into Situation Awareness (recognising, understanding, anticipating), Task Management (planning, prioritising), Decision Making (balancing risks and options) and Teamwork (coordinating activities). In addition, other skills identified were assertive leadership and stress/conflict management. Stakeholders reported that role modelling is important to imbibe these skills, the practice of which can be influenced by hierarchy and culture. Certain key elements in the ANTS system were deemed more crucial than others for the entrustment of distant supervision by key stakeholders. Further work is required for the teaching and assessment of ANTS.
Knowledge and perceptions of Anaesthesiology among fourth-year Greek medical students after completion of the anaesthesia core rotation

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Background and Goal of Study: Several studies reported that medical students lack sufficient knowledge regarding the anaesthesiology practice. In this study, we sought to investigate the knowledge and perceptions regarding the Specialty of Anaesthesiology in fourth-year medical students of Medical School University of Thessaly.

Materials and Methods: A theoretical knowledge questionnaire was used, that surveyed the students’ knowledge and perceptions regarding the Specialty of Anaesthesiology, before and after the completion of the 14-week anaesthesia core rotation. The questionnaire was distributed to the 104 students, 65 (62.4%) male and 39 (42.2%) female during their first and their last in-class session of the mandatory 14-week anaesthesia core rotation.

Results and Discussion: Before the rotation, the students’ primary sources of information regarding Anaesthesiology were university experience (N=35, 33.6%) and television/film/media (N=27, 25.9%). Moreover, although the majority of students (90.2%) knew that the anaesthesiists work in the operating room, 50 (48.9%) and 43 (41.2%) students respectively reported that they have no place in the recovery room or in the pain clinic, while 71 (88%) that they are somehow kind of psychiatrists. After the completion of the rotation almost all students reported that their primary sources of information is university experience. Additionally, only 10 students (9.6%) stated that anaesthesiologists have no place in the recovery room or in the pain clinic, while none of them that they are some kind of psychiatrists. Last but not least, after their training 100 (96.1%) students stated that their preferred method of studying Anaesthesiology is the hands-on skills session, compared to 45 (43.2%) students before the rotation.

Conclusion: It seems that the 14-week anaesthesia core rotation of our Medical School have a positive impact on the knowledge, perception and attitudes of the undergraduate medical students, regarding our specialty.

Learning and training together: Combined DATC/DSTC course in Spain

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Background and Goal of Study: DATC (Definitive Anesthetic Trauma Care) course is already established in some European countries and worldwide. It is offered along with the surgical version, the Definitive Surgical Trauma Care (DSTC) course, in a combined program on trauma care adapted for surgeons and anaesthesiologists. This course is a good option and broadest trauma course ever, following initial management principles based on European Society of Anaesthesiology ETC course (European Trauma Course) and Advanced Trauma Life Support (ATLS) course. The aim of the study was to assess the opinion among Spanish anaesthesiologists and surgeons after attending this combined two and a half day course.

Results and Methods: A follow-up questionnaire was sent by email. 15 questions of 3 groups of issues: 1) Self-efficacy in trauma care after attending the course, 2) Contents of the DATC course, 3) Relationship between anaesthesiologists and surgeons. We obtain 18 responders from the last three years.

Results and Discussion: 1) Self-efficacy in trauma care: 90% of them still considered the course quite or very beneficial for their clinical practice. Average confidence rating in managing trauma patients improved from 6 out of 10 pre-course to 9 out of 10 post-course of 80% of participants reported an improvement on their ability to deal with major trauma in a high or very high degree after the course.

2) Contents of the DATC course: 90% considered technical contents of the DATC course as the best part of it, but only 50 % pointed out non-technical skills (decision making, team working, etc). 100% of the responders would recommend the course to another surgeon (50% of the combined version and 50% the surgical version alone).

3) Relationship between anaesthesiologists and surgeons: 70 % of the surgeons think DATC/DSTC course could very beneficial for improving relationships with the anaesthesiologist in areas of daily clinical practice (establishing protocols, medical education, day-case surgery, etc).

Conclusion: DATC course has been well received among anaesthesiologists and Surgeons involved, with subjective evidence of empowerment and improved ways of judgment. Follow-up questionnaires should be planned in next editions in order to measure changes in the clinical practice, level of confidence and organizational situation of trauma care in the participant’s departments.

First year residents are satisfied with an innovative training programme to deal with a new challenge: Starting anaesthesia residency

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Background and Goal of Study: Initiating Anaesthesiology residency, normally, is perceived with hope and enthusiasm; but, on the other hand, it can generate anxiety, fear and uncertainty. For this study, we develop an initiation training programme for First Year Residents (R1) and we evaluate its impact on them.

Materials and Methods: The twelve R1 at Vall d’Hebron University Hospital accomplished, during the first month of residency, 8 training modules dictated by Anaesthesia’s senior residents (SR); and were assigned to other SR as tutors for operating rooms (OR) activities. The theoretical and practical modules were: Preparation of OR, Types of Anaesthetic Procedures, Preoperative Evaluation, Basic Anesthesia Monitoring, Pharmacodynamic and Pharmacokinetic of Anesthetics, Mechanical Ventilation, Airway Management and Computer Programs. At the end of the training course, all R1 answered a structured paper questionnaire (containing 17 multiple-choice and open questions).

Results and Discussion: 58.3% and 41.7% have responded as very satisfied or satisfied, respectively, concerning feeling integrated in the Anaesthesia, Resuscitation and Pain Management Department (AD). 91.6% perceived themselves as part of the working team during OR activities. When asked if they felt that the AD had offered a commencement of their anaesthesiology specialization with support and academic formation, 100% answered that they were very satisfied and 100% think that this training programme should be repeated on the next R1. As positive aspects of modules dictated by SR, most of R1 (83.3%) believe that SR has a good idea of what a R1 needs at this point; and 91.6% felt less nervous dispelling doubts during theoretical classes and practical activities. Non negative aspects were reported.

Conclusion: This study indicated that R1 were highly satisfied with the initiation training programme and with the support and educational background provided by the Anaesthesia, Resuscitation and Pain Management Department.

Variability in exposure to transplant procedures during anaesthesiology residency: a review of argentino residency programs per lustrum for 2010 decade

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Background and Goal of Study: Transplantation is a complex procedure performed on critically ill patients with multiple comorbidities. Currently transplant training is not required for accreditation or certification in anaesthesiology, and not all anaesthesia residency programs are associated with transplant centers. The purpose of this paper was to analyzed transplant exposure in domestic residencies in Argentina in the last decade.

Materials and Methods: We analyzed all organ transplantation performed in Argentina Transplant Centers in lustrum for 2010s decade. Each period was separated in three groups: A) Kidney/Pancreas, B)Liver and C)Intrathoracic (Heart/ Lung). We calculated the average and median in each group per period. We defined the variability to measure changes in the clinical practice, level of confidence and organizational situation of trauma care in the participant’s departments.
Attitude and knowledge of the students of the University Department for Health Studies in Split about organ donation

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Background and Goal of Study: Although brain death signifies the end of life, at the same time, it brings up the possibility to save lives with organ donation. An important step in organ donation is family consent, which is largely dependent on the family’s knowledge and attitudes towards brain death and organ donation. The goal of the study was to investigate the opinions among students of the University Department for Health Studies in Split, Croatia and their knowledge about the organ donation process.

Materials and Methods: 210 students from nursing, radiology, physiotherapy, laboratory and midwifery studies filled out a newly constructed Questionnaire with 11 questions about student knowledge, and 13 questions exploring student opinions on organ donation. Examinees scored their attitude or knowledge on a Likert scale from 1 (completely disagree) to 5 (completely agree).

Results and Discussion: No difference in knowledge or attitudes were noted between genders or different study groups. Older examinees showed more knowledge about brain death and organ donation (≥30 y, p=0.042). Almost all students (96.2 %) have a positive attitude towards organ donation, 77.6% are willing to donate their organs. However, 35.7% have doubts or disagree with brain death as the death of a person. In addition, 37.0% are indifferent or agree with the fact that brain death is very difficult to detect. Moreover, 48.1% of all students are concerned about possible manipulation in brain death confirmation. The very high percentage of students (62.8%) disagree with the fact that donation contributes to the recipient’s life quality. More than half of all students (54.7%) are inconclusive or agree that organ donation is against religious beliefs. Fortunately, 70.5% of all students agree with the need for additional education.

Conclusion: Although Croatia is a very successful member of Eurotransplant, further improvements need to be made regarding the knowledge about organ donation from both, civilian and religious authorities. Although student attitudes towards organ donation are positive, additional education about this subject is required to clear the doubts about brain death confirmation, organ donation allocation and life quality of the recipients.

Comparison of and factors affecting publication rates of abstracts presented at ASA 2016 and ESA 2016

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Background: An understanding of publication rate should be informative to academic conference attendees, since the findings of abstracts are based on preliminary data and have not gone through the rigorous peer-review process of published studies. Determining factors that influence publication rate can also help illuminate bias in the review process. This study seeks to ascertain the publication rate of abstracts presented at Anesthesiology 2016, the annual meeting of the American Society of Anesthesiologists (ASA), and Euroanaesthesia 2016, the annual meeting of the European Society of Anaesthesiology (ESA). The objectives of this study are to examine differences in publication rate across clinical track and country of origin within and between both academic conferences. These factors are analyzed in correlation to destination journals and their impact factor.

Methods: A total of 1128 presented abstracts from ASA 2016 and 1368 presented abstracts from ESA 2016 were examined. Their authors, qualifications (M.D., D.O., Ph.D etc.) and country of origin were extracted. Google search, ResearchGate and PubMed were then used to learn if the research presented in the abstracts was published in medical journals within the studied timeframe. By clinical track, Anesthetic Action and Biochemistry had the highest publication rate of 56.7% at ASA 2016, while Turkey had the highest publication rate of 72.7% at ASA 2016. As a secondary objective, these requirements are compared to those employed in other allied medical military corps.

Results: Of the 1128 abstracts presented at ASA 2016 and 1362 abstracts presented at ESA 2016, 369 (32.7%) and 335 (24.6%) were published respectively within the studied timeframe. By clinical track, Anesthetic Action and Biochemistry had the highest publication rate of 56.7% at ASA 2016, while Turkey had the highest publication rate of 72.7% at ASA 2016. As a secondary objective, these requirements are compared to those employed in other allied medical military corps.

Conclusions: Publication rates of abstracts presented at ASA 2016 and ESA 2016 vary across clinical track and country of origin. Further research is needed into the underlying drivers of these biases.
Impact of simulation based CPR training for multidisciplinary OR teams

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Background and Goal of Study: Emergency situations such as a cardiac arrest present a challenge for the operating room (OR) team [1]. Team training using high-fidelity simulation is the gold standard in health care education but there are few studies of full professional OR teams. [2,3] This study was performed at the Center of Advanced Medical Simulation and Training (CAMST) and included 17 full days of training on focusing on communication and collaboration during OR emergencies. Each team consisted of the 5 professions commonly working in an OR. The aim was to evaluate the impact of training on team members’ self-reported level of non-technical skills and knowledge regarding European CPR guidelines.

Materials and Methods: All participants (n=138) gave written informed consent. Data on self-reported performance was collected using questionnaires consisting of seven-level Likert-type scales and knowledge of CPR guidelines using single correct answer questions. Scores before and after training were analyzed using the Wilcoxon matched-pairs signed rank test (significantly different P value < 0.001).

Results and Discussion: Scores improved significantly after training regarding the questions: ‘I know how to act in my role in an emergency situation; b. I will communicate “clearly” in an emergency situation; c. I will call for help when I need support while working in the OR. d. I will act correctly in case of a CPR situation in the OR. Regarding CPR guidelines scores improved significantly, nurses and doctors scoring 91% respectively 93% after training. Interestingly, 7.7 % of licensed personal did not answer correctly regarding when to administer epinephrine.

Conclusion: Self-assessment concerning non-technical skills improved significantly after training. Interestingly, theoretical knowledge regarding CPR guidelines was equally among nurses and doctors but still not 100% correct after training. The results will guide further improvements of the ongoing training intervention.

References:

High-fidelity simulation to assess task load index and performance: a prospective observational study

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Background and Goal of Study: Measuring task load by NASA Task Load Index (NASA-TLI) in high-fidelity simulation is a tool widely used in aviation to assess pilots. This index might be an interesting asset for optimising the quality of a scenario (mobilization of optimal amount of mental and physical resources). The main purpose of this study was to explore whether the score of NASA-TLI of residents in anaesthesia and critical care medicine during critical simulation scenarios, was consistent with the values reported in the literature. The second purpose was to describe relationships between NASA-TLI, performance during simulation and generated stress.

Materials and Methods: All residents in anaesthesia and intensive care medicine undergoing HFS sessions between June and December 2017 were involved. No exclusion criterion was applied. The primary endpoint was the task load generated by each scenario assessed by NASA-TLI questionnaire. Based on literature, the NASA-TLI score between 39 and 61 was considered as a consistent task load level. Stress level (Visual Analogue Scale for stress), specific technical and non technical skills performances (Team Emergency Assessment Measure (TEAM)) were also assessed.

Results and Discussion: Fifty-three residents actively participated in one of ten different scenarios. Median NASA-TLI score of scenarios was 61 [48-65]. No association between NASA-TLI score and technical or TEAM performance scores, but an association between NASA-TLI and the stress level (r=0.47, p<0.001) was observed.

Conclusion: Simulation scenarios generate different task loads in residents; the task load was deemed acceptable for half of the scenarios. The NASA-TLI could be considered as a tool to assess the pedagogic adequacy of scenarios. Scenario and generated stress level, but not task load, can modify residents’ performance during simulation. This should be considered when planning normative simulation.

References:

A national survey of simulation utilization in anesthesiology residency programs in the Russian Federation

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Background and Goal of Study: Currently, there are little data available regarding the current status of simulation-based curricula across residency programs in Russia. In this study, we aimed to characterize the type, frequency, and content of the simulation courses offered for resident training in anesthesiology in the Russian Federation.

Materials and Methods: An 44-question survey was distributed to anesthesiology residency program directors in the 88 universities, academies, research centers. Results and Discussion: 65 of 88 (73.9%) residency program directors responded to the survey. All of respondents utilized any type of simulation for anesthesia education. 52 (80%) included official simulation course in curriculum. Most of respondents (60, 92,3%) reported using part-task trainers for training airway management skills. Using phantoms for training central venous access reported by 50 (77%) respondent and 25 (38,4%) use special phantoms for US-guided central venous access. Simple manikins for training BLs used in 62 (85,4%) centers and computerized manikins for training ALS – in 57 (78,7%). 42 centers utilized manikins for training neuralgia anesthesia. 27 (41,5%) directors reported using manikins and check-lists for assessment of resident’s manual skills during exam. 62 (95,4%) centers equipped with high-fidelity patients simulators. Regular simulation session (at least 1 full day in month with each group) provided in 42 (64,6%) centers, in 51 (78,4%) centers debriefing is essential part of training. The most often used scenarios include basic of anesthesia (48%), airway management (80%), intraoperative anesthesia crises (44,6%), cardiac emergencies (70,7%), 43 (66,1%) centers use high-fidelity patients simulators for resident’s performance assessment during OSCE with check-lists. Inter-professional command training provided in 43% centers. The respondents called the lack of qualified teachers (66%), simulator availability (32,3%), lack of motivation among teachers (66%) as most common limitations for introducing simulation into the educational process. 63 (97,9%) respondents agree with the need to develop a national simulation program in anesthesiology residency.

Conclusion: The results from this survey highlight that there are currently large variations in simulation-based training and assessment among training programs. Most directors consider it necessary to develop a standard curriculum.
Prevalence of sleep disturbance of residents the night before high-fidelity simulation: results from a prospective one-year national survey

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Background: The stress level of participants of high-fidelity simulation (HFS) stems from various factors but may result in anticipatory anxiety causing sleep disturbances during the night prior to HFS. The objective of this survey was to determine the prevalence of sleep disturbances of residents during the night prior to HFS.

Methods: The survey was sent to all residents at the beginning of the HFS during one year, in ten simulation centres. The questionnaire combined demographics and the Leeds Sleep Evaluation Questionnaire using visual analogue scales divided into four sleep qualitative domains. The primary outcome was the prevalence of sleep disturbance (more than 10 mm on one of the four domains). Secondary outcomes were the prevalence of severe sleep disturbance (more than 25 mm) as well as disturbance (more than 10 mm on one of the four domains). The survey was sent to all residents participating in HFS.

Results: Among respondents, 66% [95%CI, 63 to 69] of residents had more than 10 mm and 27% (~95%CI, 24 to 30) had more than 25 mm of sleep disturbance (Figure 1). Residents with a sleep disturbance of more than 10 mm had fewer hours of sleep (6.4 (SD 1.8) vs. 7.3 (SD 1.3), difference: -0.9 (95%CI, -1.1 to -0.7); P<0.0001), with a higher number of night-time awakenings (1.3 (SD 1.5) vs. 0.7 (SD 0.9), difference: 0.6 (95%CI, 0.4 to 0.8); P=0.0001).

Conclusion: Among residents participating in HFS, a high prevalence of sleep disturbance during the night before HFS, was noted. Strategies to help residents achieve better sleep prior to HFS should be explored.

Adapting a low-cost high-fidelity phantom for teaching emergent cricothyrotomy in a virtual multidisciplinary scenario

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Background and Goal of Study: Despite significant advances in airway management, difficult airway is still a challenge in anaesthesiology due to its potential serious complications. Cricothyrotomy (CT) is the technique of choice in the scenario “can’t intubate can’t ventilate” (CICO), but CT is rarely performed in clinical practice and skill acquisition is difficult. Our goal was to adapt a low-cost high-fidelity phantom, the Real Cric Trainerl1, and apply and evaluate it in a multidisciplinary simulation scenario.

Materials and Methods: We applied some modifications to the mentioned model to increase its fidelity and to adapt it into a simulation scenario. The main modifications were related to simulation of bleeding and air. We designed a CICV case and performed a multidisciplinary workshop. We evaluated: the fidelity and usefulness of the phantom, the possibility of applying ultrasound (US) to the phantom and the satisfaction of the participants.

Results and Discussion: The workshop involved 11 participants (6 doctors and 5 nurses) from an Intensive Care Unit. The initial cost for building the phantom was 220€. The price for each student at the workshop was 4€. The students scored out of 10 the following characteristics of the phantom: visual appearance 8.2±1.4; tactile sensation 8.2±1.4; fidelity when performing the technique 7.9±1.8; usefulness to teach the technique and usefulness of integration the phantom in a clinical scenario 9.6±0.7. Regarding the use of US, the images were evaluated as high-fidelity by two experts. Regarding satisfaction, students scored out of 10: usefulness of the workshop for their clinical practice 9.9±0.3; improvement in the technical performance 9.9±0.3; improvement in the development of the scenario 9.8±0.7. The debriefing 9.9±0.3. Definition of learning objectives, expectations, acquisition of new skills and usefulness of the training 9.9±0.3. All participants would recommend the workshop to a colleague and would repeat it.

Conclusion: The adaptations made to the Real Cric Trainer model allowed the integration of this phantom in multidisciplinary simulation scenario. The model was evaluated as high-fidelity by the participants and the satisfaction and usefulness of the workshop was very high. The cost of the model was low compared with commercial ones. The phantom allows identification of anatomical structures by US and therefore might be useful for teaching this skill.

References:
Results and Discussion: The total cost was 47€, remarkably cheaper than commercial ones, whose cost ranges between 2000€ and above 40000€ what are beyond most educational budgets. When it comes to usefulness and fidelity, the low-cost manikin was used in a simulation workshop for ICU staff. A high-fidelity simulated scenario was achieved by placing the model on an actor’s thorax with vital signs response monitoring. The model was then assessed by an expert thoracic surgeon and the 12 workshop participants with high scoring in fidelity (Table).

Conclusions: Authors conclude that this model is feasible, reproducible, transportable and extremely cheaper than their commercial counterparts. These characteristics make this realistic chest-tube insertion model accessible to most educational budgets.

Effects of standardized breathing and biofeedback on performance of anaesthesiologist residents during high fidelity simulation

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Background: High fidelity simulation (HFS) remains stressful for residents. This stress level negatively impacts performance not only in HFS but most likely also in clinical practice. Thus, stress management with standardized breathing and biofeedback exercise might help participants to improve performance. This study explored whether these methods can contribute to improve performance during HFS.

Methods: Residents who convened to HFS were randomized in 3 parallel-arms: standardized breathing exercise (BR), BR paired with heart rate variability biofeedback (BR+BFB), review of normal biological results (CONTROL). The 5-min intervention was performed after the scenario briefing (1 of 4 scenarios). Primary endpoint was a composite score made of technical (scenario specific grid) and non-technical (Ottawa1) performance scored by 2 blinded investigators. Secondary endpoints included physiological (heart rate, breathing rate) and psychological stress markers (visual scale, Thayer2) that were analysed at different time-points. Performance was analysed by a ANOVA-2 with GROUP and SCENARIO factors. Stress markers were analysed by repeated-measures ANOVAs with between subject variable GROUP and with within-subject factor TIME.

Results and Discussion: 34 residents were included in the analysis. Residents in the BR group had higher performance score compared to control while a similar trend was observed in the BR+BFB group (fig 1). Residents with BR+BFB had an increase in internal relaxation from the Thayer questionnaire after intervention (fig 2).

Conclusion: A 5-min session of standardized breathing before scenario provides higher performance, hence offering promising application for stress management during HFS. Biofeedback association shall be further explored for its potential additional interests.

References:
1. CCM 2006; 34: 2167-74.
2. Internal relaxation (Thayer)

Evolution of internal relaxation during treatment. Grey, blue and green thick lines represent CONTROL, BR, BR + BFB groups respectively. Points represent effects of the models with confidence intervals.
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Anaesthetics gases

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Anaesthetics local

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Anaesthetist, activity

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Anaesthetist, stress

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Analgesia, obstetric

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Analgesia, patient-controlled

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Analgesia, postoperative

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Analgesia, paediatric

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Analgesia, paediatric

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Analgesics, opioid, stress

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Analgesics opioid, addiction

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Analgesics opioid, morphine

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Antagonists, neuromuscular block

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