EVIDENCE OF CONTINUOUS REGIONAL ANESTHESIA/SINGLE SHOT

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Technique overview: While single-injection peripheral nerve blocks provide multiple benefits in both acute and chronic pain states, the maximum duration of 8-24 hours for currently available local anesthetics is often far less than required.1 Multiple techniques to extend duration have been reported, such as the additives buprenorphine,2 naloxone,3 clonidine,4 and dexmedetomidine.5 However, these agents may result in undesired side effects, and do not reliably extend action beyond 24 hours. In the past two decades, there has been an increasing interest in providing “continuous peripheral nerve blocks” (CPNB)—also called “perineural local anesthetic infusions”. This technique involves the percutaneous insertion of a catheter directly adjacent to the peripheral nerve(s) supplying an affected surgical site (as opposed to a “wound” catheter placed directly at a surgical site).6 Local anesthetic is then infused via the catheter providing potent, site-specific analgesia. Therefore, CPNB provides an alternative option when a prolonged neural blockade is desired.7 Since its first description in 1946,8 CPNB has evolved from an experimental case report involving a needle inserted through a cork taped to a patient’s chest, to a well-validated analgesic technique accepted by the medical community with products designed solely for its application.

Benefits of CPNB: There is now a plethora of evidence demonstrating the benefits of a CPNB over a single-injection peripheral nerve block when analgesia is desired longer than the duration of a typical single-injection bolus of local anesthesia. Randomized, controlled trials provide evidence for continuous interscalene,9,10 infraclavicular,11 femoral,12,13 and psoas compartment,14,15 sciatic,16-21 and paravertebral nerve blocks.22 Although definitive data is lacking, it appears that nearly all benefits derived from CPNB result from the induced analgesia. Examples include decreased opioid consumption, decreased opioid-related side effects, fewer sleep disturbances, and improved patient satisfaction with analgesia.6,9,10,13,19,20 Lastly, compared with a single-injection peripheral nerve block, CPNB may decrease the time to readiness to discharge,11,16-18,23-25 and in some cases, time to actual hospital discharge.11

Complications: Because there are inherent risks with CPNB, the majority of published series limit this technique to patients expected to have moderate postoperative pain of a duration greater than 24 h that is not easily managed with oral opioids.23 However, CPNB may be used following mild surgical procedures—defined here as usually well managed with oral opioids—to decrease opioid requirements and opioid-related side effects. Because not all patients desire, or are capable of accepting, the extra responsibility that comes with the catheter and pump system, appropriate patient selection is crucial for safe perineural local anesthetic infusion.

Combining a perineural catheter with a portable infusion pump, outpatients may experience the same level of analgesia previously afforded only to those remaining hospitalized.28,29 However, compared with single-injection peripheral nerve blocks, CPNB requires additional considerations.28,29 Since some degree of postoperative cognitive dysfunction is common following surgery, investigators often require patients to have a “caretaker” at least through the first postoperative night. Whether a caretaker for one night or for the entire duration of infusion is necessary remains unresolved. If caretaker removal at home is expected, then a caretaker willing to perform this procedure must be available at the discharge conclusion if the patient is unwilling or unable to do this themselves (e.g. psoas compartment catheter).

Complications that could be managed routinely within the hospital may take longer to identify or be more difficult to manage in medically unsupervised patients at home with CPNB. Related to this, investigators often exclude patients with known hepatic or renal insufficiency, in an effort to avoid local anesthetic toxicity. For infusions that may effect the phrenic nerve and ipsilateral diaphragm function (e.g. interscalene or cervical paravertebral catheters), patients with heart or lung disease are often excluded since continuous interscalene local anesthetic infusions have been shown to cause frequent ipsilateral diaphragm paralysis. Although the effect on overall pulmonary function may be minimal for relatively healthy patients, conservative application of this technique is warranted until additional investigation of hospitalized, medically supervised, patients documents its safety.

Discharge and Home-Care: CPNB requires additional patient and caretaker education prior to discharge. Because most patients have some degree of postoperative cognitive dysfunction, most investigators educate both the patient and his/her caretaker at the same time prior to discharge. Although currently uninvestigated, there is consensus among practitioners that both verbal and written instructions should be provided, along with contact numbers for health-care providers who are available throughout the infusion duration. Along with standard postoperative outpatient instructions, topics reviewed usually include infusion pump instructions, expectations regarding surgical block resolution, breakthrough pain treatment, specific instruction not to drive or operate machinery, catheter site care (sponge bath instead of shower), limb protection, what to do if local anesthetic leaks from under the protective dressing, signs and symptoms of possible catheter-related complications, and catheter removal plan.

Dislodgement: Unlike single-injection peripheral nerve blocks, a continuous block may be unexpectedly truncated prior to expected termination. The most common complication during ambulatory perineural infusion is simply inadvertent catheter dislodgement. The reported incidence of dislodgement varies greatly between 0 and 30%, and is most likely related to the anatomical location, equipment type, and technique used to secure the catheter. Every effort to optimally secure the catheter must be made to maximize patient benefits. Measures may include the use of sterile liquid adhesive (e.g. benzoin), sterile tape (e.g. “Steri-Strips”), securing of the catheter-hub connection with either tape or specifically designed devices (e.g. “Statlock”), subcutaneous tunneling of the catheter, and the use of 2-5% cyanoacrylate glue. Using a combination of these maneuvers, investigators have reported a catheter retention rate of 95-100% for 6-9 days of ambulatory infusion.

Patient contact and catheter removal: Unlike single-injection peripheral nerve blocks, practitioners usually have daily (or frequent) contact with patients during the infusion. Although not systematically investigated, practitioners may want to consider documenting each patient contact, as is standard-of-care for inpatients. The optimal frequency of contact with ambulatory patients is currently unknown, and probably is dependent upon multiple factors such as patient comorbidities and surgical procedure. Multiple investigators have suggested that patients be contacted daily by telephone, while others have provided twice-daily home nursing visits in addition to telephone calls.

Also unlike single-injection peripheral nerve blocks, the perineural catheter requires removal. Investigators have reported catheter removal for ambulatory patients by various techniques: some discharge patients with written instructions, others have insisted on a health-care provider performing this procedure, while others have patients’ caretakers (or occasionally the patients themselves) remove the catheters with instructions given by a provider over the telephone. While there are no data documenting the superiority of any one technique, one survey revealed that with instructions given by phone, 98% of patients felt comfortable removing their catheter at home.29 Of note, only 4% would have preferred to return for a health-care provider to remove the catheter, and 43% responded that they would have felt comfortable with exclusively written instructions.29 Practitioners may consider providing nonsterile gloves for patients having their catheters removed at home. The presence of a blue/silver catheter tip identified by the person removing the catheter confirms complete removal (depending on catheter design), and should be documented in the medical record.

Liposome Bupivacaine. Bupivacaine liposome injectable suspension (EXPAREL®; Pacina Pharmaceuticals, Inc., Parsippany, NJ) consists of
multivesicular liposomes in a honeycomb-like formation (DepoFoam®) with numerous aqueous chambers that contain bupivacaine.1,2 The proprietary DepoFoam® technology, which provides steady, reliable, and prolonged drug release, is well established, having been used to encapsulate other analgesic (e.g., morphine), anesthetic (e.g., mepipicaine, levoetaxim), and antiviral agents (e.g., zalcitabine, acyclovir), as well as peptides and proteins (e.g., interferon α-2b, insulin-like growth factor, apolipoprotein E).3,4 The milligogram dose of liposome bupivacaine is usually expressed as the free base (e.g., 266 mg of bupivacaine base is chemically equivalent to 300 mg of bupivacaine HCI). Liposome bupivacaine is approved by the US Food and Drug Administration (FDA) for single-dose administration into the surgical site to produce postsurgical analgesia in adults, and NOT for peripheral nerve blocks. However, there are now Phase 1 and 2 studies suggesting that a single-injection of this formulation of bupivacaine may last over 100 hours.5-7 If—and these are big ifs—liposome bupivacaine (1) is approved for use in peripheral nerve blocks; and, (2) is demonstrated in well-controlled randomized trials to be at least non-inferior in providing postoperative analgesia compared with continuous peripheral nerve blocks, there are a number of important potential advantages of a single-injection over an infusion:

- No infusion pump, catheter, large volume of local anesthetic (reservoir)
- Decreased costs
- Decreased provider time for block placement (without the need for catheter insertion)
- Decreased provider time for infusion management
- Decreased inconvenience to patients without having to carry a portable infusion pump and large reservoir of local anesthetic as well as having to remove a perineural catheter
- No potential for catheter leakage and dislodgement
- Decreased necessity for provider training (for catheter insertion)
- Decreased infection risk (without a perineural catheter left in situ)
- Possible decreased hemorrhage/hematoma formation risk without a perineural catheter (and possible use with potent anticoagulants?)

Potential Disadvantages. There are also potential disadvantages to using a long-acting single-injection of local anesthetic over a continuous peripheral nerve block:

- Unclear if surgical anesthesia is attainable with any dose of Exparel
- Potentially inferior short-term analgesia (during the duration of unencapsulated bupivacaine HCl) if Exparel proves less potent
- Inability to titrate down: too dense a sensory block may be disconcerting to patients or even increase the risk of limb injury; too dense a motor block may decrease physical therapy ability or increase the risk of falling; and, a dense proprioception deficit might increase the risk of falling
- Inability to titrate up: inadequate sensory block my provide inadequate analgesia; and, an inadequate duration of analgesia cannot be prolonged without a perineural infusion
- Inability to administer bolus doses: inability to provide extra analgesia when sporadically needed (e.g., physical therapy or dressing changes)

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32. Riche DB, Ottler LR, Gregorio Marañón Hospital., Madrid, Spain, and Reanimation, Navarra Hospital Complex B. Virgen del Camino Hospital., Madrid, Spain. - Epidural analgesia. Sometimes the puncture is very caudal and/or only 3 cm and can accumulate in the fetus (the same as mepivacaine, pH 7.6). Close monitoring of appearance of IELA (when?) is very important, because the possible solutions are quite different in the first (T10-L1) and the second (L2-S1) stage of labor. A detailed anamnesis and examination of the patient (how is presented?) is necessary to identify the causes (why?) and establish the correct solutions. Unfortunately, there aren’t exhaustive guides to solution every case of IELA. However there are some well-defined steps to minimize its incidence: adequate epidural technique, equipment verification, adequate test and initial dose (enough to obtain T10 level), especially in those cases with greater known risk of IELA.


35. Ilfeld BM: Liposome bupivacaine in peripheral nerve blocks and epidural analgesia. Obstetrical anesthesia". Sometimes the puncture is very caudal and/or only 3 cm and can accumulate in the fetus (the same as mepivacaine, pH 7.6). We emphasize the need for a multifactorial therapeutic approach to the pregnant woman, not just limiting ourselves to eliminate the pain of childbirth.

The epidural approach may fail and alleviate the mother in labor, and delivery. However, this technique may fail and alleviate the mother in an inadequate way. The risk factors, possible causes and possible therapeutic alternatives to inadequate analgesia are reviewed in this lecture either by pharmacological therapies (neuraxial, peripheral blocks or analgesic administration via intravenous or inhalational routes) or no pharmacological ones (relaxation techniques, psychological or mechanical). In all possible cases the efficacy and indications of alternative therapies based on the published literature are reviewed, especially from the point of view of evidence-based medicine. It is emphasized the need for a multifactorial therapeutic approach to the pregnant woman, not just limiting ourselves to eliminate the pain of childbirth.

Key words: Labor pain
Obstetrical anesthesia
Epidural
Patient controlled analgesia
Remifentanil

Epidural analgesia is the most common method today for labor pain relief (Table 1); however, the resulting analgesia may not be satisfactory (Figure 1).

1. - Epidural analgesia: The incidence of inadequate epidural labor analgesia (IELA) is 3.5-32% and it’s etiology isn’t fully established (1-7) (Table 2). There are predictors of IELA related to the patient (previous patient tolerance to opioids, previous IELA, cervical dilation >7 cm, multiparity, abnormal presentation, fetal distress, maternal weight, epidural anesthesia, and previous epidural punctures, trauma, blood patches or plica mediana dorsalis epidural), related to the methodology and technical equipment (defective material, needle bevel no cephalic, epidural location with air, inadequate initial volume of local anesthetic, inappropriate volume and concentration dose, catheters not multiperforated, non-specific fixing to skin systems and incorrect placement of the catheter, i.e. intravascular, subdural, paravertebral space, subarachnoid, anterior epidural space or transforaminal), and related to the experience of the anesthesiologist.

Three questions can modify the treatment: when? how? and why? The moment of appearance of IELA (when?) is very important, because the possible solutions are quite different in the first (T10-L1) and the second (L2-S1) stage of labor. A detailed anamnesis and examination of the patient (how is presented?) is necessary to identify the causes (why?) and establish the correct solutions. Unfortunately, there aren’t exhaustive guides to solution every case of IELA. However there are some well-defined steps to minimize its incidence: adequate epidural technique, equipment verification, adequate test and initial dose (enough to obtain T10 level), especially in those cases with greater known risk of IELA.

IELA can be presented as:

1.1. - Total absence of analgesia: if immediate, the catheter placement is possible outside of the epidural space (a new puncture is mandatory). If it happens belatedly, think in moving out or disconnection of the catheter. Suspect the catheter dysfunction if growing need of supplemental epidural bolus dose (SEBD) after an adequate initial block. Labor > 6 hr. and morbid obesity are risk factors. Try to retire 1-2 cm the catheter and administer SEBD. There is a failure rate of 42% in morbid obesity partly due to movements of the catheter in the skin of up to 3 cm. For this reason some authors recommend introducing the epidural catheter more than the recommended 4-5 cm into the epidural space. 10-14

1.2. - Insufficient initial Analgesia: VAS > 3 after 30 minutes after the initial bolus and bolus 15 minutes scheduled PCA and is usually due to a low initial dose. Solution: SEBD of 10 ml of 0.2% ropivacaine, levobupivacaine 0.25% or 1% lidocaine. Remember that sometimes we use lidocaine thinking in the immediacy of its effect, but its physicochemical characteristics (slightly ionized and pH 7.7) don’t increase really the onset and lidocaine cross through the placenta and can accumulate in the fetus (the same as mepivacaine, pH 7.6).

1.3. - Unilateral analgesia (5-21%), persistent in 0.4-2% of cases. Pain in only one side is sometimes due to the woman’s position. Turn to the other side if the CTG registration permits it, and SEBD. Other causes could be an excessive catheter introduction (>6 cm) (retire it 1-2 cm), previous epidurals, epidural anatomic alterations (i.e. surgery, plica mediana dorsalis) 14,15 and epidural blood patch. 16

A new epidural couldn’t be enough to improve analgesia in the later, so other neuraxial techniques (i.e. continuous spinal analgesia) or different approaches could be necessary to explain the patient the alternatives and objectives.

1.4. - Bilateral pain: the woman hasn’t complete analgesia but has effects of epidural analgesia. Sometimes the puncture is very caudal and/or only 3 cm catheter is introduced, making it impossible to reach D10 with anesthetic solution. Solution: SEBD 10 ml (consider to add 50 μg fentanyl).

1.5. - Perineal and low back pain:

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Perineal pain usually occurs in advanced stages of labor because the sacral roots are thicker and require more concentration of anesthetic to be blocked. Low back pain may be due to the compression of the fetal head in sacrum and pelvis. Solution: enhance analgesia (i.e. with 5-10 ml of 0.2-0.375% ropivacaine or 0.25-0.33% levobupivacaine) and advise the patient to have more motor blockade. It is a pain sometimes difficult to control, because proximity of delivery doesn’t allow us to administer enough local anesthetic to impregnate the sacral roots.

1.6. - Patched Analgesia: Often attributed to anatomical epidural space abnormalities, but we must not forget that it may be due to a malfunctioning catheter placement, such as transformaminal escape of the catheter. If there is no improvement after SEBD and the partial withdrawal of the catheter, make a new puncture.

2. - Other neuraxial analgesia strategies

2.1. - Combined analgesia: A dose of subarachnoid medication is administered (e.g. 1 ml of 0.25% bupivacaine preferably without morphine because it is involved in the greatest CTG registration alterations) 17,18 by single injection plus continuous analgesia by epidural catheter. Useful in advanced stages of expansion or in patients with long initial pain.

2.2. - Subarachnoid puncture over epidural technique: Similar to the above except that no subarachnoid catheter was administered. It could improve epidural analgesia with lower incidence of sacral pain because of the passage of the epidural dose through the hole in the dura to the subarachnoid space 19. Needs further studies to assess its efficacy 20.

2.3. - Continuous spinal analgesia: Consider as an alternative for patients with instrumented arthrodesis of spine that may compromise the diffusion of the local anesthetic into the epidural space 21,22, or accidental dural puncture (through the catheter itself).

3 - Peripheral Blocks 23

3.1 - Paracervical: 24

The bilateral plexus block of Frankenhauser applies only in the initial stages of dilation (4-5 cm) at intervals of at least 1 hour. With dilation > 8 cm is more difficult and has more risk of side effects. It is not an alternative in IELA.

3.2 - Pudendal Block: 25

It is used in the 2nd stage of labor, in the expulsive with simple instrumentation, childbirth, episiotomy and sometimes to supplement epidural analgesia. It is ineffective in 10-50 % in one or both sides 26 and does not eliminate the pain of the anterior part of the perineum. The incidence of complications is rare.
5 - Intravenous analgesia: First choice in patients with not desired or contraindicated neuraxial techniques.

5.1 - Opioids

Problems: cross the placental barrier and affect the fetus and mitigate the pain of childbirth (not as effective as epidural) only with high doses and therefore more side effects (nausea, vomiting, pruritus, maternal sedation, reduced fetal heart rate variability and respiratory depression in the neonate).

5.1.1 - Meperidine and morphine: rarely used because of potential adverse effects.

5.1.2 - Fentanyl: unable to relieve the pain in the 2nd stage of labor even at doses of 0.3 mg.

5.1.3 - The FDA classifies remifentanil as a drug category C (no well-controlled studies in pregnant women), so its use is limited to situations where the benefits outweigh the potential risks, as its safety has not been established during childbirth. Remifentanil has a rapid onset of action and short latency from the peak effect, with short-term action and rapid elimination (half-life 10-20 min). It does not accumulate and its metabolism is independent of renal or hepatic function. Crosses the placenta, with ratios umbilical vein / maternal artery of 0.73 and umbilical artery / umbilical vein of 0.60, but it is rapidly metabolized or redistributed by the fetus and produces, neonatal depression, in part because the half-life of remifentanil in the fetus is similar to an adult.

Its pharmacokinetic characteristics make remifentanil PCA administer an alternative in patients with contraindication to neuraxial analgesia, although more studies are needed to assess its efficacy and safety. The main side effect are maternal respiratory depression (continuous monitoring and availability of oxygen is required), even a cardiac arrest has been described. Other adverse effects are nausea (variable incidence), moderate itching (usually need no treatment) and sedation. There is a case report of new born's rib rigidity and respiratory depression in a cesarean section using remifentanil at doses greater than those used for labor analgesia. In a series of 23 neonates there were no differences in hemodynamics or oxygen saturation during the first 24 h of life after receiving the mothers remifentanil PCA, although the authors describe a tendency to hypotension compared to infants whose mothers did not receive remifentanil during the 1st hour. The new borns whose mothers received remifentanil had better results of neurobehavioral tests than pathologic and lower incidence of neonatal resuscitation than fentanyl.

Remifentanil PCA dosage: the bolus dose varies from 0.15 to 0.5 μg.kg⁻¹ (range 0.15 to 0.93 μg.kg⁻¹) infused in 20 s and block interval of 1-3 min. Some authors add a continuous basal infusion of 0.025 to 0.05, 0.075, 0.1 and 0.15 μg.kg⁻¹ improving analgesia and reducing the incidence of adverse effects compared to bolus administration only. Although this issue is controversial, because other authors have reported the opposite, that continuous infusion does not improve analgesia and increases the side effects.

The association remifentanil PCA - intermittently inhaled Entonox has been studied with good results in 84 patients with preeclampsia (loading bolus 0.5 μg.kg⁻¹ in 20 s, PCA boluses 0.25 μg.kg⁻¹ with a lockout interval of 5 min, continuous infusion of 0.05 μg.kg⁻¹.min⁻¹ and maximum dose of 3 mg over 4 h). The PCA remifentanil gets more analgesia than meperidine, and better results in the neonate, fentanyl PCA, or intermittently inhaled nitrous oxide. However, the results are worse than neuraxial analgesia in nulliparous. The overall feeling is that remifentanil in PCA, although it is worth and gives good results with high rates of maternal satisfaction, fails to give an adequate level as neuraxial analgesia do and is often relegated to situations where the epidural is not feasible / workable. Because of its potential adverse effects, it is necessary to inform the patient, monitor her properly, and train nurses and midwives in its administration. In the Netherlands, where epidural analgesia is not fully extended to the entire population, it has come to recommend PCA remifentanil from a cost-effectiveness point of view. Something that has been highly criticized.

Agnostins - antagonists (nalbuphine, butorphanol, pentazocine and buprenorphine) have also been used, but its main advantage ceiling effect concerning doses causing respiratory depression (e.g. higher doses of 10 mg butorphanol intensify analgesia without producing greater respiratory depression).

5.2 - Non opioids: Pethidine, hydromorphone, fentanyl, alfentanil, fentanyl and ketamine. Rarely used, almost always close to expiratory.

6 - Non-pharmacological

The primary goal is to eliminate suffering. There are 3 groups of techniques: relaxation (peripartum environment, massage, acupressure, acupuncture, audioanalgesia, respiratory techniques and aromatherapy), psychological (hypnosis) and mechanical (transcutaneous electrical nerve stimulation, application of heat or cold and Swiss ball).

In conclusion, the anesthesiologist needs to apply their knowledge of pharmacology and physiology and explore the woman to diagnose the cause of failure of analgesia, and offer you the most suitable alternative in the different stages of labor and delivery. It is always necessary to explain the patient the therapeutic alternatives and what is expected of them, especially when neuraxial analgesia isn't an alternative. Finally, remember the need for a multifactorial approach to obstetric analgesia, not only limited to physical pain relief.

References


Panel Discussion: Nerve injury

REVIEW OF THE ASRA PRACTICE ADVISORY ON NEUROLOGIC COMPLICATIONS OF REGIONAL ANESTHESIA
Neal 1. (Anesthesiology, Virginia Mason Medical Center, Seattle, WA).

I. Neuraxial catastrophes
a. Epidural hematoma
   i.Suspicion of epidural hematoma demands immediate imaging and neurosurgical consultation for possible decompression
ii. Specific recommendations regarding neuraxial hematoma and concurrent anticoagulation can be found at www.asra.com
b. Neuraxial infectious complications
   i. Infectious complications of regional anesthesia and pain medicine is the topic of the Second ASRA Practice Advisory on Infectious Complications; manuscripts should be published in Regional Anesthesia and Pain Medicine by late 2014
   ii. Respiratory depression
      i. The ASA Closed Claims study points to instances of respiratory depression consequent to neuraxial opioids administered during pain medicine procedures
      ii. It is incumbent upon interventional pain medicine practitioners who administer neuraxial opioids to establish the same safety protocols that they would use for similar practice in surgical patients
      d. Local anesthetic toxicity
         i. Application of local anesthetics has been linked to falls and hypotension. Also, accidental intravascular injection has been linked to cases of local anesthetic systemic toxicity (LAST)
         ii. It is incumbent upon interventional pain medicine practitioners who administer neuraxial local anesthetics to establish the same safety protocols that they would use for the similar practice in surgical patients. This includes immediately available equipment to facilitate treatment of local anesthetic toxicity.

II. Patients with preexisting neurologic disorders
a. Concept of the double crush injury
b. In theory, patients with preexisting injury to the neuraxis or periphery may be at increased risk of injury should a secondary injury occur from the anesthetic procedure itself (double crush). A similar concern has been that surgery on a nerve that is blocked by an anesthetic technique may constitute an increased risk for injury (double crush) or at least an injury with unclear etiology (resulting in medicolegal concerns of surgical vs. anesthetic causation)
c. The literature neither confirms nor refutes the above concerns

d. Limited retrospective studies do not universally support that patients with preexisting disease are at increased risk for perioperative nerve injury. For instance, several studies from the Mayo Clinic have demonstrated that:
   i. Patients with stable diabetic or peripheral sensorimotor neuropathy who underwent neuraxial anesthesia experienced a slightly increased rate of new neurologic injury as compared to historic controls
   ii. Neuraxial block did not increase the risk of exacerbation in patients with preexisting CNS disorders such as multiple sclerosis or post-polio syndrome
   iii. Patients with peripheral multiple sclerosis or past use of neurotoxic chemotherapeutic agents are likely at increased risk for double crush injury in the setting of peripheral nerve blocks
   e. Definitive studies do not exist

III. Spinal stenosis
a. Emerging data from Sweden and the Mayo Clinic note an association of neurologic injury after neuraxial blockade in those patients with spinal stenosis
b. It is unclear if this is association or cause-and-effect

 Nevertheless, practitioners are advised not to re-dose spinal anesthetics in a very small subset of patients who have a much higher lower limit of autoregulation and are at risk for spinal cord ischemia during neuraxial anesthesia
d. Because there are few, if any compelling reasons to allow patients undergoing neuraxial block to experience blood pressures below 30% of baseline mean arterial pressure (and especially, to experience lower MAP for a sustained period of time), it is recommended that practitioners maintain blood pressure during neuraxial anesthesia within 20% of baseline

V. Cauda equina syndrome
a. The ability to perceive a painful paresthesia (presumably from intrascleral injection) and the linkage of that experience to peripheral or neuraxial injury is poorly understood. Furthermore, case studies point to inconsistency between the experience of a painful paresthesia and subsequent nerve injury. Few data refute or confirm this theory.
b. The panel continues to take the conservative stance that regional anesthetics or pain medicine procedures not routinely be performed in anesthetized or heavily sedated adults

c. The panel recognized the unique goals of placing regional blocks in asleep vs. awake children (assurance of no movement). Practitioners are advised to consider the risks (particularly with thoracic and high lumbar epidurals) versus the benefits of this practice on an individual basis
d. Since the 2005 panel, the ASA Closed Claims project has published its experience with cervical spinal cord injury during interventional pain medicine procedures. The rate of injury was markedly higher in those patients who were heavily sedated or asleep.

e. New data from pediatric registries support the concept that doing regional anesthesia in anesthetized children does not appear to increase their risk for injury higher than historic controls. Nevertheless, reports of devastating injury to
the neuraxis continue to emerge in children who were under general anesthesia at the time of thoracic epidural placement.

f. Definitive studies do not exist.

ESRA1-0621
Symposium: Regional anaesthesia of the upper extremity

UPPER EXTREMITY REGIONAL ANAESTHESIA - ESSENTIALS FOR YOUR PRACTICE
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Techniques That Improve Block Success
Nerve Localization

Block success (a term that unfortunately encompasses multiple definitions) plateaus at 90-98% regardless of whether nerves are localized using peripheral nerve stimulation, paresthesia, or in the case of axillary block, perivascular tech- niques. When compared to peripheral nerve stimulation, randomized clinical trials variably show that the use of ultrasound-guided regional anaesthesia (UGRA) im- proves block onset, reduces block performance time and the number of needle passes, and results in more reliable blockade of the lower trunk via the interscalene approach. However, rates for surgical readiness and block success are similar.

Ideal Number of Injections

Nerve stimulator-guided interscalene and supraclavicular approaches to the brachial plexus achieve reliable blockade after a single injection. As the brachial plexus architecture begins to diverge into more widely spaced components, the value of increasing the number of local anaesthetics becomes evident.

Double or triple ultrasound-guided injection leads to faster supraclavicular block onset. Infranuclear brachial plexus block is improved with double rather than single injection, particularly when one of the stimulations involves the posterior cord. A single posterior injection appears adequate for UGRA techniques. Axillary blocks are improved by using three, but not four, injections. Injecting near the radial nerve is most important for attaining optimal anesthesia using the axillary approach, while injecting near the ulnar nerve is least impor- tant. Recent studies suggest that a two-injection ultrasound-guided technique (injecting at the musculocutaneous nerve and at the 6 o’clock position below the axillary artery) may be equally efficacious to a triple-injection nerve stimu- lation technique.

Pharmacologic Considerations
Additives

Only epinephrine, clonidine, and buprenorphine reliably prolong blockade from intermediate-acting local anaesthetics; they do not significantly affect long- acting local anaesthetics. Epinephrine prolongs peripheral nerve blockade by reducing clearance of the local anaesthetic, in addition to serving as a marker of intravascular injection. Epinephrine 2.5 mcg/mL (1:400,000) achieves nearly the same block prolongation as 5 mcg/mL (1:200,000), but with less tachycardia and less reduction in peripheral nerve blood flow. Clonidine 0.5 mcg/kg prolongs anesthesia and analgesia by 50% for intermediate-acting local anaesthetics, but <20% for long-acting agents (~2 hr. prolongation for either epinephrine or clonidine). However, clonidine can cause sedation (NNH 5) or hypertension (NNH 10) and lacks epinephrine’s ability to signal intravascular injection. Neither epinephrine nor clonidine improves sensory block quality when used during continuous infusion. Dexamethasone has been shown in limited studies to prolong the duration of mepivacaine analgesia to a degree similar to epinephrine or clonidine (~50%). However, recent commentary raises concerns about neurotoxicity with dexamethasone, particularly in diabetic patients or in doses that exceed 1 mg. Preliminary data are promising for block prolongation from dexametomidine, but well-controlled human studies are lacking.

Alkalization of intermediate-acting local anaesthetics does not accelerate bra- chial plexus block onset, despite its usefulness in hastening the onset of epidural block. Moreover, alkalization has been shown in animals to actually reduce block duration and intensity. The use of liposomal bupivacaine around a neural plexus remains off-label and the dearth of published data limit any supportive recommendation at this time.

Complications of Brachial Plexus Blocks
Local Anaesthetic Systemic Toxicity

Two unique circumstances related to brachial plexus blockade affect local anaesthetic systemic toxicity. First, seizures associated with local anaesthetic in- jection are five times more likely to occur with peripheral nerve block than with epidural block. Second, brachial plexus approaches are particularly prone to sys- temic toxicity because they are often placed near arteries that directly supply the brain, thus seizures can occur after remarkably small doses of local anaesthetic, e.g., 2.5 mg bupivacaine injected into the vertebral artery during the interscalene approach. Case reports document episodes of local anaesthetic systemic toxicity (LAST) despite the use of UGRA, although recent studies report an overall de- crease in the incidence of LAST when ultrasound-guidance is used rather than peripheral nerve stimulation.

Hemidiaphragmatic Paresis

All interscalene blocks and ~50% of supravaculaclar blocks result in tempo- rary hemidiaphragmatic paresis (HDP) secondary to anaesthesia of the phrenic nerve. During interscalene anaesthesia, a small subset of patients experience 25-32% reduction in pulmonary spirometric values. Pulmonary function is un- affected in healthy volunteers whose hemidiaphragm is paralysed following supravacular block, but this may not be the case in patients with compromised pulmonary function. The incidence and severity of HDP can be reduced, but not completely and predictably eliminated, when local anaesthetic volumes are decreased to 5-10 mL using UGRA. The ultrasound-guided approach probably blocks the phrenic nerve because of its proximity to the C5 nerve root. (Figure 4) In general, above the clavicle blocks are relatively contraindicated in patients unable to withstand a ~30% reduction in pulmonary function.

ESRA1-0627
Symposium: ASRA/ESRA Joint Session: Continuous regional anaesthesia for ambulatory surgery

ESRA: ECONOMICAL ASPECTS OF CONTINUOUS REGIONAL ANAESTHESIA FOR AMBULATORY SURGERY
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Introduction: Healthcare costs are increasing in all OECD countries despite the worldwide recession, averaging 9.3% of GDP. Costs in the United States are even higher -17.9% of GDP in 2011 and predicted to rise to 20% by 2021 (1). Therefore anaesthesia techniques or practices that can deliver value for money – good clinical care at a lower cost – need to be examined. Healthcare costs vary across a multitude of areas whether funded by public spending or pri- vate sources: drugs, staff and capital costs may be cheaper in one country, hos- pitals may have individual pricing contracts with drug and medical device companies and national or regional clinical practices may vary. Therefore gen- eralization of any cost discussion is impossible. The principles rather than the actual cost differences should be the “take home” message.

Anaesthesia Costs: Anaesthesia costs can be considered to relate to person- nel, equipment, drugs, postoperative care and time in hospital (2). Patients who require resource intensive postoperative care for pain, PONV or hospital admission will cost more (3). Single shot regional anaesthesia (RA) has been shown to significantly reduce pain, PONV & drowsiness compared to general anaesthesia (GA) (4).

Savings with Ambulatory Regional Anaesthesia: Ambulatory surgery re- duces healthcare costs by reducing patients’ time in the hospital (5). RA is an ideal anaesthesia technique for ambulatory surgery, reducing admission and re-admission rates (6). The use of RA allows patients to bypass PACU in up to 100% cases (upper limb nerve blocks) generating savings in nursing care.

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(7) The use of block rooms in day surgery saves money by decreasing both anaesthesia related time and operating room use through faster recovery (8).

These cost savings while welcome are unfortunately small. Savings on drugs costs compared to GA average €5 to €7 for interscalene blocks (9) and CS30 for daycase spinal anaesthesia vs desflurane for GA (10). Even looking at all aspects of care the cost of IVRA vs GA was €248.80 vs CS49.66 in 1995 (11). There are no real savings if the PACU is used as nurses have to be rostered for the peak attendances not average (12,13).

Hospital Admission & PACU Bypass: When examining the data, one sees that the real cost in anaesthesia depend on 1) the time from end of surgery to awakening, 2) whether the PACU is bypassed or not and 3) can a patient be discharged from the hospital earlier and in particular can an overnight stay be avoided (14-16).

Overall in a study of 948 patients undergoing ACL repair (where some patients had a single shot femoral nerve block), PACU bypass was associated with a 12% hospital cost reduction ($420/patient) and the avoidance of hospital admission was associated with an 11% hospital cost reduction ($385/patient) (16). If bypass of PACU cannot be achieved or if nursing staff cannot be utilized elsewhere or not rostered then avoiding or reducing hospital admission is vital if real savings are to be made (16). In Ireland the current cost of daily in-patient care is €907 vs €407 for day surgery (17). Single shot RA provides greater pain relief than GA for ambulatory surgery but this is short lived (4). In the absence of FDA approval for liposomal bupivacaine for RA (18), long lasting pain relief (~24 hours) can only be provided for major surgery with a continuous peripheral nerve catheter (CPNC) (19) or wound LA infusions (20).

Cost Effectiveness of Continuous Regional Anaesthesia: CPNCs provide better postoperative analgesia than PCA opioids allowing a > 50% decrease in opioid use (21). Wound infusions also reduce pain scores and PONV compared to opioids (22). These benefits allow major orthopaedic (5) or breast surgery (23) to be carried out in the ambulatory setting.

The Mayo Clinic have a multimodal analgesic regime clinical pathway for both total hip and knee arthroplasty (TKA) that includes a continuous lumbar plexus catheter for 2 days (24). Compared to historical controls they demonstrated a total saving of $1999 per case. The vast bulk of this was through reduced hospital costs ($1911) indicating that for real economic benefits, patients need to be discharged as soon as possible. There are few studies to have examined the postulated economic benefits of continuous LA infusions whether via CPNC or wound catheters, on earlier hospital discharge. A retrospective review of analgesia techniques after open calcaneal fracture surgery in both a university hospital and stand alone orthopaedic centre, found 18 of 106 patients received a CPNC popliteal block and were discharged home the next day. These patients cost less than either spinal, single shot, GA or CPNC (not discharged) techniques (25). The average savings in the hospital charges per case in this study were $4000 or a 30% reduction with inflation adjusted to 2006 dollars. No patient was readmitted. There was no difference in cost for these patients whether treated in the university hospital or the stand alone centre.

Another retrospective study with case-controls found that with a continuous femoral nerve block (CFNB) after TKA, 9 out of 10 selected patients could be discharged the next day (within 23 hours) and managed for 3 days with the CFNB at home (5). These patients generated an average of $2,682 (34% decrease) savings in hospital costs compared to 10 control patients who had the CFNB but remained in hospital for a median of 4 days. Comparing all costs including professional fees and implant charges resulted in a $5,454 saving (14% decrease). It should be noted however that even a 10% re-admission rate would negate these benefits and that the patients were carefully selected (<70 years, no significant medical history and good social support).

Additional Factors: There are other considerations that need to be taken into account when CPNCs are used for ambulatory surgery that may impact on costs. Failure of catheters can be common with up 30% falling out or not working (21). These patients may have increased pain management requirements compared to those not receiving a block. The catheter kit, elastomeric pumps and postoperative nursing follow up (community or via telephone) need to be taken into account. The management and costs of complications such as infection (5 reported cases of infection after ambulatory CPNCs – 3 ISBs, 2 Poptidal) and retained or difficult to remove catheter tips should be considered and are unlikely after single shot RA (21). Relying on the patient’s carers at home may have no direct healthcare cost but the cost to them (less leisure time, time off work, increased stress) should be considered (26).

Finally, factors identified as affecting whether RA of any kind is performed in the ambulatory setting, are metropolitan areas, private or government funded units and free standing centres (27). These factors would need to be addressed to realize full economic benefits for a healthcare system as a whole.

Conclusion: In summary, through improvements in patients’ pain control, reductions in PONV and faster recovery, CPNCs and wound infusions may allow a greater number of patients undergoing major surgery to be managed more cost effectively by earlier hospital discharge.

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ESRA Abstracts
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ESRA1-0628
Panel Discussion: Ambulatory anaesthesia

SINGLE SHOT REGIONAL ANAESTHESIA FOR AMBULATORY SURGERY

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Introduction: Anaesthesia for ambulatory surgery requires rapid recovery from anaesthesia, minimal postoperative nausea and vomiting (PONV) and excellent postoperative analgesia. Single shot regional anaesthesia (RA) meets all these requirements (1).

General or Regional Anaesthesia: A meta-analysis of randomized trials comparing general anaesthesia (GA) to RA in ambulatory surgery found RA patients had lower pain scores and required less analgesics (2). PONV was only reduced for peripheral nerve blocks (PNB), not central nerve blocks (CNB).

Somewhat surprisingly these benefits do not translate into faster discharge times from the post anaesthesia care unit (PACU) or the hospital, in fact CNB patients stayed 35 minutes longer. RA also resulted in longer induction times (8-9 minutes) than GA (2).

Anaesthesia Related Time: This increase in anaesthesia time is cited as why single shot RA is not chosen for ambulatory surgery. However recent studies have demonstrated that when a block or “swing” room is used then anaesthesia related time for brachial plexus block (BPB) is the same (3) or significantly reduced (4,5) compared to GA. Post procedure bypass of PACU occurs in 60–100% of patients (3,5).

BPB patients used less postoperative antiemetics (2%) vs (1%) than in the GA group, and less opioids (0.6%) vs (80%). More patients could be operated on per day in the BPB group than if GA was used (6).

Critics say that these rooms need extra space and staffing. This is not necessarily the case - in our institution the recovery bay of the PACU becomes the block area and patients bypass it after surgery. There is no increase in staffing. Large theatre complexes can benefit from one block room servicing multiple theatres. Swing rooms require one block area serving two operating theatres. One anaesthesiologist performs the blocks with patients monitored during surgery by anaesthesia nurses (4,6).

Patient Satisfaction: Patients are very accepting and satisfied with single shot RA in the ambulatory setting. 96 to 98% of patients undergoing CNB were satisfied with that technique (7). Even with a nerve stimulation technique for upper limb blocks in unsedated patients, 90% would request the same ambulatory anaesthetic technique (8). A study of 1700 ambulatory patients undergoing PNB revealed patients (8-9 minutes) than GA (2).

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ESRA1-0632

WHAT ARE THE ALTERNATIVES TO INTERSCALENE BLOCK?

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1. Single-injection interscalene block (SSISIB) is the most commonly used technique for postoperative analgesia following shoulder surgery, but with a limited duration of action. Continuous interscalene block compared to SSISIB provides better analgesia, reduces opioid-related side effects and improves patient satisfaction after major shoulder surgery. Beside the classical risks associated with peripheral nerve blocks, the most common side effects reported with both techniques include pleural puncture, central neuraxial needle placement, cervical cord damage, dyspnea, hoarseness, bradycardia and hypertension. Phrenic nerve paresis following interscalene block (ISB) provides by the spread of local anaesthetic to the phrenic nerve, but the incidence as high as 100% of cases. Such phrenic paresis is usually transient and resolves with the duration of action of local anaesthetic, even though some cases reported persistent nerve paresis. Therefore interscalene block for patients presented with a reduction in pulmonary function is contraindicated.

In such circumstances, alternative techniques to ISB have been proposed in the literature for postoperative analgesia after shoulder surgery. This includes lower doses of local anaesthetic, suprascapular block, suprascapular block ± axillary block (called ‘shoulder block’) and indwelling infusion catheters. Opiates cannot be recommended as they provide an equivalent reduction in pulmonary function when compared to continuous interscalene catheter, with higher pain scores and more postoperative nausea and vomiting.

To limit the spread of local anesthetic during ISB to phrenic nerve, several strategies have been investigated. Applying digital pressure above the injection site does not prevent incidence of phrenic paresis after ISB. Conversely, it has been demonstrated that the incidence of paradoxical movement of the diaphragm can be decreased (but not abolished) when local anesthetic is diluted. The main advantage of ultrasound guided ISB concerns the reduction of the dose of local anesthetic. Gautier et al found that successful surgical anesthesia for arthroscopic shoulder surgery can be achieved with 5 mL of 0.75% ropivacaine, and that duration of analgesia was not associated with volume of LA injected during ultrasound-guided interscalene block. However, discrepancies persist on the impact of such dose reduction thanks to ultrasound technique, in terms of phrenic paresis. Some studies concluded that lower doses of local anesthetic significantly decreased the incidence of phrenic paresis, while others failed to demonstrate any difference. The distance between phrenic nerve and brachial plexus increases as the probe moves caudally into the interscalene groove. Performing local anesthetic injection around a more distal root (i.e. C7) identified with the aid of ultrasound reduces the risk of phrenic paresis. However, in all the positive studies, even though the incidence...
of diaphragm paresis decreased, the risk was never abolished. Thus, because of the unpredictable incidence of hemidiaphragmatic paresis, current recommendations from the American Society of Regional Anesthesia (ASRA) published in 2010 considered that small-volume of local anesthetic and ultrasound technique would be relatively contraindicated in patients with a potential 30% reduction in pulmonary function.

Supraventricular block benefited from the rise of ultrasound technique to become again a popular technique during the last decade. This approach can be considered as an alternative of ISB for shoulder surgery. For shoulder arthroscopy, success rate was similar to ISB, with a lesser incidence of hoarseness but a similar incidence of dyspnea. A recent case reported the occurrence of a pneumothorax after supraventricular block even performed under ultrasound control. Reduction of volume would decrease the incidence of phrenic paresis. Studies on volume reduction for supraventricular block report conflicting results. In two studies, the reported effective volume for 95% of patients (ED95) for ultrasound-guided supraventricular block varied between 32ml and 42ml. Conversely, Gupta et al, using a similar method, reported an ED95 between 9 and 14 ml accounting the BMI of the patients. Finally, 20-25ml of local anesthetic seems the recommended volume for supraventricular block. For all the approaches above the clavicle, the same recommendations from the ASRA can be drawn for patients with a potential reduction in pulmonary function.

A more distal block may be performed to reduce the risk of phrenic paresis. The supraventricular block belongs to this category. The supraventricular nerve originates from the C5 and C6 nerve roots. It innervates the supraspinatus muscle and, more distally, the infraspinatus muscle. For shoulder surgery, several studies concluded that supraventricular block was more efficient than either placebo or subacromial infiltration. However this technique remains inferior to interscalene block for postoperative pain relief after shoulder surgery. To improve the efficacy of such technique, Price proposed to add an axillary nerve block to the supraventricular block and called this association the “shoulder block.” Some studies confirmed the effectiveness of these nerve blocks for the management of postoperative pain after shoulder surgery. However the effect of the ‘shoulder block’ on respiratory mechanics has not yet been studied, even though such complication is unlikely to occur according to anatomical consideration (both nerves are far away from the phrenic nerve). Finally, this approach provides an incomplete blockade of all nerves innervating the shoulder joint. This concerns the lateral pectoral nerve particularly. Nevertheless, the ‘shoulder block’ may be the preferred technique when an interscalene block is contraindicated.

Subacromial/infra-articular infiltration is usually performed by the surgeon at the end of the procedure. A catheter can be inserted. This approach appears to be an efficient technique for minor shoulder surgery (arthroscopic non-rotator cuff procedure). No benefit on analgesia was found for major surgery when this technique was compared to placebo. In a prospective, randomized study, intra-articular injection did not show any benefit compared to control group for analgesia after arthroscopic acromioplasty. Recently dramatic reports of chondrotoxicity have raised concerns about the safety of such technique.

This treatment modality can no longer be recommended.

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ESRA1-0634

Ask the Expert

SHOULDER SURGERY IN THE BEACH CHAIR POSITION: SPECIAL CONSIDERATIONS FOR ANAESTHESIA, HEMODYNAMICS AND MONITORING

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Even if the mechanism of this dramatic complication is disputed (5), we think like Cullen that the pressure gradient between heart and brain in sitting position could explain it (3). In awake patient there a 14% to 20% reduction in cerebral blood pressure during sitting position. Combination of sympathetic system inhibition by general anesthesia and other factors like hypovolemia, position of the head, partial carotid stenosis and/or mechanical ventilation could favor cerebral hypoperfusion. Moreover, during surgery MAP is measured at the level of the arm. In the supine position, MAP measured in the arm and MAP perfusing the brain are essentially the same. However, if the patient is upright in the beachchair position, MAP will be less in the brain than at the heart or arm. The BP difference will be equal to the hydrostatic pressure gradient between the heart/arm and the brain (0.77 mmHg/cm). For example, with a MAP arm at 80 mmHg, and a distance between the middle of the arm and the external auditory meatus of 20cm the real pressure at the level of circle of Willis is 65 mmHg. And this gradient could be more important if the pressure is measured at the level of the leg. Acceptance of relatively low MAPs at heart level could result in cerebral hypoperfusion and ischemic injury. Cullen and al advocated that clinicians manage patients undergoing procedures in the beach chair position on the basis of MAP measured at the level of the head or corrected to head level by imposing an arithmetic adjustment to MAPs recorded at other sites (3).

During arthroscopic surgery, bleeding is a common complaint and lead to frequent discussion between anesthesiologist and surgeon. Without monitoring it’s probably better to treat aggressively mean blood pressure values less than 80 mmHg to enhance the margin of safety and deliberate hypotension must be avoided. Nevertheless, for this surgery since several years, we use regional cerebral oxygen saturation (rSO2) to monitor our patients. The use of rSO2 based on non-invasive near-infrared spectroscopy (NIRS) has been proposed for the detection of cerebral ischemia during cardiovascular surgery (6). A first case report and several studies have suggested that this method of monitoring could be of interest during shoulder surgery in sitting position (7-9). In our experience we have seen highly variable between patients with an unpredictable tolerance to hypotensive events (in reviewing). Some patients tolerate extremely low MAPs without rSO2 changes while others display a dramatic decrease in rSO2 for moderate hypotensive events. Unfortunately, accepting blood pressure values that are beneath the range of autoregulation could potentially lead to unrecognized cerebral ischemia. Since there is no currently available way of identifying the inflection point in the autoregulatory curve, where cerebral perfusion changes from pressure dependant to independent, monitoring rSO2 reflects the end-effect of this autoregulatory process and offers objective data upon which therapeutic interventions can be made and evaluated for efficacy. But there are several limits to rSO2 measurement with NIRS that you have to take into account. Cerebral NIRS devices measure mean haemoglobin oxygen saturation in tissue. This value obtain is a mixture of venous and arterial blood. For cerebral cortex, average haemoglobin is distributed in a proportion around 70% venous and 30% arterial. But, this proportion is variable between patients and there is confounding factors like acute variation in haemoglobin concentration, hypoxemia or patient positioning. It’s a reason why, cerebral NIRS has to considered as a trend monitor (10). A trend monitoring approach thus minimizes confounds introduce by variation in individual A/V ratios and outer layer tissues. Each variation must be replaced in the clinical context. A general algorithm has been proposed by Davin to use cerebral NIRS which could be adapted for different kind of surgery (1).

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FIGURE 1. ESRA1-0634: Estimation of blood pressure at the level of external auditory meatus and cerebral cortex for a of mean arterial blood pressure of 80 mmHg measured at the level of the arm (A), or call (B)

ESRA1-0635
Symposium: Regional anaesthesia of the upper extremity

NEEDLE / CATHETER PLACEMENT: DOES IT PLAY A ROLE?
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Introduction: At the beginning of regional anaesthesia, the doctrine “no parasthesia, no anaesthesia” could be read in books of reference [1]. Implicit to that concept, a successful block could be achieved only after a needle-to-nerve contact.

In the late 70’s, the nerve stimulator appeared in the daily clinical practice. The concept was based on a single assumption: the presence of a muscular contraction at an intensity between 0.3 to 0.5 mA would represent a safe distance where the physician could inject the local anaesthetic without risk of intraneural puncture. Animal studies revealed that this principle was erroneous [2, 3]. Indeed, Tsai and colleagues took 20 pigs, dissected the sciatic nerve on each leg and positioned the needle tip at a variable distance from the nerve, switched on the nerve stimulator and measured the current at which they obtained a muscular contraction. Unexpectedly, the minimum current ranged between 0.1 and 1.8 mA when the needle tip was positioned within the nerve.

The advent of ultrasound (US) guidance for peripheral nerve blockade (PNB) has enabled providers to purposefully position the needle tip as close as possible to the target nerve [4, 5]. Unfortunately, the risk of nerve puncture persists despite US guidance [6, 7]. Difficulties with accurate visualization may contribute to unintentional intraneural injection, which has been found to occur at rates between 16 and 17% for both deep [8] and superficial [9] US-guided blocks. The performance of this technology depends not only on the machine resolution, but also on the operator’s skill [10]. It has repeatedly been demonstrated that maintaining the tip in constant view while advancing the needle is not always achievable, even for physicians with an experience of more than 60 blocks [11]. When the needle is visualized, the tip may extend beyond what the anaesthesiologist sees, due to inexact alignment of the US beam and the orientation of the needle [12].

Given that mechanical needle-nerve trauma is likely the foremost mechanism responsible for nerve injury related to peripheral nerve blockade, providers are increasingly cautioned to avoid intentional intraneural injection [13] or even needle tip placement in close proximity to nerves [14-16]. Adopting a conservative approach and finding the optimal balance between the spread of local anaesthetics and distance to the nerve has recently been described as the ‘Holy Grail’ of regional anaesthesia [15]. The need for needle-to-nerve contact might better be replaced by the concept of needle-to-nerve proximity with optimal local anaesthetic spread. Literature tells us that the optimal needle tip position relative to the target nerve that balances success and safety during US-guided PNB depends on the location of the block.

We will now focus on the single-shot injection technique for the interscalene and the axillary blocks. We will put aside the question of the optimal catheter placement, as data in the literature is unfortunately still scarce.

Interscalene brachial plexus block: With regards to this block, it is commonly taught to position the needle tip between C5 and C6 roots. Interestingly, Olekhno and colleagues in a cadaveric study showed that this approach might result in an intraneural injection in 50% of the cases [17]. The authors concluded the outer limit of these hypochoic nodules does not actually represent the external boundaries of the nerve and the epineurium is probably more external than what we see. Our inability to identify this epineurium stems from the dense character of the region and the resolution of the US that is not accurate enough to tell us where the outer limit of the nerve is. On top of that, that type of injection may also result in an epidural and a contralateral spread [18].

The concept of effective needle-nerve distance and conservative targets for needle tip positioning was recently considered by Spence and colleagues who enrolled 168 patients undergoing US-guided interscalene block for shoulder surgery and concluded that the injection of local anaesthetic adjacent to the brachial plexus sheath is as effective as an injection within the sheath in terms of block onset times and block quality [19].

We explored the concept even further in an up-and-down study and investigated the question “How close is close enough?”, by determining the maximum distance that the needle tip can be placed from the nerve roots to achieve a successful interscalene block for analgesia after shoulder surgery. Our results indicate that needle-nerve contact is not a requirement for an effective ISB and a distance of about 8 mm between the needle tip and brachial plexus sheath produces effective and long-lasting analgesia in 50% of patients. Further, a distance of about 2 mm can achieve a successful block in 95% of patients. Of note, the intraoperative and postoperative opioid requirements among patients with a successful block were equivalent to recently published trials that evaluated analgesic efficacy of US-guided ISB [20, 21]. Similarly, the durations of sensory blockade and motor blockade among patients with a successful block fell within previously reported ranges using similar doses of local anaesthetic [22, 23].

Auxiliary brachial plexus block: The specificity of the axillary block is probably not the sheath but the identification of the terminal nerves of the brachial plexus. As nicely reported by Christophe and colleagues, anatomical variation of the locations of the terminal nerves is lavish [24]. Identifying each of these nerves might be time-consuming. The idea is to best balance risks and benefits, to reduce the number of needle passes, and finally to perform the block easily. Put in other words, we want to keep this block simple and safe.

Several authors investigated the question of multiple-injection technique versus a single-injection technique after having blocked the musculocutaneous nerve individually [25-27]. Stated differently, these trials studied a perineural injection, where the needle tip was positioned close to each nerve versus a perivascular injection, where the needle tip was positioned at 6 o’clock below the artery. Imasogie and colleagues, who were the first ones to explore that concept on 120 patients, concluded that time to perform the block was shorter in the perivascular technique, while success rate was similar in both groups [25]. Number of needle passes was obviously reduced in the perivascular group, but more importantly, patients complained less of paraesthesia [27].

Conclusion: The need for needle-to-nerve contact might better be replaced by the concept of needle-to-nerve proximity with optimal local anaesthetic spread. We have seen that the needle tip should be positioned outside the brachial plexus sheath for an analgesic interscalene block and below the axillary artery for the axillary brachial plexus block with a separate injection for the musculocutaneous nerve. While evidence brought by the literature for the peripheral sciatic nerve block is abundant, future studies are needed to better understand the location of safest local anaesthetic injection for other nerve block such as the supraclavicular nerve block, subgluteal sciatic nerve block or femoral nerve block.

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indicating that total mass of local anesthetic is the predominantly factor for these three blocks. Interestingly for continuous popliteal nerve block, it seems preferable to use a relatively concentrated solution with smaller volumes [15], whereas the opposite seems to be true for continuous infracavular nerve block [16].

In conclusion, at the end of this lecture, attenders will be suggested different infusion regimens, according to the catheter location.

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ESRA1-0638

Panel Discussion: Regional anaesthesia in orthopedic surgery

NEUROLOGICAL ANESTHESIA AND ANALGESIA FOR DISCECTOMY AND MAJOR BACK SURGERY: FEASIBILITY AND INDICATIONS

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Many studies suggest benefits of regional anaesthesia (RA) over general anaesthesia (GA) for spine surgery. Nevertheless it is rarely used due to lower acceptence by patients and/or anaesthesiologist preference for general anaesthesia because of a secure airway prior to placement in the prone position.

Regional anaesthesia: specific advantages over general anaesthesia? RA, especially spinal anaesthesia (SA) may shorten the intra-operative time, diminish blood loss by either spontaneous breathing or otherwise the induction of hypotension and vasoconlation due to the sympathetic block. Haemodynamic stability was better maintained under RA possibly due to inhibited release of stress hormones. Surprising is the incidence of postural puncture headache is low. The surgical bleeding in around the dural hole may function as a blood patch. Less thromboembolic complications have also been reported with spinal anaesthesics, most probably related to the modulation of the hypercoagulable state.

Another benefit of RA is the ability of the patient to self position and a low incidence in urinary retention being similar among patients receiving GA or SA.

Contrary to this others found that SA has no advantages over GA, the latter causing less intra-operative bleeding together with better haemodynamic stability, but also higher satisfactory surgical conditions. In addition, propofol - TIVA may reduce the incidence of nausea/vomiting.

When with combined RA and GA wake-up of the patient is requested by the surgeon, RA may lower the requirements of narcotics and muscle relaxants, accelerating partial arousal.

RA may be extended into the postoperative phase. Peak pain scores and/or narcotic requirement in the post anaesthesia care unit and ward are lower in patients, who received RA. As a consequence they may experience less nausea and emesis.

Are all patients and surgeries suitable for RA?: Apart from the classical contraindications for RA there are some specific for patients undergoing spine surgery. These are multilevel spinal stenosis, near complete-total myelographic block or arachnoiditis. GA may be a better choice for procedures above T10, those lasting longer than 2 hours or a possibility of excessive blood loss (multiple level laminectomies and spinal fusions using rods or pedicle screws). Obese patients with protuberant abdomens are also more likely to be candidate for GA, because their ability to breath in the prone position may be compromised, even more in the knee-chest position.

Regional intra-operative anesthetic techniques: SA as the sole anesthetic technique, has been successfully used for lumbar disc surgery, laminectomies and lumbar spine fissions. Epidural anaesthesia (EA) is used to a lesser extent than SA because it is more time consuming while many surgeons fear the presence of catheters in the operative field. Operations are commonly performed in the prone position but the lateral or sitting position are also possible for pregnant patients in whom a herniated disc may warrant emergency surgery.

The final position should be installed when the block has settled. The choice of the baricity is still debatable. Hyperbaric bupivacaine has a faster onset for complete block but greater degrees of hypotension and more need of wound infiltration. Opposed to this others found that plain LA result in unreliable or unpredictable quality of anaesthesia. The upper sensory level should be at T10 or just above to provide adequate surgical anaesthesia. High levels of motor block are poorly tolerated in the prone position.

Fortunately the failure rate of neuraxial blocks in patients with spine pathology seems to be extremely low although it was found that patients with spine problems experience more paraesthesias upon intrathecal injection or catheter placement.

Regional postoperative analgesia: As mostly GA is performed for spine surgery, postoperative analgesia commonly consists of systemic paracetamol, NSAIDs, pregabalin, clonidine, dexmedetomidine, ketamine, opioids or in combination.

Single shot injection or placement of neuraxial catheters have been studied before or after surgery (at some distance from the operative field) but they can also be performed under direct vision. Epidural analgesia for postoperative pain relief has been found repeatedly to be effective and safe for all kinds of spine surgery, providing superior analgesia, less opioid rescue and higher patient satisfaction when compared with PCA for up to 72 hours.

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Despite encouraging reports others found that epidurally injected substances may cause more side-effects while more patients suffered from pain due to failure of the epidural and/or catheter loss while costing significantly more than systemic analgesia.

The use of two epidural catheters has been described to be more effective than a single catheter after spinal instrumentation and fusion but with more side-effects.

An alternative method for epidural analgesia may be an injection by the caudal route or a ‘pre-emptive’ single dose infiltration of the affected nerve root after surgical exposure but after skin incision.

Epidural analgesia does not necessarily require the use of local anesthetics (LA). Opioids such as fentanyl and sufentanil but especially morphine have been used, alone or combined with LA, in single dose, repeated boluses, PCA or continuous infusion. Morphine has also be instilled in sponges soaked with the opioid or as an extende-release formulation. Other reported substances used epidurally without LA were methylprednisolone and clonidine.

A single intrathecal injection of opioids, mostly morphine for postoperative pain relief is commonly used with great satisfaction and controls pain equally for the first 24 hours with less pruritus and adverse events than epidural analgesia.

Continuous intrathecal analgesia has also been reported.

Wound infiltration or infusion with LA also seems to be effective in reducing the need for postoperative analgesics after laminectomy with plasma concentrations remaining below toxic levels. The exact depth of catheter placement seems to be less important. Pre-incisional instillation is better than at closure initiation.

Intra-operative lidocaine infusion, lidocaine patches, TENS and acupuncture have also been reported to be valuable alternatives to be used alone or as part of a multimodal approach.

**Conclusion:** RA can be an excellent choice during and after spine surgery.

**ESRA1-0640**

**REFRESHER COURSE: NON ANAESTHETIC EFFECTS OF LOCAL ANAESTHETICS**

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**Introduction:** Local anesthetics induce a reversible membrane stabilizing effect by blocking the sodium influx through the voltage-gated sodium channels primarily in the neuronal cell membranes. They are commonly applied in peri-operative settings as part of chronic or acute pain management. The use of local anesthetics has long been focused on their analgesic effects and applications. However, the effects of local anesthetics go beyond pain relief. An increasing number of studies have demonstrated that local anesthetics also exert other non-anaesthetic effects that are relevant to patient recovery and surgery prognosis. The aim of this review is to provide an overview of these non-anaesthetic effects with particular emphasis on their myopathic, anti-proliferative, anti-inflammatory, and anti-coagulation effects.

All local anesthetics are structurally similar: they consist of a lipopholic aromatic ring, an intermediate chain and a hydrophilic terminal amine group. The potency of an anesthetic is determined by the degree of lipid solubility of the aromatic ring, an important criteria that enables its rapid diffusion into nerve membranes. The intermediate chain that connects the aromatic and amine components is either an ester or an amide group – this forms the basis of classifying local anesthetics into either the ester (procaine) or amide (lidocaine, ropivacaine, bupivacaine) group. Differences in potency between individual or between groups of local anesthetics are closely linked to their structural differences, which govern the degree of lipophilicity and may even explain their broad spectrum of biological effects [1, 2].

**Myopathy:** Myopathy is a common consequence of local anesthetics administration, which causes acute muscle fiber degeneration [3]. The main cause of myopathy is toxicity of administered local anesthetics that is largely due to difficulties in conveying their local concentrations at the site of administration [4]. As is with potency, toxicity of local anesthetics is dose-dependent and directly correlates with their lipophilic properties.

The impact of local anesthetics on mitochondrial role in cellular oxidative phosphorylation and ATP production is believed to have a pivotal role in myopathy [5, 6]. In the case of bupivacaine-induced myopathy, toxicity occurs at the mitochondrial level leading to disruption of mitochondrial energy production and dysregulation of calcium homeostasis, which subsequently results in the alteration of mitochondrial structure and eventually muscle fiber degeneration (see [4] for an excellent review).

Disruption of mitochondrial oxidative phosphorylation can occur via two ways: by inducing the uncoupling of mitochondrial oxidative phosphorylation or inhibiting components of the electron transport chain. Firstly, local anesthetics (usually at low concentrations) are known to stimulate mitochondrial respiration and collapse mitochondrial membrane potential [7-10]. This phenomenon is largely recognized as mitochondrial uncoupling of oxidative phosphorylation, whereby the anesthetic translocates protons by shutting single protonated molecules across the mitochondrial membrane in a classical proenophoric action [11]. Secondly, high concentrations of local anesthetics, such as ropivacaine and bupivacaine, can inhibit mitochondrial respiratory chain at multiple sites, predominantly complex 1 (NADH ubiquinone reductase) [5, 12, 13]. There have also been reports that bupivacaine specifically inhibits the F0-F1 ATP synthase [14]. Additionally, local anesthetics may also inhibit substrate transport into the mitochondria. In the heart, for example, bupivacaine has been shown to inhibit carnitine acylcarnitine translocase (CACT) [15], an essential fatty acid transporter across the inner mitochondrial membrane. All of these result in an overall decline in the bioenergetic capacity of mitochondria, and have far-reaching implications in tissues with high aerobic demand and low tolerance to hypoxia, particularly the heart, lungs and central nervous system. which altogether coincide with the pattern of affected tissues during local anesthetic-induced toxicity [16].

The toxicity of local anesthetics also impacts upon the role of mitochondria in cellular carcinoma homeostasis and reactive oxygen species (ROS)-mediated processes, ultimately leading to apoptosis. Local anesthetics, such as lidocaine and bupivacaine in high concentrations, induce a persistently high calcium level [4] by stimulating calcium release from sarcoplasmatic reticulum (SR) via the ryanodine receptors at the SR membrane, and simultaneously inhibiting calcium reuptake into the SR [17-19]. This, coupled with increased ROS production as a result of complex I and/or III inhibition of the mitochondrial respiratory chain [20, 21], triggers the release of cytochrome c, which is then followed by the mitochondria-initiated apoptosis, often with DNA fragmentation as the main apoptotic feature [22].

Here in consideration of all the above effects of local anesthetics, we wish to highlight the significance of intravenous lipid emulsion as an antidote for bupivacaine- or ropivacaine-induced toxicity [23, 24]. Apart from acting as a “lipid sink” that removes circulating local anesthetics and preventing local anesthetics from binding to receptors, the administration of lipid emulsion increases intracellular fatty acid and therefore, overcomes the CACT inhibition [25]. Currently, there is also an intense interest in co-administering protective agents (e.g. erythropoietin, N-acetylcysteine) to ameliorate the adverse ROS effects of local anesthetics administration [26, 27].

**Anti-proliferative effects:** One of the most intriguing observations with the administration of local anesthetics is the reduction of cancer recurrence and metastases, thereby improving long-term survival in cancer patients [28]. This cytostatic effect of local anesthetics is further supported by recent findings that lidocaine, bupivacaine and ropivacaine suppress proliferation in several cancer cell lines [22, 29, 30] as well as models of cell regeneration i.e. stem cells [31]. Whether local anesthetics eventually induce cell death is dependent on their dose and length of exposure of cells to these anesthetics.

Evidently, toxicity effects on mitochondria and ROS production (see above section) has adverse effects on cell growth, proliferation and viability. However, several other mechanisms have also been proposed to explain the observed anti-proliferative and anti-metastatic effects, i.e these anesthetics (i) inhibit metastasis via voltage-gated sodium channels [32]; (ii) promote the reactivation of tumor suppressor genes by altering the DNA methylation status of cancer cells [33]; (iii) inhibit cell migration via the tumor necrosis factor-α-induced Sarc-activation [34] and intercellular adhesion molecule-1 phosphorylation, or the IKK-NEK5-CAM1 signaling pathway [31] which disrupts efficient cell-to-cell communication; (iv) inhibit the epidermal growth factor receptor (EGFR) activity [29], which forms part of the signaling cascade that triggers DNA synthesis during cell proliferation; and (v) arrest or delay cell cycle [31, 35].

While the significance of local anesthetics on tumor growth and spread is fascinating, we must bear in mind that those similar cytostatic effects will have a profound impact on wound healing - slower wound healing can imply a reduced breaking strength and rate of healing were previously reported in rat models of acute wound repair after exposure to local anesthetics [36]. However, this effect was not replicated in a mouse model of cutaneous wound healing.
lidocaine and bupivacaine [37]. This mixed conclusion may be attributable to dose administration.

Another implication of the anti-proliferative effects of local anesthetics is on fetal development, when anesthetics or their metabolites cross the placenta. Prenatal exposure to cocaine (a structural analogue of local anesthetics) has been linked to a variety of neuronal growth and development retardation in human adolescents and non-human primates [35]. Cocaine is believed to possess an inhibitory effect on neural progenitor cell proliferation, which is the key determinant in neural architecture and brain development [38, 39]. While it is difficult to evaluate the impact of currently used local anesthetics on fetal development from animal or cellular models, further studies are needed to determine whether the degree and timing of fetal exposure to these agents have a bearing on the severity of their developmental retardation [40].

**Anti-inflammatory effects:** Inflammation is a typical result of a localized pathophysiological response to infection, injury or destruction of tissues, and is characterized by the presence of redness/erythema, heat, swelling, and eventually pain. Needless to say pain is a manifestation of inflammation itself. The risk and problem of inflammation after surgery is indeed significant, all the more so when it comes to transperitoneal surgery whose patients often experience postsurgical loss of function (ileus) and fatigue that necessitate a prolonged convalescence period [41]. In this context, local anesthetics appear to alleviate inflammation by blunting many aspects of the immune system, mainly by inhibiting the activation and response by cells of the immune system as well as inhibiting the release of pro-inflammatory mediators e.g. interleukins, cytokines, NFκB, and TNFα (see extensive review by Cassuto et al. [42]). Although their mechanisms of action are not fully understood, Seeman [43] proposed that local anesthetics fluidize and disrupt the protein and lipid components of the membrane and consequently influence the function/activity of membrane-associated proteins and lipids, ion channels and cytoskeleton of the cell [42]. All these have considerable repercussions on cell migration, adhesion, exocytosis and phagocytosis. Hence, local anesthetic interventions may, to a certain degree, be beneficial in reducing over-reactive inflammatory responses and protect tissues affected by acute inflammation. In fact, the efficacy of administering local anesthetics in improving functional recovery, while reducing both abdominal pain and opioid dependence after a major transperitoneal surgery [44, 45], have been established in several studies, and some claim, may even surpass those of conventional steroid treatment for inflammation [46]. More clinical studies are still required to verify the potency of local anesthetics as an anti-inflammatory therapy in various clinical conditions [47–48].

**Anti-coagulation effects & enhanced fibrinolysis:** Major surgeries can trigger stress response which in turn, will increase pro-inflammatory mediators/factors that are associated with increased blood coagulation [49]. The underlying mechanisms for these effects are still poorly understood. But recent evidence suggests that local anesthetics (via epidural administration) have a protective effect against post-operative thrombosis [50–52] – a particularly concerning situation in atherosclerotic patients who are more predisposed to post-operative cardiovascular complications [53, 54]. Local anesthetics, such as lidocaine and bupivacaine, interfere with blood coagulation by inhibiting platelet aggregation [53] and the release of granules [54] via their membrane stabilizing effect [55] and the thromboxane A2 signaling pathway [57, 58]. In addition, they also enhance fibrinolysis, occasionally without affecting coagulation [59–61]. On the other hand, these hypo-coagulable effects of local anesthetics, much work needs to be done to understand and dissect the mechanisms of action of local anesthetics such as lidocaine may have multiple non-anesthetic effects that may counteract one another e.g. while lidocaine may have anti-inflammatory effects, it may also impair/slow down wound healing. While the effects of local anesthetics are broad and over-lapping, most of these effects often overwhelmingly correlate with dosage. Most anti-proliferative and anti-inflammatory effects were seen at lower concentrations of local anesthetics, and as the concentrations were raised, toxicity effects begin to take effect, subsequently leading to apoptosis. Given the variety of effects and factors that can influence the biological activity of local anesthetics, much work needs to be done to understand and dissect the mechanisms and pharmaco-kinetics of action of local anesthetics before we can begin to design and apply patient-specific therapies. In the meantime, we can only rely on clinical skill and technique, vigilance and adequate monitoring for emergencies to ensure the safe and effective use of local anesthetics.

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**References**


Regional anesthetics provide excellent analgesia and protect the reduced neutrophil adhesion for 3 days. Patients receiving ropivacaine showed significant blunting of post-operative analgesia for postoperative pain control clearly modulates the post-dural puncture headache, sympato-vagal dysbalance is not a very rare event (1:100,000) with epidural anesthetics. In contrast to lumbar epidural anesthesia, organ protection through sympatho-modulation by regional anesthetics: Approximately one-third of patients undergo regional anesthesia for surgery. Some meta-analyses suggest that regional anesthesia may be superior to general anesthesia with respect to cardiovascular outcomes and outcomes related to other vital organs such as the lungs, infections, transfusion requirements, renal failure and stroke) [8-10]. However, most large-scale randomized trials demonstrate that the choice of anesthesia does not influence cardiac morbidity and mortality [11-14]. It should be also noted that cardiac arrest due to sympatho-vagal dysbalance is not a very rare event (1:100,000) with spinal anesthesia [15]. But serious complications such as post-dural puncture headache, neurological injury and epidural hematoma with paraplegia are very rare (1:100,000) with epidural anesthetics. In contrast to lumbar epidural anesthesia, thoracic epidural anesthesia may be more effective in protecting the heart against ischemia. They were reported to effectively blunt myocardial ischemia in patients refractory to conventional medical treatment [16]. Nonetheless, current evidence supports the view that factors other than the type of anesthesia may be more important for at least cardiovascular outcome in even high-risk patients. Hence benefits from regional anesthesia may be either related to improved pulmonary outcomes [8] and maybe to reduced incidence in perioperative stroke, acute renal failure and acute confusion in patients undergoing coronary artery bypass graft surgery [17]. Thoracic epidural anesthesia may also prevent bowel dysfunction after abdominal surgery and improve gastrointestinal recovery. Endothelial protection: effects of regional anesthesia: The vascular endothelium not only represents a barrier between the vessel lumen and surrounding tissue. It actively controls vascular permeability and plays an important role in cell adhesion, inflammatory responses, immune reactions, and hemostasis, all of which are affected by surgical stress. A recent study found in a rat model that thoracic epidural anesthesia attenuates the endothxin-induced increase of IL-1β concentration, adhesion molecule expression and leukocyte-adhesion with subsequent endothelial injury [18]. Likewise, thoracic epidural anesthesia reverses sepsis-induced alterations in hepatic perfusion and ameliorates hepatic leukocyte recruitment [19] and exerts positive effects on pulmonary endothelial integrity via the NO pathway [20] in rat models of sepsis. During hemorrhagic hypotension and after resuscitation, thoracic epidural anesthesia favourably affects other study in patients undergoing coronary artery bypass graft surgery reported that thoracic epidural anesthesia increased internal thoracic artery free blood flow markedly via increased VEGF, iNOS and adenosine-A2B receptor expressions [22]. Regional anesthesia also favourably reduces oxidative stress under ischemia-reperfusion conditions [23]. However, it should be kept in mind that volatile anesthetics also exert a strong endothelial protection in humans [24].

**Symposium:** Topics of future research for regional anesthesia

**IMPACT OF RA ON ORGAN / ENDOTHELIAL PROTECTION**

**Zaugg M.**

Introduction: Trauma and surgical stress and their related pain elicit endocrine and metabolic changes, which have been demonstrated to influence the immune response [1]. This hormonal and metabolic stress response is induced by blockade of afferent neuronal input when using regional anesthetic techniques (epidural or spinal anesthesia). Regional anesthesia alone or provided as intra- and postoperative analgesia for postoperative pain control clearly modulates the cytokine production (see e.g., [2-6]). More recently, novel approaches for post-operative immunomodulation by chemical afferentectomy have been proposed. In the setting of an established enhanced recovery after surgery (ERAS) program, Kahokehr et al. [7] applied the local anesthetic ropivacaine intraperitoneally before colon resection and added a postoperative ropivacaine infusion for 3 days. Patients receiving ropivacaine showed significant blunting of post-surgical systemic cytokines and cortisol release. These patients also had markedly reduced pain and use of opioids as compared with patients receiving an epidural anesthetic [7].

**Organ protection through sympatho-modulation by regional anesthetics:** Approximately one-third of patients undergo regional anesthesia for surgery. Some meta-analyses suggest that regional anesthesia may be superior to general anesthesia with respect to cardiovascular outcomes and outcomes related to other vital organs such as the lungs, infections, transfusion requirements, renal failure and stroke) [8-10]. However, most large-scale randomized trials demonstrate that the choice of anesthesia does not influence cardiac morbidity and mortality [11-14]. It should be also noted that cardiac arrest due to sympatho-vagal dysbalance is not a very rare event (1:100,000) with spinal anesthesia [15]. But serious complications such as post-dural puncture headache, neurological injury and epidural hematoma with paraplegia are very rare (1:100,000) with epidural anesthetics. In contrast to lumbar epidural anesthesia, thoracic epidural anesthesia may be more effective in protecting the heart against ischemia. They were reported to effectively blunt myocardial ischemia in patients refractory to conventional medical treatment [16]. Nonetheless, current evidence supports the view that factors other than the type of anesthesia may be more important for at least cardiovascular outcome in even high-risk patients. Hence benefits from regional anesthesia may be either related to improved pulmonary outcomes [8] and maybe to reduced incidence in perioperative stroke, acute renal failure and acute confusion in patients undergoing coronary artery bypass graft surgery [17]. Thoracic epidural anesthesia may also prevent bowel dysfunction after abdominal surgery and improve gastrointestinal recovery.

**Endothelial protection: effects of regional anesthesia:** The vascular endothelium not only represents a barrier between the vessel lumen and surrounding tissue. It actively controls vascular permeability and plays an important role in cell adhesion, inflammatory responses, immune reactions, and hemostasis, all of which are affected by surgical stress. A recent study found in a rat model that thoracic epidural anesthesia attenuates the endothxin-induced increase of IL-1β concentration, adhesion molecule expression and leukocyte-adhesion with subsequent endothelial injury [18]. Likewise, thoracic epidural anesthesia reverses sepsis-induced alterations in hepatic perfusion and ameliorates hepatic leukocyte recruitment [19] and exerts positive effects on pulmonary endothelial integrity via the NO pathway [20] in rat models of sepsis. During hemorrhagic hypotension and after resuscitation, thoracic epidural anesthesia favourably affects other study in patients undergoing coronary artery bypass graft surgery reported that thoracic epidural anesthesia increased internal thoracic artery free blood flow markedly via increased VEGF, iNOS and adenosine-A2B receptor expressions [22]. Regional anesthesia also favourably reduces oxidative stress under ischemia-reperfusion conditions [23]. However, it should be kept in mind that volatile anesthetics also exert a strong endothelial protection in humans [24].

**Mechanisms of endothelial protection by local anesthetics:** Local anesthetics interfere with neutrophil function

Local anesthetics such as lidocaine inhibit chemotaxis, adhesion, phagocytosis, and burst activity of neutrophils [25-28]. Also, pre-treatment with intravenous lidocaine attenuated acute lung injury in rabbits [29, 30]. Most recently, lidocaine was shown to modulate inflammation in septic patients by decreasing chemokine-induced neutrophil arrest and transendothelial migration [31]. However, some caveats are warranted. First, one has to bear in mind that the neutrophil functions shown to be inhibited by lidocaine are ultimately necessary for microbial clearance during infection and this may actually worsen outcome [32]. In the clinical trial by Berger and colleagues [31], clinical outcome or patient recovery data were not presented. As such, we do not know to date whether bacterial clearance was affected. Also, septic patients may suffer from myocardial dysfunction but the potential cardiovascular effects of lidocaine were not evaluated. In an interesting study, Chiangi and co-workers used a murine peritonitis model to study the impact of different anesthetics on the resolution of the inflammatory response [33]. The authors elegantly showed the anti-inflammatory properties of isoflurane, which reduced leukocyte infiltration and promoted inflammation resolution. In contrast, lidocaine delayed the onset of resolution by impairing leukocyte removal.

**Local anesthetics and cell adhesion molecule expression**

The vascular endothelium only represents a barrier between the vessel lumen and surrounding tissue. It actively controls vascular permeability and plays an important role in cell adhesion, inflammatory responses, immune reactions, and hemostasis, all of which are affected by surgical stress. The loss of barrier function results in tissue inflammation, an important component of ischaemia-reperfusion injury. Inflammatory mediators such as thrombin, bradykinin, and vascular endothelial growth factor (VEGF) disturb the organization of interendothelial junctions opening the barrier [34]. Endothelial hyperpermeability and intercellular adhesion molecule-1 (ICAM-1) are markers of endothelial activation [35]. ICAM-1 is upregulated on the surface of endothelial cells after exposure to inflammatory cytokines such as tumor necrosis factor-α. ICAM-1 mediates the firm adhesion of leukocytes to the endothelium and therefore facilitates the endothelial transmigration of leukocytes. Lidocaine pre-treatment has been shown to reduce ICAM-1 expression in activated human umbilical vein endothelial cells (HUVECs) [36]. However, this was shown only at concentrations larger than clinically relevant. Piegeler et al. [37] demonstrate in an in vitro setting that concomitant treatment of human lung microvascular endothelial cells with rosiglitazone and tumor necrosis factor-α reduced neutrophil adhesion and endothelial hyperpermeability via a reduction of Akt, eNOS, and Src activation. The authors argue that local anesthetics may be helpful in reducing inflammatory endothelial hyperpermeability [37]. Although lidocaine (but not tetracaine) pre-treatment attenuates cytokine-induced endothelial cell injury (death) [38], the protective effects of local anesthetics have not been firmly established. In fact, pre-treatment with local anesthetics in vivo has been shown to exacerbate renal ischaemia-reperfusion injury in rats [39] by increasing both necrotic and apoptotic kidney cell death. On the other hand, lidocaine can reduce inflammatory responses and protect tissues from local injury in other experimental settings (sepsis) [40].

**Local anesthetics and cell viability and function**

In vitro, local anesthetics have been shown to directly protect cells (endothelial cells, vascular smooth muscle cells, neural cells) from cytokine-induced injury [38, 41, 42]. Tissue protection, however, may also result from improved perfusion. However, aside local anesthetics are known to cause vasoconstriction [43].

**Summary:** Regional anesthetics provide excellent analgesia and protect the function of vital organs. However, there is little evidence that regional anesthetics are superior to general anesthetics so far and more research is required in this area. While local anesthetics may have organ/endothelial protective properties and thus positively impact outcomes by modulating and/or mitigating...
the stress response, there are currently insufficient data to make any clinical recommendations.

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Esra Abstracts

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Ask the Expert:

IMPACT OF ANAESTHESIA REGIMEN ON MIDDLE AND LONG-TERM CANCER SURGERY OUTCOME

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Introduction: Recently, a new field of perioperative research emerged with the main goal of optimizing the perioperative treatment (including the anesthetic regimen) to improve middle and long-term outcome in patients undergoing cancer surgery. The surgical trauma and multiple other factors increase the risk of metastasis formation and accelerated tumor growth. Anesthetic techniques including regional anesthesia with its opioid-sparing effects and improved pain control, restriction of blood transfusions with the aid of blood transfusion protocols and modulation of the perioperative inflammatory response are nowadays thought to be important cornerstones in improving outcomes in oncological patients. The ultimate goal of “onco-anesthesia” is to establish the best “cancer anesthetic”. However, despite the great enthusiasm in this novel field of research, it should be kept in mind that surgery itself, i.e. completeness of tumor resection, still has an impact on oncological outcome, which is of magnitudes higher than the one by anesthetic techniques.

Cancer: an increasing burden in healthcare: In the next decade, the incidence of cancer will increase by 50%. In developed countries, cancer is the leading cause of death.1 This is mainly due to aging and increased life expectancy. In 2025, 1.2 billion people will be over 60 years worldwide.2 However, elderly cancer patients are a very heterogeneous population with some having only little co-morbidities, while the majority does have multiple co-morbidities and are very frail. These patients will need significant resources of healthcare systems and thus represent an economic challenge to modern societies. Provision of value-based and cost-effective care is hence key.3 Cancer centers for multidisciplinary treatment and care with high volumes of patients using ERAS programs (Enhanced Recovery After Surgery) may offer the most economic care and best outcomes.4

How can the anesthetic regimen affect cancer outcome?: Anesthesia affects major elements of the tumor microenvironment, including angiogenesis and lymphangiogenesis, neural activity, inflammation and the immune system. A number of tumor cells have beta-adrenergic receptors and a reduction of the surgical stress by anesthesia in general is thought to mitigate tumor growth and formation of metastasis. There is experimental5 and clinical data6 supporting the view that beta-blockade is associated with improved outcome in cancer surgery. In contrast, clonidine (alpha-alpha-adrenergic agonist) augments proliferation in certain breast cancer cells.7 Avoidance of hypoxia (upregulation of HIF-1) and mitigation of inflammation are two other strategies to reduce tumor growth. Since postaglandins play a crucial role in inflammatory processes and stimulate tumor growth via activation of cyclooxygenases (COX), it is not surprising that NSAIDs are thought to be of benefit in surgical cancer patients. Clinical trials showed that NSAIDs impair tumor growth in breast and prostate cancer patients. A randomized clinical trial with postoperative low-dose aspirin reported a 10% improvement in 5-year survival after esophagectomy8. There may be additive effects when using beta-blockers and COX inhibitors concomitantly. Although it is currently unclear whether the anti-inflammatory and immunomodulatory effects of statins in the perioperative setting also affect cancer outcome, large studies showed reduced cancer-related mortality in patients on chronic statin treatment.9 Anesthetics modulate the immune system by affecting pain and inflammation, but they also directly modulate immune responses. For example, volatile anesthetics, ketamine and barbiturates are known to hamper NK cell activity significantly, while propofol has much less impact on these cells and rather elicits antiangiogenic effects.10 Importantly, even very low doses of ketamine (0.15 mg/kg) compromise NK cell activity.11 Local anesthetics improve pain control, reduce inflammation and mitigate the adrenergic stress response. Interestingly, local anesthetics may directly stimulate NK cells.12 Local anesthetics reduce tumor cell migration and increase apoptosis, and they also reduce activity of mesenchymal stem cells, which support tumor growth in many ways13. Neuraxial anesthetics specifically maintain a favourable balance of Th1/Th2 immune cells.14 Finally, it is important to maintain normothermia perioperatively. Hypothermia compromises the immune system and increases the risk of blood transfusions. A retrospective study found a decrease in overall survival of ovarian cancer patients with perioperative hypothermia (36°C).15 Red blood cell transfusions have been associated with reduced cancer-free survival in lung cancer patients16. A meta-analysis further suggests a relation between transfusions and cancer-free survival17. Irradiated or leukocyte-depleted red blood cells should be preferred, but may not completely avoid “tumorogenic” side-effects elicited by allogetic blood transfusions. Hyperglycemia may also have detrimental effects on the immune system and affect long-term outcomes in patients undergoing cancer surgery.

Does regional anesthesia and analgesia affect recurrence after cancer surgery?: So far, retrospective analyses suggest an association between regional anesthetic techniques and improved cancer outcomes (for esophageal, colorectal and ovarian cancer surgeries). Esadalyotis et al.18 found in a retrospective study reduced recurrence in breast cancer patients undergoing mastectomy when concomitantly treated with paravertebral analgesia compared with general anesthesia and opioids only. Cummings et al.19 used retrospective data from a large population (42,000) and found a significant improvement in 5-year survival in patients with epidural anesthesia when compared with general anesthesia alone. However, there are no data available from large-scale randomized control trials to date. It is believed widely that the opioid-sparing effect of regional anesthesia may be the clue to the reduced recurrence after regional anesthetic techniques. Fentanyl is able to impair NK cell function for up to 8 days in rats.7 Most opioids also enhance angiogenesis. However, current data are conflicting and finally there is an endogenous endorphin system, which cannot be entirely blocked for therapeutic reasons. Nonetheless, a single nucleotide polymorphism of the morphine receptor (A118G), which is associated with reduced analgesic response to morphine, also shows an improved survival in breast cancer patients20. On the other side, extended and high doses of opioids may suppress tumor growth, adhesion, migration and proliferation. Regional anesthesia reduces the release of stress hormones, which are known to promote tumor growth. In a rat model, general anesthesia supplemented with spinal analgesia decreased lung metastases after laparotomy21. Conclusions: Current literature suggests a reduced recurrence after regional anesthetic techniques compared to general anesthesia alone. However, this
knowledge is mainly based on retrospective analyses. There is clear experimental data linking local anesthetics to anti-tumor effects. But more translational and experimental investigations with regard to the effects of clinically used anesthetics and analogues on tumor biology and the human immune system are necessary. Only data from randomized controlled trials will be ultimately able to answer the burning questions in the novel field of "onco-anesthesia." 

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ESRAS Panel Discussion: Regional anaesthesia in special patients

RA WITH US IN OBESE PATIENTS

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Summary: In this review obesity is to be defined in context of recent development in surgery and its mortality and morbidity, specifically bariatric surgery. Recent publications related to ultrasound guided regional anaesthesia in obese are discussed: peripheral nerve blocks and catheters, central neuraxial, lumbar plexus as well as chronic pain interventions. Principles of ultrasound imaging and way to improve the picture quality in obese patients are explained. Finally examples of ultrasound images in morbidly obese patients are presented and discussed.

Introduction: Obesity has been defined as BMI (Body Mass Index) >30kg/m² and morbid obesity as twice ideal body weight. In XXI century in developed countries pandemic of obesity has been observed. More than 1.4 billion adults, 20 and older, were overweight. Overall, more than 10% of the world’s adult population was obese. Around 3.4 million adults die each year as a result of being overweight or obese. Culture of high calories fast food with decrease outdoor activities is about to blame. General mortality in obese population used to be twice as normal with increased risk of cardiac, pulmonary and metabolic complications.

More recently bariatric surgery has become popular and attractive showing rapid improvement in metabolic condition such diabetes mellitus and hypercholesterolemia even before measurable weight loss. National Bariatric Surgery Registry audit presented outcome after 8710 surgeries in the UK showing in hospital mortality 1:1000 and overall complications about 2.6%. 2 Overall 30 day mortality after elective procedures in the UK has been calculated as 6.7 per 1000 as presented by Aylin et al. 3 Obese patient is a challenge for an anaesthetist for both intraoperative and postoperative management. Beginning with pre-existing comorbidities such as sleep apnoea, pulmonary hypertension, heart failure, coronary artery disease, hypertension, diabetes mellitus through vascular access, difficult airway management, positioning to prevention of postoperative complications and adequate pain control. Regional anaesthesia solely or combined with general anaesthesia seems to be an attractive option in such demanding population both in avoiding general anaesthesia and reducing opioid consumption. However anatomical landmarks for regional anaesthesia are often of no use and even in expert hands failure rate is high. High Resolution Ultrasonography has become golden standard of regional anaesthesia over the last 20 years since the article by Kapral et al. 4 describing ultrasound guided supraclavicular brachial plexus in 1994. Wallace et al.
described indirect ultrasound guidance for epidural anaesthesia in obese pregnant patients back in 1992. Both papers have been a visionary work as resolution of ultrasound images were at the time very limited and enormous progress in this field has been made. PubMed search on 25.05.2014 using “obesity and ultrasound and regional anaesthesia” revealed 13 publications. Three were in last three years in human English. Six were related to proximal nerve blocks for TAP block (transversus abdominis plane block) in bariatric surgery, one to peripheral catheter insertion, chronic pain and central neuraxial respectively.

Peripheral nerve blocks - single shot and catheters: In pre-ultrasound era Franco et al. reviewed retrospectively 2020 nerve stimulator guided supravacular blocks performed in their institution between February 1996 and April 2003. 455 blocks (22.5%) were performed in obese patients (BMI>30). Overall success rate in this subgroup was 94.3%(P<0.01) comparing to 97.3% in the non-obese population.

Shroeder et al. analysed retrospectively 528 ultrasound guided interscalene block. They found that elevated BMI was associated with an increased time required for block performance, intra and post operative opioid administration, higher pain scores, as well as increased nausea and vomiting in PACU.

Shewmmer et al. assessed differences in success of ultrasound guided interscalene block between normal BMI < 25 and excessive weight BMI > 25. Identification of nerve structures in obese group required more time 5 (± 1 min) comparing to patient of normal weight 4 (± 1 min) and was found difficult in 3 small obese patients. US guided interscalene block was achieved in 80% overweight group respectively but difference were not statistically significant.

Mariano and Brodsky11 pulled out the data from 5 previously published randomised controlled trials comparing ultrasound and nerve stimulation guided perineural catheter insertion techniques. They identified 51 obese and 69 nonobese patients. All patients but one in non-obese group had successful catheter placement. 12 and 8 femoral catheters, 7 and 13 infrascapular, 8 and 12 interscalene, 24 and 36 popliteal in obese and nonobese group respectively.

Procedural time for catheter insertion were similar in both groups (4-15 min) and served as a primary outcome. There were no statistical differences in secondary outcomes such as block efficacy, procedure related pain, fluid leakage, vascular or catheter dislocation.

All above results should be interpreted cautiously. Firstly they present retrospective data with a bias of recording accuracy. Secondly criteria of primary and secondary outcome such as block effectiveness and procedure time or overall success differs among the studies. Thirdly they all come from centres of excellence experience with the techniques however different in local population needed to be considered. Lastly there might be difference in procedure performance depending on the nerve/plexus to be blocked (e.g. interscalene v. sciatic) and BMI with minimal difference around 30 to significant in patient with BMI 40 and more. Further study are needed especially in subpopulation with morbid obesity but up to date result suggest that both ultrasound and nerve stimulator guided technique are useful tool in nerve location for single shot and catheter insertion techniques. Combination of both and use of other surrogates like pressure monitoring and performing the block in awake or minimally sedated patient may further increase safety and efficacy.

TAP block in bariatric surgery: TAP block initially described as a landmark technique rapidly gained popularity once ultrasound become widely available in regional anaesthesia practice. TAP block established its place in multimodal pain management proving to be effective, safe, relatively simple and fast to perform. Krol e tal. retrospective study of 42 patients having laparoscopic bariatric surgery showed that post operative pain scores, as well as increased nausea and vomiting in PACU. Although author is a great advocate of US-guided lumbar plexus exclusively in obese population. Actual visualisation of lumbar plexus is often extremely difficult unless in expert hands (Moriggl) or paediatric, slim adult subjects. Nevertheless structures such as transverse process, psoas major, quadratus lumbarum, kidney, psoas minor, major vessels are usually identified in majority but most challenging cases. Ultrasound guidance should help to identify and avoid vital structures and insert needle between posterior third and anterior two-thirds of psoas muscle. Different techniques of needle trajectory have been described, author’s choice being out-of-plane in longitudinal scan allowing clearly visualize transverse processes, whole thickness of psoas muscle and kidney pole cranially. Combination of ultrasound and nerve stimulator for lumbar plexus block makes perfect sense especially in overweight population.

Chronic Pain Interventions: Ultrasound has brought a new dimension to intervention in pain management. Extraordinary work have been done in this field by Moriggl, Eichenberger, Greher, Siegenthaler , Curatallo and Narouze, Peng, Goedel on the other side of the pond. For Pain Clinician deeply localized targets like facet joints/medial branches, epidural, caudal, sacroiliac joints are of interest. Above structures can be accessed under ultrasound guidance but in very degenerative spine, in high BMI patients a combination with fluoroscopy will bring the best of both worlds. Author identified only one paper by Rach et al referring to ultrasound guided intervention in obese patients. Twenty patients BMI 39 (32-54) underwent 84 ultrasound guided medial branch blocks at L3, L4, L5 level. Final needle position was verified according to ISIS (International Spine Intervention Society). 52 out of 84 needles were positioned correctly, success rate of 62%. Therefore exclusive usage of ultrasound guidance for medial branch blocks in obese patient were discouraged. Although author is a great advocate of using ultrasound guided procedures in interventional pain practice, lumbar medial branches and facet joints are of least favour for a reason above as well as impracticality of multiple injections.

Ultrasound Conditions in Obesity: Ultrasound waves travel through tissues in different speed 1450m/s in fat, 1575 m/s in muscles and blood tissues, 2800m/s in bone and 380m/s in air. US waves are transmitted to deeper structures but at the cost of loss of acoustic energy – attenuation, transformed to heat, reduction of amplitude by acoustic shadow of speed differences of sound transmission, scattered whenever hitting small or irregular object of different acoustic impedance and the most important reflected back to the transducer as an echo. The intensity of reflected echo is proportional to the difference of acoustic impedance between two media sound wave travels through. Acoustic impedance in 1 (10^8) Rayls of bone, muscle, fat, lung and

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The wavelength and frequency are inversely related as per simple equation C = f x wavelength. The higher the frequency (short wavelength) the better resolution which is ability to distinguish one object from another. Logically the lower frequency (long wavelength) the less attenuation and the deeper the wave travel in same image ability to distinguish details. Pretransducer selection is the single most important factor in optimizing ultrasound image. High frequency transducers (8-13 MHz) are not able to reflect good image at depth more than 4-6 cm therefore in any case of target lying deeper as it is often in obese patients lower frequency transducer (5-8 MHz) or (2-5 MHz) should be used (22,23).

Is there anything else but depth in ultrasound imaging in obese people? Saranteas summarise other factors associated with fat tissue which may affect imaging quality. We already mentioned reflection caused by mismatch of acoustic impedance at the fat/muscle interfaces. Adipose tissues has apparently nonlinear relationship to frequency resulting in exaggerated attenuation. Due to uneven speed of sound in irregularly shaped adipose layers phase aberration occurs (24). Most recently Marksofer et al designed feasibility study to help more systematic, objective comparison of nerve structure. The visibility of nerve depends on interface with surrounding tissues as difference in acoustic impedance determine reflection and grey-scale histogram on US machine screen. They performed a prospective, comparative, blinded study to quantify nerve visibility differences in obese versus normal-weight patients. 40 female patients were included in the study, 20 in normal-weight group BMI 22(18-24) and 20 obese BMI 40(31-57). Median nerve at the mid-third of the forearm between the superficial and profound flexor digitum muscul and sciatic nerve at the mid-femoral level between the biceps femoris, semitendinosus/semimembranosus and adductor muscles were identified and assessed. The depth, circumference and cross sectional area (CSA) recorded. Not surprisingly both nerve were located deeper in obese group but nerve diameters and CSA were similar in both groups. Histogram grey-scale difference between median nerve and surrounding tissue in both group were similar whereas surrounding tissues around sciatic nerve displayed significant higher values in obese group making sciatic nerve significantly less visible. Although use the histogram grey-scale to quantify US picture has been described previously this is the first description addressed to peripheral nerve visibility. More studies in larger population are needed and other peripheral nerves assessed to determine if the observation are valid and trend maintained.

To optimize ultrasound pictures 3 main factors are to be taken into consideration. Patient, ultrasound system settings and the abilities of operator. The forth one would be needle visibility enhancement. The differences in patients population depending on BMI have been outlined already. Here some tips on pictures optimization. Transducer – The role of transducer has been highlighted already. For given probe range of frequency can be adjusted e.g. 2 to 5 MHz. Depth-Operator should be able to estimate the depth of the target to optimize the setting to visualize both the nerve and surrounding structures. Gain–determines how bright or dark the image appears. Increasing the gain amplifies signal produced by returning echo resulting in increased brightness of the whole image. Time Gain Compensation – is used to increase brightness of structures lying deeper to compensate attenuation which naturally occurs while sound waves travel. Focus- Focal zone is the boundary at which convergence of the beam ends and divergence begins. At this level lateral resolution , ability to distinguish two objects lying next to each other is at its best. Most of ultrasound systems used by anaesthetists have autofocus to simplify performance. Compound Imaging-Transducer emit ultrasound waves at different angles and then collected echoes are combined to produce a single higher quality image and reduce artefacts. Tissue Harmonic Imaging-is ability of transducer to selectively capture higher frequency echoes and in result produce better picture resolution and less artefacts such as phase aberration caused by fat tissue. Operator experience -Experience of an individual operator should not be underestimated. Pattern recognition and optimal angle is of paramount important due to nerve anisotropy. PART acronyms- Pressure, Alignment, Rotation , Time reflect the need of dynamic scanning and preprocedural identification of neighbour structures often prior target recognition. Needle visibility enhancement In and out of plane techniques are equally accepted and may be individual preference or dictated by procedure or anatomical conditions. Tissue movement and hydro location helps to localize the needle tip. Needle- beam angle – for shallow structures needle direction is almost perpendicular to US beam resulting in hydrodynamic reflection and almost mirror reflection occurs when needle is hold within 1 mm wide ultrasound beam. For deeper structures echogenic needle proved to make a difference.(26) Most recently radiofrequency echogenic needles has been evaluated by author. The size of the needle will also increase visibility but at the cost of patient discomfort if awake or lightly sedated. The newer ultrasound machines have various software’s such as beam steering and other navigation systems to reduce scattering and increase needle visibility. Operator has to be aware of the system capability to optimize image. Attached are few examples of commonly performed blocks of nerves and plexuses in male patient with BMI of 57

FIG 1. A. ESRA1-0643. Radial nerve at the distal humerus between brachioradialis and brachial muscle. B. Median nerve medial to brachial artery at the antecubital fossa. C. Ulnar nerve above medial epicondyle. Note that despite increased depth hyperechoic nerves are easy to distinguish from surrounding tissues. Ulnar nerve lying under the cushion of fat tissue might be most difficult to identity.


Conclusion Ultrasound guided blocks in obese population are undoubtedly challenging and often difficult reducing effectiveness in many cases. Benefits of regional anaesthesia in these group are even more prominent. Ultrasound with its limitations may often produce inferior imaging in obese population but may also make possible what would be otherwise not if rely only on anatomical landmarks or their lack. Combination with nerve stimulation and perhaps pressure

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monitoring may add extra help in both nerve localisation and avoidance of intemural injections in case of not clear differentiation between nerve and surrounding structures as often observed in obese population.

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ESRA1-0644
Refresher Course:
FROM ACUTE POSTOPERATIVE PAIN TO CHRONIC PAIN: HOW TO PREVENT?

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In Europe, the prevalence of chronic pain reaches 20% [1]. Trauma and surgery are reported as the cause of their pain by 15% of the patients who attend the pain clinics.

The definition of Persistent Post-Surgical Pain (PPSP) involves pain that develops after surgical intervention and lasts at least 2 months, other causes for the pain having been excluded (e.g. infection, recurrence of malignancy) as well as pain from a condition preceding the surgery [2] [3]. The first largest study aimed to assess the prevalence of PPSP in a general population reports a prevalence of 6.2 to 18.3% moderate to severe pain in the area of surgery to 3 to 36 months after the procedure [4]. The existence of PPSP in the pediatric population is also a recent concern. The first studies reveal an incidence of 13 to 22% at one year after surgery [5,6].

Since several years, the anesthesiologists are questioning the long-term effects of patients’ perioperative management and seriously considering their role in preventive medicine. The persistence of pain after a surgical procedure, a trauma or ICU stay has become a major focus of interest and its prevention now represents a challenge as an index of the quality of health care. Chronic pain is a complex problem, with a multifactorial etiology. Several studies have analysed the risk factors involved in the development of PPSP after various surgical procedures. Among the risk factors, the severity of acute postoperative pain and the presence of pre-operative pain at surgical site or elsewhere (co-
existing chronic pain condition) are the most cited predictive factors [7]. Recently, the role of psycho-social factors has also been highlighted e.g. anxiety, hypervigilance, catastrophizing. However, some patients presenting with severe acute pain will never develop persistent pain what supports the fact that individuals are not equal facing pain and that endogenous pain modulation may place people at less or more risk for severe acute and chronic pain. The mechanisms underlying the persistence of pain in some patients are not fully understood although a better understanding of the transition period would certainly help to better prevent PPSP [8]. The recent development in the field are in favor of moving from the traditional view of “risk factors” to that of “patient at risk”. Patients at risk should be targeted during the preoperative visit and then should benefit of tailored perioperative management.

Central nervous system sensitization participates to the acute pain experienced by the patient and is one of mechanisms underlying the maintenance of pain. For these reasons, the control of central sensitization has been and still remains a major target in the prevention of PPSP. Accordingly, the concept of preventive analgesia, a broader definition of preemptive analgesia, has been developed which involves any perioperative analgesic and antihyperalgesic treatments aimed to control central nervous system sensitization and to reduce the development of PPSP. In preventive analgesia, both the duration and the efficacy of the treatment are more important than the timing of administration of the drugs. Recent clinical studies have highlighted the fact that an optimal control of preoperative perioperative and postoperative pain is mandatory to the success of preventive analgesia. Modern perioperative analgesia and analgesia relies on the use of multimodal or balanced techniques which are aimed to reduce the intraoperative administration of opioids. The concept of opioid-sparing anesthesia and analgesia (even more, opioid-free anesthesia) is a major step in the prevention of PPSP [9]. Several pharmacological strategies besides their own effectiveness in reducing central sensitization process also reduce the development of PPSP by decreasing perioperative use of high doses of opioids and OIH e.g. antihyperalgesic drugs like ketamine and gabapentinoids, nitrous oxide, loco-regional analgesic techniques [10]. The extent and the duration of central sensitization, thereby its importance in pain chronification process may highly differ among individuals even after similar injury. Recent preliminary results show that, after limb amputation, prolonged and individualized (from 4 to 83 days) perineural infusion of local anesthetic allows to significantly reduce the incidence of phantom pain [11]. A clinical trial concerning limb amputation has recently highlighted the impact of an effective preoperative pain control on PPSP development [12].

Preoperative pain at the surgical site or elsewhere is often associated with PPSP. Preoperative pain itself may sensitize the central nervous system and preoperative analgesic treatments, specifically the chronic use of opioids, may also contribute to central sensitization. The resolution of acute postoperative pain of patients under preoperative opioid treatment is slower as demonstrated by the use of pain trajectories [13] and their longterm outcome is worse [14]. These findings reinforce the need to improve the perioperative management of the patients.

The nature of PPSP remains uncertain but with a predominant neuropathic origin [4], some procedures carrying higher risk. Neuropathic pain characteristics may appear very early after surgery and enhances acute pain severity. A recent study, using the iliac crest bone harvest model, suggested that both nerve lesion and central sensitization are involved in persistent neuropathic pain [15]. Patients who developed PPSP displayed higher acute pain intensity and neuropathic characteristics on DN4 questionnaire [15]. After total knee arthroplasty, patients with PPSP of neuropathic origin at three months had more severe acute pain as highlighted by postoperative pain trajectories [16]. The early use of adequate questionnaires aimed to diagnose a neuropathic component in postoperative pain (e.g. DN4) and the rapid optimization of postoperative analgesic treatments may improve patients’ rehabilitation process and perhaps might help to prevent the occurrence of PPSP [17].

Consequently, the anesthesiologists should pay a particular attention to patients’ evolution during the early recovery period. Accurate evaluation of the patient (e.g. neuropathic pain diagnosis) and rapid adaptation of analgesic treatment should be possible from the immediate postoperative period (during hospital stay) until weeks later (follow up in “transitional pain units”) [18].

References


ESRA1-0645

Symposium: Evidence of regional anaesthesia

EVIDENCE OF IMPACT OF RA IMMUNOMODULATION

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Investigations have shown that many of the analgesic, sedative, and anesthetic agents commonly used during surgery modify components of the immune response in vitro. The effects of the anesthetic and analgesic techniques, the anesthetic agents, as well as the modulation of the sympathetic system on the NKA, are involved in the metastatic process and sometimes have opposing actions.
Shaprio et al.\(^{(1)}\) demonstrated that anesthetic drugs such as ketamine, thiopental, halothane and nitrous oxide accelerated the progression of postoperative metastases of mouse tumors. Specifically the use of the above anesthetics for surgical excision of the local tumor, strongly hastened postoperative progression of spontaneous lung metastases caused by a lung carcinoma and a melanoma. Meanwhile, isoflurane in rats the effects of ketamine, thiopental, halothane and propofol on NKA and resistance to experimental metastasis. They also investigated possible mechanisms of action. It was found that all anesthetics except propofol significantly reduced NKA activity and increased lung tumor metastasis. Beta-adrenergic antagonists and chronic small doses of an immunostimulator decreased this effect.

It has been demonstrated that opioids affect Cell Mediated Immunity (CMI). It has been established that the exogenous opioids administered centrally or systemically, as well as the endogenous peptide β-endorphin can suppress CMI.\(^{(2)}\) Morphine and fentanyl cause inhibition of both cellular and humoral immune function in humans\(^{(3)}\) and animal models.\(^{(4)}\) Epidemiologic studies have indicated that patients who receive general anesthesia with opioids rather than local or regional anesthetics have a greater rate of cancer recurrence.\(^{(5)}\)

Belin et al.\(^{(6)}\) investigated NK cell cytotoxic activity in 40 patients undergoing major surgery who were randomised to either receive a high dose fentanyl anesthesia regimen, including midazolam as a single dose and isotonic saline if necessary, or low dose fentanyl, with isoflurane and nitrous oxide used for anesthetic maintenance. In vitro NKA was suppressed in all patients but high dose fentanyl resulted in a slower rate of recovery of NK cell activity (NKCA) compared to low dose.

Sacerdote et al.\(^{(7)}\) studied the effects of morphine and tramadol in patients undergoing ablominal surgery for uterine carcinoma. Phycotericulin induced T lymphocyte proliferation and NKA were evaluated. In the morphine group lymphoproliferative values were attenuated by surgical stress and stayed depressed after the administration of morphine whereas in the tramadol group these values came back to baseline after the administration of tramadol. NKA was increased by tramadol.

Gupta et al.\(^{(8)}\) demonstrated that morphine stimulates angiogenesis by activating proangiogenic signaling via Gq/Go-coupled G protein receptors and nitric oxide. In clinically relevant plasma concentrations, morphine stimulated human microvascular endothelial cell proliferation and promoted tumor neovascularization in a human breast tumor xenograft model in mice which led to the progression of the tumor.

Singleton et al.\(^{(9)}\) showed that opioid agonists in clinical concentrations transactivate the VEGF receptors, and that the opioid induced angiogenesis was blocked both by naloxone and the peripheral µ opioid receptor antagonist methylnaltrexone.

Subsequently, Lannon et al.\(^{(10)}\) published the results of their more recent study where the effect of overexpression of the µ-Opioid Receptor (MOR), on lung cancer progression was examined. The authors tested their hypothesis in vitro (H358 human NSCLC cells) and in vivo (human lung cancer xenograft models/mouse model). They demonstrated that MOR1 overexpression in H358 human NSCLC cells increased proliferation, migration, invasion, transendothelial migration, and activation of two serine/threonine kinases implicated in cancer progression, Akt and mTOR. In addition, the same effect of increased tumor growth and lung metastasis was observed in human NSCLC xenografts. The authors suggested that these results may provide a plausible explanation for the differences in recurrence rates observed in different contexts.\(^{(10,11-13)}\)

**References**


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associated with fewer side-effects, fewer hospital admissions and shorter hospital stay. Patients acceptance of interscalene block was investigated by Tetzlaff et al.5 in patients willing to receive regional anesthesia who had previous shoulder surgery under general anesthesia. Patients were surveyed on the first postoperative day and all preferred interscalene block. The placement of the block was tolerable, gave better pain control in the recovery room and less nausea and vomiting compared to their previous experience with general anesthesia.

The interscalene catheter has greatly progressed the management of postoperative pain therapy after major open shoulder surgery. Indeed, studies have shown that a continuous infusion of local anesthetics through an interscalene catheter as compared to traditional PCA with opioids, provides significantly better control of pain, with statistically lower incidence of side-effects and greater patient’s satisfaction.5,7 The interscalene catheter is indicated in almost all open shoulder surgeries, rotator cuff repair being the main indication. According to the type of surgery performed, the catheter may be used for 3–5 days.

Due to the richly innervated pericentral structures (particularly with nociceptors), postoperative pain is not only severe during movement, but also at rest, making a bolus technique alone inadequate in this context (Singelyn et al.6). Continuous infusion of 0.125% bupivacaine at a rate of 0.125 ml/kg per hour has been shown to provide efficient pain relief, but requires a large volume of local anesthetic.7 Moreover, a simple continuous infusion may not be the best method for this purpose, as the pain is dynamic; moderate to severe at rest becoming severe to very severe during movement. The use of a continuous infusion with supplemental bolus to be is more appropriate.

The PCA technique with a basal infusion and supplemental bolus is the most appropriate technique for analgesia after major open shoulder surgery. The use of ropivacaine as compared to bupivacaine seems to have some advantages in terms of better sensorimotor dissociation.8 Ropivacaine 0.2% appears to be adequate for most patients, but has to be increased up to 0.3% or 0.4% in some others, particularly young, athletic patients (unpublished data).

The optimal use of interscalene block (single-shot and catheter technique) requires close team work between the surgeon and the anesthetist in order to provide the best operating conditions for the surgeon and to avoid any painful, unpleasant events for the patient.

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Electrophysiology of peripheral nerve stimulator: Prior to the middle of 19th century, nerve fiber conduction was thought to be instantaneous. In 1850 von Helmholtz1, in a classic series of experiments with an isolated nerve muscle preparation, demonstrated the temporal nature of nerve fiber conduction and paved the way for the elucidation of most relevant physiology of peripheral nerve stimulation. Of particular importance is the relationship between the strength and the duration of the current and the polarity of the stimulus.

There is a threshold stimulus that must be applied to a nerve fiber to cause it to propagate a nerve impulse. Below this threshold no impulse is propagated; above this threshold no increase is produced in the impulse. If a square pulse of current is used to stimulate the nerve, the total charge applied to the nerve is the product of the current (strength) and the length of the pulse (duration).

The relationship between the strength and the duration of the charge needed to stimulate a nerve can be expressed by the familiar strength duration curve. The rheobase is the minimum current required to stimulate the nerve with a long pulse width while the chronaxie is the duration of stimulus required to just stimulate at twice the rheobase (in general, strength duration curves follow the formula, I = I0(1+C/T)). Where I is the current required, I0 is the rheobase, C is the chronaxie, and T is the duration of stimulus. Thus, the current needed to stimulate a nerve will depend on the pulse width or duration of the stimulus. The chronaxie can be used as a measure of the threshold for any particular nerve and is useful when comparing different nerves or nerve fiber types. It will be noted that smaller unmyelinated fibers have large chronaxies. This supports the observation that the larger the fiber, the easier it is to stimulate at any given distance.8 Thus, it is possible to stimulate the large A alpha motor fibers without stimulating the smaller A delta or C fibers for pain. In practical terms, this means that a mixed peripheral nerve can be located by a twitch in the muscles it supplies without causing pain.

Desirable Characteristics of Nerve Stimulators: The device should have a constant current output. This implies that the stimulator should have a high internal resistance. Since it is a particular current (not voltage) that will stimulate nerve, it is important that the current should not vary with changes in resistance of the external circuit. The resistance of tissues, needles, connectors, et., when using a nerve stimulator, may vary from 1 k Ohm to 20 k Ohm. For a constant voltage instrument, this change in resistance could cause a 20-fold change in the current delivered, easily the difference between a painful and nonpainful stimulus.

The current delivered should be displayed on a clear reading meter, preferably digital. The importance of this is emphasized below, but, from the foregoing discussion, it will be appreciated that with the stimulating needle on the nerve only a very small current (in the region of 0.5mA) will be needed to stimulate the nerve. Knowledge of this is vital for accurate location. Older nerve stimulators without meters cannot be recommended.

The device should have an easily moved variable output control with a linear scale. This means that if the dial is turned to 50%, the output should be 50% of maximum. The polarity of the leads should be clearly marked. It is not enough to color the leads or to label them positive and negative as few practitioners are aware of the importance of attaching the negative to the needle. Furthermore, as the negative is conventionally colored black, common sense might suggest that this should be attached to the ground, which is incorrect. The matter could be further complicated by manufacturers compensating for this and thus reversing their color coding. The answer is for the negative end of the electrode to be clearly marked “needle” and the positive end of the electrode to be marked “ground”.

The pulse width should be short; 50-100μsec pulse is ideal. This corresponds to the chronaxies of A delta fibers in mammalian mixed peripheral nerves. The importance of this is emphasized by re-examining the strength duration curves. The reciprocal of the duration is used to obtain a straight line. It can be seen that with a pulse width of 40μsec, the change in stimulation strength as the needle moves from 1 cm away to the nerve is tenfold. If the pulse width is increased to 1ms, the change is only double. Notice that the change in required current is minimal for all pulse widths with the needle on the nerve. Since the current is being read continuously off a meter, the shorter pulse width will provide better discrimination of the distance between needle and nerve. Although a shorter pulse requires a greater current when distant from the nerve than a longer pulse, the actual change delivered is less because the time for which the current flows is much shorter.

The device should have both high and low outputs. This is especially important if the instrument is also used for monitoring neuromuscular block where the high currents required are best provided by a separate output. The optimal frequency is 0.5 – 2 Hz.
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Panel Discussion: Cancer pain
TOTALLY IMPLANTED DRUG DELIVERY SYSTEMS
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Intrathecal drug delivery (ITDD) represents a technique able to provide sat-
sisfactory analgesia by continuous infusion of drugs into the cerebrospinal fluid
(CSF). The technique is based on the concept that the drug, by direct delivery
into the CSF within the intrathecal space, avoids crossing the blood-brain barrier
and therefore it is possible to use a dosage lower than oral, intravenous, transder-
mal or epidural administration. A further advantage of administering the drug
directly into the CSF involves the possibility of using small doses capable of
binding to the specific receptors, with a consequent reduction in systemic side
effects and a more rapid and effective response.

There are many receptors at the level of the spinal cord that can be used for
the management of pain: opioid receptors (mu, kappa and delta), GABA, alpha-
2, dopaminergic and NMDA receptors, as well as sodium and calcium channels.

Pain is often regarded as the most feared symptom among cancer patients and
may present itself as acute or chronic. In addition, the worsening of the disease
can result in pain worsening. In patients suffering from chronic cancer com-
plaining of intolerable side effects as a result of their current therapeutic options,
intrathecal analgesia has become a technique of choice whereas all other treat-
ment options have been exhausted. Some studies have suggested that ITDD is ef-
ficacious in providing pain relief in 60-80% of patients with chronic cancer pain.

It is common opinion that, before implanting a patient with an intrathecal
pump, it could be useful a trial test as it could simulate the system which is
then implanted. Recently, the group of experts of Polyanaleticis Conference
2012 considered the trial questionable in the case of patients with cancer
pain. In fact they supposed that a trial (single-shot or continuous infusion for 72-
96 hours) can hardly predict an OIH or pain modification in the event of cancer
pain. In fact they supposed that a trial (single-shot or continuous infusion for 72-
96 hours) can hardly predict an OIH or pain modification in the event of cancer
pain progression.

There are numerous options for intrathecal administration ranging from ex-
ternal catheter connected to an external pump to a fully implanted system.

The choice of device depends on several factors, including life expectancy, cost,
professional skills, patient’s wishes and level of comfort. Intrathecal pumps are suit-
able for long term use as patient’s daily life is not limited by these systems.

Patients will obviously need for subsequent assessments provided by a specialist
who can appear at any time during the course of the disease. Very frequently pain
is also the first sign of cancer; pain is also associated with cancer treatment, and
may present itself as acute or chronic. In addition, the worsening of the disease
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Implantation of a SCS system is performed in two stages. Infection during the wrong type of equipment or without basic safety precautions, if the operator has insufficient training and/or hand skills, serious complications may still occur, mainly with the use of epidural blockade (12,13). Furthermore, there is always the risk of experiencing very rare complications that will not be adequately identified in large-scale studies.

References

and other neuropathic and visceral pain syndromes. In recent months we have published the results of a pain registry that lends further support to the use of SCS in the cervical spine to treat diseases of the head, neck and upper extremities. A recent consensus group, the Neuromodulation Appropriateness Consensus Conference (NACC), has commented on proper uses of SCS for neuropathic pain, vascular diseases and angina. The NACC has also published on contraindications and improving safety. These papers will be an important guide for patient safety going forward.

SPINAL CORD STIMULATION: THE PROCEDURE GENERAL PRINCIPLES: After appropriate patient selection and education the patient should undergo preoperative evaluation for perioperative risks. Once cleared for trialing, the patient should be interviewed by the anesthesiologists and stabilized. Preoperative antibiotics are based on local pathogens and susceptibilities. Most common antibiotics include intravenous vancomycin or a third generation cephalosporin preoperatively, bacitracin or kanamycin intraoperatively. Intraoperative prepping and draping should be broad and extend well beyond the surgical field. Positioning should facilitate surgical technique and patient safety and comfort.

IMPLANT METHOD: The use of a percutaneous lead or surgical paddle lead is at the discretion of the implanting physician. Percutaneous leads are introduced in a less invasive and less dangerous method so are usually preferable, but in some cases such as those with complex spinal disease, extensive scar tissue, or primary axial back pain a paddle lead may be a better choice. In those who obtain a percutaneous lead, whether using a cylindrical lead or new paddle constructs, a needle must be placed appropriately prior to delivering the device.

NEEDLE PLACEMENT: Prior to implanting a device physicians should consider planning the needle placement including the level of entry, the side of entry and the angle. In the lumbar spine needles are usually placed into the epidural space at 30 to 45 degrees. A paramedian approach is preferred, with a skin entry site one and half to two levels below the desired entry space. The needle entry into the epidural space should be two to three levels below the final lead target. In the cervical spine the needle entry should be below the C7 vertebral level.

LEAD PLACEMENT: Lead placement has evolved in recent years. Classically the lead is placed into the posterior epidural space and confirmed on AP and lateral fluoroscopy. The targets are noted in the tables below. New clinical practice has shown the addition of leads in the paravertebral adipose tissues in the areas of pain to the epidural leads may lead to improved coverage through a process referred to as triangulation. This use of both epidural leads and subcutaneous leads may create a more wide spread parasthesia and capture pain relief in areas that are difficult to obtain with class epidural leads alone. Two major companies in the neuromodulation space have begun work with the FDA to evaluate this method of treatment. The use of new waveforms and new targets may lead to a reduced need for this hybrid type of implant.

EPIDURAL LEAD TARGET: The physician should understand the target for the lead to achieve proper stimulation. Table 1 provides general targets for spinal cord stimulation.

LEAD PROGRAMMING: The field of stimulation or the array is influenced by the number of the cathode (negative) and anode (positive) electrodes and the orientation of each contact. Current is driven into the neural tissue based on the presence of a cathode. The optimal current delivery occurs when a cathode is surrounded or “guarded” by an anode on each side. New lead arrays have been developed using percutaneous, percutaneous paddle and paddle leads. Cross talk between leads, program cycling and isolated electrode programs may impact the outcomes. Programming for DRG, Burst and HF 10 requires a new skill set and physician and nurse training to these new methods will be important.

TABLE 1. Lead Placement for Anatomical Stimulation

<table>
<thead>
<tr>
<th>Region</th>
<th>Position</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>C2-Lateral</td>
<td>Mandible, Neck, Shoulder</td>
</tr>
<tr>
<td>C2-3</td>
<td>Shoulder, Arm</td>
<td></td>
</tr>
<tr>
<td>T4-6</td>
<td>Arm, Hand</td>
<td></td>
</tr>
<tr>
<td>C7-T2</td>
<td>Anterior Shoulder, Chest</td>
<td></td>
</tr>
<tr>
<td>Thoracic</td>
<td>T3-T6</td>
<td>Abdominal, Thoracic, Visceral Organs</td>
</tr>
<tr>
<td>Thoracic</td>
<td>T1-3</td>
<td>Abdominal, Thoracic, Visceral Organs</td>
</tr>
<tr>
<td>Thoracic</td>
<td>T4-6</td>
<td>Abdominal, Thoracic, Visceral Organs</td>
</tr>
<tr>
<td>Thoracic</td>
<td>T7-9</td>
<td>Visceral Abdomen</td>
</tr>
<tr>
<td>Thoracic</td>
<td>T10</td>
<td>Axial Back</td>
</tr>
<tr>
<td>Lumbar</td>
<td>L1</td>
<td>Knee, Hip</td>
</tr>
<tr>
<td>Lumbar</td>
<td>L1-2</td>
<td>Leg, Foot</td>
</tr>
<tr>
<td>Lumbar</td>
<td>L5-S1</td>
<td>Foot, Possible Pelvic Organs</td>
</tr>
<tr>
<td>Sacral</td>
<td>S2-4</td>
<td>Pelvis, Rectum, Perineum</td>
</tr>
</tbody>
</table>
perception. This dissociation may lead to improved function and reduction of other treatments including opioids.

CONDITIONAL APPROVAL OF MRI: Recently, MRI approval has been achieved by one manufacturer. This MRI is conditional and requires certain limitations. In patients where an MRI is permissible such as those with Multiple Sclerosis, prior lesions in growing tumors, this may be the best selection. The implanting doctor must compare the features of each manufacturer and determine the risk versus benefit of implanting the MRI compatible device versus a device that may be more optimal for the patient’s disease or pain pattern. Additional work is ongoing by all device makers to eventually obtain an overall inclusive approval for generators and leads that are implanted.

PERCUTANEOUS PADDLE DELIVERY: The choice of delivering a cylindrical lead via a needle approach or a paddle lead via a laminotomy open approach has been complicated based on the risk to benefit ratio. In many cases, a paddle lead has been placed although only a small capacity of the lead has been needed. A need to deliver a more efficient lead via a percutaneous approach has been present for some time. In the past several months the approval of a percutaneous sheath to delivery a small streamlined efficient unidirectional lead has changed this equation. Now the ability to place one or two paddles without a laminectomy is available to the nonsurgical implanter. The use of hybrid systems with both paddle and percutaneous leads has recently been presented as an option for patients who suffer from both limb and axial pain. The availability of percutaneous paddle leads does not totally alleviate the need for surgically placed paddle leads. The complex paddles with multiple columns are needed in some patients who have failed percutaneous attempts at stimulation, or require a complicated revision, or who have anatomical spinal challenges. When placing a paddle lead via a percutaneous approach the needle angle and use of a paramedian approach are important. These techniques allow for proper placement of the guidewire to direct the sheath which is placed via the Seldinger technique. The sheath is used to pass the paddle lead to the target. Recent publications have suggested both favorable safety data, and good initial efficacy data.

Recent work on an expandable paddle lead that would allow for greater spinal coverage is ongoing and in development. This next generation percutaneous paddle lead would further reduce the need for a laminectomy based paddle leads.

MOTION SENSING AND ADAPTATION: When a lead is placed in the epidural space, it is used to deliver current to the spinal cord and neural structures. The spinal cord moves in the cerebral spinal fluid as the patient changes positions. In a small number of patients this movement of the cord causes difficulty in achieving reliable stimulation. There have been some methods to achieve a reduction in this variability. Options include increased hardware to further occupy the space such as paddle leads, or complex arrays, or new technology. A new method of adapting the device to motion has FDA approval and involves an implanted motion sensor that changes stimulation with variance in the patient’s body position. This implant is a part of the normal programmable device, and does not change the technique or size. The role in satisfaction with this device appears quite good, but we have not seen improvements in efficacy or function in any current studies. New devices appear to have the same impact without using motion sensing. DRG-SCS has no positional effect because of the lack of cerebral spinal fluid around the target. HF 10 and Burst waveforms are not impacted by positional changes. This appears to involve a mechanism of action that does not produce a paraesthesia.

FUTURE ADVANCES: New advances in wireless energy delivery, upgradeable devices, new waveforms, and technology that will allow for micro devices to deliver electrical current to modify disease states in the next generation of neuromodulation.

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ESRA1-0653

Symposium: Intrathecal Drug Delivery Systems: Pharmacology of Drug Dosing

PHARMACOLOGY OF INTRATHECAL DRUG DELIVERY IN THE SPINAL CORD

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Introduction: The use of intrathecal drug delivery is not a new concept. Initially cocaine, an amide, was used to produce surgical anesthesia. The subject of the initial spinal cocaine injection experienced profound sensory loss, and subsequently became the first person to have a complication when he had a post dural puncture headache. Since that time, the use of intrathecal medication was largely in the wheelchair of anesthesiology until the last sixty years when the first work was done on continuous implantable infusion systems. These devices could be done by placing a port and attaching an infusion, or by a totally implantable device. The initial drugs chosen were morphine and baclofen and both were found to have a profoundly different pharmacological impact when delivered intrathecally as compared to alternative routes. This lecture will look at what the intrathecal dosing route has to offer from a unique perspective and will also examine the finer points and issues surrounding dosing in the cerebral spinal space.

Why the Intrathecal Route: The equianalgesic dose of the intrathecal route for many pain-relieving drugs is significantly lower than any other route. For opioids this difference can be significant because of the ability to bypass the need for gastric or mucosal uptake and the ability to avoid issues surrounding the blood brain barrier. For other agents such as nicotomide the mechanism of action requires direct action into the cerebral spinal fluid and the intrathecal
route is the only option for pain treatment. Many other agents can be given intrathecally, but the ability to produce analgesia remains in question. This holds true for gabapentin and octreotide among others.

**Dose the Drug Matter: A Review of the PACC Drug Algorithm:** The Polyanalgesic Consensus Conference (PACC) has met intermittently as coordinated by the International Neuromodulation Society since 1996 and determined the proper algorithm for intrathecal drug delivery based on neurotoxicity, safety, and efficacy. The panel did initially address drug dosing and the impact of dose in the past few sessions and the latest iteration in 2012 gave specific dosing recommendations for drugs in the first three lines of therapy. This lecture will examine those recommendations and the impact it may have on improved patient care.

In addition to looking at single agents and ideal dosing, the PACC also discusses admixtures and the potential of opioid sparing with the addition of other drug classifications. Potential nonopioid drugs used in this setting include bupivacaine and clonidine.

**How Much is Too Much or Too Little?:** The occurrence of intrathecal granuloma has a direct correlation to high concentration opioid delivery via the intrathecal route. This has an indirect impact from dosing of the opioids such as morphine. A high dose of morphine for example, often leads the physicians to increase the concentration of the drug and thus can increase the likelihood of granuloma. The theory of “micro dosing”, which is ill defined, suggests using a very small dose of opioid may prevent this impact as well as other problems, but no prospective study has shown this to be an effective strategy. Highly lipophilic opioids such as fentanyl have not shown the same issue with granuloma formation even at higher doses and concentrations, but this issue is not well understood.

The impact of patient controlled dosing on both efficacy and satisfaction appears to be significant based on early research. Another goal of patient controlled analgesia is to keep the basal dose low and reduce the risk of hormonal dysfunction and granuloma.

Among the nonopioid analgesics, the response to ziconotide is very sensitive to dosing. In low doses and small incremental changes the toxicity of the drug can be limited and the efficacy can be slowly dialed up to be clinically relevant.

**To Bolus or Not to Bolus?:** Recent work by Deer, Pope, and McRoberts has suggested that some drugs may be better tolerated if the dosing is given in a bolus format as opposed to continuous high dose infusion. This has been true for ziconotide in particular and the recent work on this issue will be discussed. This research has been submitted to Neuromodulation and the review is pending.

**Does the Flow Pattern Matter?:** There has been some suggestion in basic science work by Yaksh and others that the flow pattern produced by a rotor pump may have an impact on granuloma formation as opposed to a valve based mechanism. This work is theoretical and clinical support of this theory is lacking, but it is an interesting concept by a respected research lab. We will discuss this theory and view video of the patterns in real time.

**Patient Controlled Analgesia or Side Effect Altering Delivery:** In the context of this dosing discussion there are several factors that we have found to be important. These include the total dose delivered, the impact of patient controlled delivery, the impact of programmed boluses, the use of microdosing, and the potential of the increased efficacy of the intrathecal route which overall allows for a minimal dose as compared to other routes. This discussion will summarize the current knowledge surrounding these issues and lead to a final discussion of future innovations to improve care.

**What Are Key Future Concepts in Drug Dosing?:** The key factor we are missing in the field of intrathecal drug delivery is the ideal drug. That agent would be used in low doses with minimal concentrations, have no evidence of neurotoxicity and have a very large therapeutic window. Until that research lends us to a better solution for our patients we will continue to search for the best ideas surrounding drug dosing and pharmacology. We will close this discussion by looking at some of these concepts.

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Symposium: Neuropathic radicular pain. Just discogenic?

SPINAL MAPPING AND NEUROMODULATION OF THE DRG

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I. Introduction: This is a workshop on trouble shooting for the Nurse or Assistant working with a physician in the setting of an intrathecal system that is not working ideally. In particular we will discuss the patient with a mixed pain syndrome and progressive loss of efficacy.

II. Patient Vignette: “Gill” is a 56 year old female with severe pain in the back and leg secondary to two chronic conditions. She initially had a traumatic ankle fracture that led to a non-union of the bone. This progressed to a diagnosis of Complex Regional Pain Syndrome (CRPS) and severe pain and disability.

She was initially treated with multiple oral medications, physical medicine and psychology. Unfortunately, her response to each of these interventions was temporary and she underwent a series of lumbar sympathetic nerve blocks that gave her temporary improvement. At this time the options discussed included surgical sympatheticotomy and amputation. She felt both of these options were unacceptable and sought a second opinion.

She was evaluated and found to be an excellent candidate for a spinal cord stimulation system. A conventional device was placed and stimulation was achieved, but unfortunately did not obtain relief or stimulation to her foot. Her leg pain was reduced by 70%, but her foot pain was only improved 10%. Since the majority of her pain was in the foot the trial was considered a failure. The patient then was trialed with intrathecal morphine. Her response to oral opioids had been positive, but she had complications of fatigue, severe constipation, and lethargy. The trial gave her 80% pain reduction and no side effects at a daily dose of 0.5 mgs per day. She was consented for a permanent Intrathecal Drug Delivery System (IDDS).

After implant she did well for some time but developed progress back pain and the response to IDDS of her CRPS dissipated over time. Her back pain was rated at an 8/10 on the Visual analog scale (VAS) and her leg pain was rated at a 9/10. Her daily morphine dose had risen to 8.6 mgs per day over 18 months and her concentration was at 30mgs/cc. The patient returns after an extensive work up of her back pain. She has been diagnosed with multi-level degenerative disc disease L3-4, L4-5, and L5-S1. The spine consultant did not recommend surgery because of the extent of the disease. She had no evidence of significant foraminal stenosis.

III. Options for Managing this Case: The purpose of this session is to explore options to recapture a good outcome in this complex patient. We will discuss options and determine the feasibility of each possibility.

A. Trouble shooting the device.
   a. It is important to evaluate the catheter for patency, and the possibility of granuloma.
   b. It is important to evaluate the pump for device failure rotor malfunction, motor stall, and end of life for the battery.

B. Increasing or changing her intrathecal opioid.
   a. A simple option would be to continue to increase the dose of the opioid. Risks are increased over time for hormonal issues and granuloma with solo agent high dose and high concentration therapy.
   b. A rotation to a different opioid is an option. Based on the recommended algorithm the best options would be hydromorphone or fentanyl.

C. Adding an adjuvant drug.
   a. Bupivacaine: Deer and colleagues showed bupivacaine to be opioid sparing and to be efficacious in reducing pain in those failing opioid alone.
   b. Clonidine: Clonidine has been shown to help with neuropathic pain in some settings and when combined with opioid could be helpful in treating mixed pain syndromes.

D. Weaning from morphine and starting monotherapy with ziconotide.
   a. Ziconotide can be used as an adjuvant to improve pain with an opioid combination.
   b. Monotherapy with ziconotide has more support in the literature and in many cases has been shown to treat both neuropathic and nociceptive pain. A slow titration is important to alleviate side effects. If is contraindicated in those with a history of active psychosis.

E. Spinal Cord Stimulation
   a. The patient failed conventional SCS of the dorsal columns but the therapy has evolved significantly since he time of the failed trial. Many patients who failed SCS in the past are moved on to high dose oral opioids or intrathecal drug delivery. In many cases the use of IDDS is the appropriate treatment option, but in those who are failing IDDS the implanting physician should reconsider new options with SCS.
   b. High Frequency SCS with 10kHz. Work in Europe and Australia has shown that High Frequency at 10 KHz can be successful in both axial low back pain and neuropathic limb pain. The lack of parasthesia is very attractive to those who failed SCS because they didn’t like the feeling of the “tingling” in their limb.
   c. Burst Stimulation. DeRidder and colleagues described using burst of 500 Hz to produce a parasthesia free pattern that has been shown to be successful in many patients who did not like conventional SCS. The ability to rotate the patient between conventional and burst patterns may be very attractive to the patient who has mixed pain syndromes.
   d. Dorsal Root Ganglion-SCS. The use of stimulation in the epidural space at the DRG target has shown very good results in many patients who often fail with conventional SCS. The use of DRG-SCS to achieve stimulation in the foot has been very successful at L4 and L5. The use of DRG-SCS to achieve low back SCS has also shown success at treating the axial low back at L2.

IV. Conclusions: In the past we accepted “failure” of a pump when someone quit responding to intrathecal opioids. In those patients the dose was often pushed to high levels and the response remained poor. This trouble shooting session will examine the new paradigm in patient care and new methods of improving quality of life in the suffering.

V. References:


ESRA1-0655
Symposium: Modern labour analgesia
POSTPARTUM HEMORRHAGE
Le Gouez A.1, Mercier E.J.1 1Department of Anesthesia, A. Beclere hospital - APHP and University of Paris-Sud, Clamart, France.
Post partum hemorrhage (PPH) is defined as a blood loss of more than 500 ml within 24 hours of delivery and affects about 5% of deliveries. However, any abnormal bleeding (in rate and/or in duration) should trigger at once the diagnosis of hemorrhage. PPH remains the first cause of maternal mortality worldwide, including France [1, 2]. In addition, complications of PPH are often avoidable and therefore there is still a great need to improve the management of PPH.

The cornerstone of PPH management is a coordinated, multidisciplinary approach with written protocols implemented in every maternity. These protocols should be based upon national and international recommendations plus a good knowledge of pathophysiology, etiology and treatments available.

The 3 most frequent etiologies are uterine atony in the first place (50%-60%), followed by placental retention and vaginal/cervical traumas. Risk factors for uterine atony are multiple pregnancies, hydramnios, macrosomia, chorioamnionitis, prolonged labor, preeclampsia, non contractile uterus due to prolonged use of tocolytics or volatile anesthetics. However in half of the cases at least, no significant risk factor is found. This is why every maternity unit needs to be prepared to manage PPH cases. Placental retention must be systematically checked by uterine revision under anesthesia, even if inspection of the placenta suggests no retained products of conception, as it may lead to uterine atony. Cervical/ vaginal lacerations (>10% of cases) are more likely to occur after instrumental extraction, fetal macrosomia, or quick labor and delivery before full cervical dilation. Diagnosis is made by performing a thorough examination of the cervix and the vagina with appropriate valves and thus it requires an optimal analgesia/anesthesia [3]. Severe PPH can also result from rarer antepartum causes such as a uterine rupture, a placenta abruptio, an iatrogenic uterine inversion (~1/1000) or from a placenta accreta or an amniotic fluid embolism. Finally, coagulation disorders (congenital or acquired) can be a cause or a consequence of PPH. Three tricks must be highlighted and well known: a) the bleeding can be concealed in the vaginal wall or pelvis, b) epistomy can also lead to significant bleeding if not quickly repaired and c) multiple causes can be involved simultaneously.

Initial basic treatment is based on bladder emptying and oxytocin (10-20 IU) (catherine massage), manual removal of the placenta and manual uterine exploration to address systematically the 2 etiologies more frequently involved (unless another rarer specific etiology is obvious). When these measures are not quickly effective, cervical/vaginal lacerations must be searched for. In the French PPH guidelines, the next (i.e., second) step relies on prostaglandin administration with i.v. PGE2 sulprostone and should be implemented no later than 30 minutes after initial PPH diagnosis, if the first step has proven ineffective to stop the bleeding [4]. Alternatively, i.m. 15-Methyl PGF2α-alpha carboxprost is used in other high-income countries and oral/rectal PGF1α misoprostol in low-income countries (it is likely less effective but very cheap, easy to store and to administrate). Intra-uterine balloon tamponade (using for example the “Bakri” balloon) can also be very useful.

The next step is based on invasive therapy, either surgical artery ligation ± uterine compression sutures, or radiologic embolization, depending on clinical situation, resources available and the experience of the physician involved. In most countries, it is called “second-line therapy” whereas in the French guidelines, it is named as third step of PPH management with the aim of being activated no later than 30 minutes after the second step (i.e., continuous IV sulprostone) has also failed to stop the bleeding.

In case of failure, the use of rFVIIa (60 ± 90 µg/kg) can be considered but should not delay significantly emergency peripartum hysterectomy.

Resuscitation, monitoring and analgesia/anesthesia are provided by the anesthetic team at each step. A transfusion strategy with aggressive resuscitation is crucial in PPH management with three goals: replacement of blood loss, maintenance of tissue oxygenation and correction of associated coagulopathy. Transfusion should be initiated with red blood cells (RBCs) in all obstetric patients with signs of inadequate oxygen carrying capacity and in most obstetric patients with hemoglobin < 8.9 g/dL and ongoing bleeding.

If hemorrhage is severe at once and/or accompanied by coagulation disorders, 15-20 ml/kg of fresh frozen plasma (FFP) should be given and target hemoglobin for RBCs transfusion should be set higher, around 8 g/dL, to improve overall coagulation activity [5]. Transfusion of platelet concentrates is recommended to treat active bleeding associated with thrombocytopenia below 50 G.L.~1. During massive hemorrhage a FFP:RBC ratio of 1:1 is recommended; in addition, an earlier use of platelet concentrates is advocated regardless of platelets count, as it has been shown to be associated with a decrease in mortality rate (during severe bleeding in non-obstetric trauma setting).

The use of point-of-care devices like thromboelastometry (ROTEM®) or thromboelastography (TEG®), when available, helps tailoring coagulation factors transfusion to individual needs.

Fibrinogen concentrate infusion is more and more advocated as first-line treatment (i.e., prior to FFP and RBC transfusion) to maintain fibrinogen plasma level above 2g/L [5]. Fibrinogen plasma level, at onset of PPH and at the 4th hour is the only independent hemostatic parameter associated with a severe PPH evolution [6]. Fibrinogen concentrate has an immediate effect for a small volume infused and a short preparation time. Indeed, contrarily to FFP or cryoprecipitate, it does not require blood typing nor thawing prior to infusion. It is also much safer, due to the manufacturing process (pasteurization + nanofiltration), and devoid of all known encapsulated and non-encapsulated viruses [7].

Tranexamic acid (TXA) appears to reduce bleeding, PPH duration, PPH incidence and amount of blood products transfused [8, 9]. An initial dose of 1 g IV is usually recommended in PPH resistant to basic management (i.e., when prostaglandin treatment is implemented). It can be followed by 1g over 8 hours as validated in trauma setting; alternatively, we use a continuous infusion of 0.5 g/h, with a maximum total dose of 3 g.

In massive bleeding, adequate intravenous access is mandatory; this may include an echography-guided central venous large-bore multiple line placement, when needed. The use of both a heated rapid transfusion device and a skin-warming device helps preventing hemothermic-induced coagulopathy and hypo-volemic-induced acidemia. Intra-operative cell salvage can be now considered in unexpected PPH or in high-risk patients such as those with placenta praevia/accreta, massive fibroids, or rare blood type and/or unusual antibodies. An arterial (radial or femoral) line allows precise and beat-to-beat blood pressure measurement and facilitates blood sampling for laboratory evaluation; it can be used also to adjust vasopressor therapy (norepinephrine) at minimal rate in addition to fluid and transfusion therapy when needed, to maintain mean arterial pressure between 60 and 70 mmHg (i.e., without normalizing blood pressure that would favor blood losses) [10]. Large spectrum antibiotic prophylaxis is used empirically, usually no more than 24-48 h to try to reduce the high infectious risk linked to massive bleeding management.

Placental abnormalities such as placenta accreta/increta/percreta become an increasing concern due to the increasing rate of C-section. Placenta percreta poses specific issues as it perforates the uterine muscle, invades the serosa and the surrounding pelvic structures, usually the bladder. It is worth noticing that is a combination of a placenta previa and a previous uterine scar increases the risk significantly. Abnormal placenta is the main risk factor of massive blood transfusion (odd ratio de 18.5) [11]. Thus, antenatal diagnosis is potentially life-saving and can also reduce morbidity. However, ultrasonography and magnetic resonance imaging both have a poor sensitivity and the diagnosis is still quite often made solely upon opening the abdomen and uterus.
Conservative strategy (i.e., keeping on site the placenta after childbirth) tends to
result in a lower rate of PPH. An alternative approach involves the use of peripartum balloon
occlusion of the internal iliac arteries (14), which has been demonstrated to be safe and
effective in reducing blood loss in cases of failed uterine atony. However, this procedure is
considered by some authors to be less effective in cases of major PPH (15). Therefore, a
conservative strategy should be considered as the first line of treatment for PPH, and
invasive procedures should be reserved for cases that do not respond to conservative
measures.

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ESRA1-0657
Refresher Course:

NEW ANTICOAGULANTS AND REGIONAL ANAESTHESIA

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INTRODUCTION: When an anticoagulated patient is scheduled for surgery
or an invasive procedure, the physician’s worry is how to achieve an optimal
haemostasis without increasing the risk of thrombosis. This worry increases
when the anaesthesiologists can choose a neuraxial technique to perform
the surgery.

For decades, the main drugs for chronic anticoagulation has been
antivitamin-K (warfarin or acenocumarol). In the majority of patients, the
periprocedural management proposal has been stopping the drug and giving
a short acting anticoagulant prior to cesarean delivery. These complications should be prevented or early diag-
nosed to avoid severe morbidity or even mortality in patients that have been suc-
cessfully treated for PPH.

DIRECT ORAL ANTICOAGULANTS: AN UPDATE: New DOAC have common features but also important differences that are summed up in table 1 (11, 14, 15). The dosage for DOAC is quite different depending on the indication: thromboprophylaxis, prevention of arterial thrombosis and stroke in patients having atrial fibrillation of treatment/secondary prevention of pulmonary embolism (table 2).

Apixaban

Apixaban (Eliquis®, Bristol-Myers Squibb-Pfizer EIEG, United Kingdom) is an orally bioavailable, highly selective, reversible, and direct acting factor Xa inhibitor. After oral intake apixaban has more than 50% bioavailability and reaches peak plasma concentration in 30 min to 2 h, with a terminal half-life around 12 h. It is metabolized in the liver and it is eliminated through both the renal (30%) and the fecal routes (70%) (16). Apixaban is not recommended in patients with creatinine clearance (CrCl) < 15 ml/min, in patients undergoing dialysis, or with severe hepatic impairment. It should be used with caution in patients with severe renal impairment (CrCl 15-29 ml/min) and in patients with mild to moderate hepatic impairment (Child Pugh class A or B), although no dose adjustment is required. Dose adjustment must not be done because of body weight, gender, age or food. The use of apixaban is not recommended in patients receiving concomitant systemic treatment with strong inhibitors of both CYP3A4 and P-glycoprotein (P-gp) inducers, such as azole-antimicrotics and HIV protease inhibitors (17).

Rivaroxaban

Rivaroxaban (Xarelto®, Bayer HealthCare ALG, Leverkusen, Germany) is an oral direct FXa inhibitor. The peak level is reached 2-4 h after ingestion and is slightly enhanced by food. Its half-life is 5-9 h. Approximately 66% of the administered dose is metabolized with half then being eliminated by renal clearance and the other half through the fecal route. The other 33% of the administered dose is excreted unchanged in the urine (18, 19). It is not necessary to adjust the dose in mild or severe renal impairment. Rivaroxaban is contrain-
dicated in hepatic disease with coagulopathy and bleeding risk and should be used with caution in moderate hepatic impairment (Child Pugh class B). It is not recommended in patients being treated with potent inhibitors of CYP3A4 and P-gp, such as azole antifungals or systemic HIV-protease inhibitors (17).

Dabigatran

Dabigatran (Pradaxa®, Boehringer Ingelheim International GmbH, Ger-
dany) is a direct thrombin inhibitor (20). Dabigatran etexilate is a prodrug that is biotransformed to the active molecule, dabigatran, by esterases. Because its absorption requires an acidic environment, the oral capsule contains tartaric acid and it must not be manipulated, it should be swallowed as a whole with water, with or without food. The dabigatran half-life extends to 8 h after a single-dose administration and up to 17 h after multiple doses. As much as 80% of the drug is excreted unchanged by the kidneys and 20% by the biliary system after being conjugated. Therefore the drug is contraindicated in patients with CrCl < 30 mL/min and dose adjustment should be done in patients with CrCl 30-50. It is not recommended in patients with elevated liver enzymes more than two times the upper limit of normal (21, 22). Dabigatran is a substrate for the P-
gp transport system, then close clinical surveillance (looking for signs of bleed-
ing or anemia) is required when dabigatran is co-administered with strong P-gp inhibitors; systemic ketoconazole, cyclosporine, itraconazole or tacrolimus are contraindicated and dosing should be reduced in patients who receive concom-
itantly dabigatran etexilate and amiodarone, quinidine or venlafaxine (17).

DISCONTINUATION BEFORE SURGERY: Based on DOAC rapid on-
set of action and short half-life, it has been proposed their withdrawal some days before surgery as an invasive procedure (12). As DOAC have different half-lives and different renal clearance rates, this proposal must be adapted to each drug, the patient, the creatinine clearance and procedure’s bleeding risk. There is no consensus on the “exact” time for this management, ranging from 1-2 days for low-bleeding risk procedures up to 2-5 days for high-bleeding risk (11, 23-31). Moreover, the lack of experience and data in patients undergoing high
risk bleeding procedures (neurosurgery, cardiac surgery, etc.) demands to be extremely careful in these scenarios.

For selected patients at high thrombotic risk (defined as a CHA₂DS₂-VASC score more than 4 (11) or CHADS₂ score more than 2 (27)), some authors have proposed a perioperative bridging strategy (10, 11, 27) (table 3). The rationale for this protocol, replacing the DOAC during some days before surgery by a LMWH, raises from the difficulty to assure the antithrombotic efficacy as much near as possible to surgery without increasing bleeding risk.

Our consensus proposal based on recent articles and large discussions within the Spanish Forum is summarized in table 4 (11, 23, 24, 27, 31). The bridging therapy is also reflected as an option in this decision algorithm for patients at high thrombotic risk.

THE CASE OF NEURAXIAL ANESTHESIA: Neuraxial anesthesia is widely used, mainly in patients undergoing an orthopaedic surgery. Haemostatic competence is required to avoid spinal/epidural bleeding. The incidence of spinal/epidural hematoma after a spinal puncture or an epidural catheter placement in patients receiving chronically a DOAC is completely unknown.

The recommendations published for the management of neuraxial anaesthesia in patients receiving a DOAC for thromboprophylaxis (15, 32, 33) are based on each DOAC pharmacological profile (pharmacokinetics and pharmacodynamics). In general, they follow the rule that it is necessary to wait at least two half-lives from the last DOAC intake before performing neuraxial puncture or removing an epidural catheter (34). Although it is quite difficult to reach evidence, the practice based on these recommendations is probably safe and does not increase the risk of neuraxial bleeding (35).

Nevertheless, in the case of patients with atrial fibrillation or venous thromboembolism, the higher DOAC dose, the chronic administration, the pharmacokinetic variability, etc., have moved the recommendation to a free interval of at least three half-lives before the puncture. Moreover, standard coagulation tests in the normal range should be associated (PT-ratio and aPTT-ratio ≤ 1.2) (10, 26). From a similar point of view, for scheduled surgery, the neuraxial puncture should be considered as a “high risk” procedure, similar to an intervention in the spine, applying the same safety time. This point of view means to overtake the three half-lives, having a free interval of 2 days for rivaroxaban and apixaban and 3 days for dabIGATRAN, in a patient with a normal renal function (CrCl ≥ 50 ml/min). Finally, some authors have suggested a longer free window, with a more conservative recommendation of four to six half-lives before neuraxial injection or removal of epidural catheter (36, 37).

Bridging therapy could be a solution for patients in which the performance of a neuraxial technique has a reasonable benefit. The safety time before the puncture must be respected according the recommendations for LMWH at prophylactic (12 hours) or therapeutic doses (24 hours) (15, 23, 33).

THE CASE OF PERIPHERAL NERVE BLOCKS: Each day, continuous peripheral nerve blocks (CPNBs) are used more and more in clinical practice because they provide good analgesia, are associated with fewer side effects than opioid-based analgesia and improve outcome benefits and perceived quality of treatment by most patients (38, 39). Furthermore, they could be considered as efficient as epidural analgesia, being associated with fewer side effects or technical problems (40). Upon performing CPNB, bleeding complications are usually less important than those associated with neuraxial blocks. But, an eventual bleed derived from a CPNB can lead to a mechanical compression of the nerve with nerve palsy and could even lead to life threatening bleeding (41) if undiagnosed.

In last years, ultrasound-guided peripheral nerve blockade has become a valuable tool that is available to anesthesiologists. This technique shows great promise given its success regarding the insertion of catheters and the result of the block. Nevertheless, it cannot be assumed in clinical practice to be the new gold standard for peripheral regional anesthesia in absolute terms of efficacy and safety. This question is of paramount importance when we describe the guidelines for the performance of CPNB in the setting of the thromboprophylaxis with one of the new anticoagulant agents.

On the one hand, the practice of CPNB could have the same safety profile as neuraxial blocks; but this proposal may be too stringent. On the other hand, it seems necessary to maintain caution at least in some kinds of blocks performed in a non-compressible area: posterior lumbar plexus, sciatric parasacral or infraclavicular blocks so as to emulate the safety profile of neuraxial blocks.

To sum up, although ultrasound-guided CPNB would be a recommended practice to improve efficacy and safety, when an anticoagulant agent is administrated for thromboprophylaxis, current recommendations should be respected mainly in non-compressible areas (15).

DOAC: direct oral anticoagulant; LMWH: low-molecular-weight heparin.

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**TABLE 1. Pharmacokinetic properties of new anticoagulants (personal adaptation from references 11, 14, 15)**

<table>
<thead>
<tr>
<th>Mechanism of action</th>
<th>APIXABAN</th>
<th>RIVAROXABAN</th>
<th>DABIGATRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibitor</td>
<td>Direct Xa</td>
<td>Direct Xa</td>
<td>Direct Ha</td>
</tr>
<tr>
<td>Renal elimination</td>
<td>25%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>Urine</td>
<td>70%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Feces</td>
<td>5%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Inactive metabolite</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Drug+ active metabol</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**TABLE 2. Main dosage of DOAC**

<table>
<thead>
<tr>
<th>DOAC</th>
<th>APIXABAN</th>
<th>RIVAROXABAN</th>
<th>DABIGATRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopaedics</td>
<td>2.5 mg/12 h</td>
<td>10 mg/24 h</td>
<td>220 mg/24 h</td>
</tr>
<tr>
<td>Stroke prevention</td>
<td>5 mg/12 h</td>
<td>20 mg/24 h</td>
<td>110-150 mg/12 h</td>
</tr>
<tr>
<td>VTE treatment</td>
<td>10 mg/12 h</td>
<td>15 mg/12 h</td>
<td>150 mg/12 h</td>
</tr>
<tr>
<td>6°-12° month</td>
<td>2.5 - 5 mg/12 h</td>
<td>20 mg/24 h</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 3. Scheme of the recommendations for bridging therapy (based and modified from the recommendations of the Working Group on Perioperative Haemostasis and the French Study Group on Trombosis and Haemostasis (30) and the Spanish Forum on Anticoagulants and Anaesthesia (11)).**

**BRIDGING THERAPY**

Consider mainly in patients with high thrombotic risk or in patients undergoing a neuraxial anesthesia technique

Optional in other cases

**TABLE 4. Proposed preoperative discontinuation time of direct oral anticoagulants based on renal function and bleeding risk.**

<table>
<thead>
<tr>
<th>Drug</th>
<th>CrCl (ml/min)</th>
<th>APIXABAN</th>
<th>RIVAROXABAN</th>
<th>DABIGATRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low bleeding risk</td>
<td>&gt;50</td>
<td>1 d</td>
<td>2 d</td>
<td>2 d</td>
</tr>
<tr>
<td>Moderate to severe bleeding risk</td>
<td>30-50</td>
<td>2 d</td>
<td>3 d</td>
<td>4 d</td>
</tr>
<tr>
<td>High thrombotic risk</td>
<td>&gt;50</td>
<td>Bridging therapy with LMWH is suggested</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(*) In patients with normal renal function undergoing “very low bleeding risk” procedures, the direct oral anticoagulant may not be interrupted. In the case of apixaban and dabIGATRAN (both given twice per day) last dose before surgery should be skipped.
References:


5. Harrison RW, Ortel TL, Becker RC. To bridge or not to bridge: these are the questions. J Thromb Thrombosis 2012;34:31-5.


BLEEDING COMPLICATIONS IN REGIONAL ANAESTHESIA: AN UNDERESTIMATED PROBLEM

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Neuraxial anaesthesia and bleeding risk: Because of the potential devastating consequences of a prolonged compression of the spinal cord, one of the most important complications after performing neuraxial anaesthesia is epidural/spinal hematoma.

Controlled studies to evaluate the causes of spinal hematomas are not feasible. Because of the low incidence of bleeding complications from a neuraxial anaesthesia/analgesia technique, and because there are often several possible causes, exact risks are not possible to be estimated. Furthermore, the number of unpublished cases is large.

Some articles have estimated the incidence, mainly based on cases reported in the literature and statistical analysis. So, the overall rate of epidural hematoma was estimated to be about 1:150000 after epidural anaesthesia and 1:220000 after spinal anaesthesia (1,2). Nevertheless, this rate is probably underestimated. More recent proposals have raised this risk to 1:100000 after epidural labor anaesthesia and to 1:3600 in female orthopedic patients undergoing TKR surgery with an epidural catheter (3). This higher prevalence could have a double explanation: the frequent dual therapy with antplatelet agents and antithrombotic drugs in orthopedic patients and that at this time the majority of Anaesthesia Society guidelines that establish a time interval between the administration of the anticoagulant and the performance of the anaesthesia technique had not been published.

Current literature highlights not only the importance of concomitant factor that can increase the risk for the development of an epidural hematoma. Some procedure-related risk factors and additional personal risk factors (anatomical abnormalities of the spine and spinal blood vessels, elderly patients, and renal and hepatic impairment) (4-8),(Table 1) have been traditionally related with high risk for spinal bleeding.

Nevertheless, the main related risk factors are hemostatic disorders and the concomitant administration of an anticoagulant or antplatelet agent. For this reason some recommendations have been published to make sure the performance of a neuraxial anaesthesia in this scenario (7, 9-12). It can be considered safe enough in patients receiving drugs that alter hemostasis or taking drugs, can be summarized as follows (5, 7, 8, 19):

(1) The first dose of the anticoagulant after a neuraxial puncture must be administered so as to ensure an interval of at least 8 h between the end of surgery and the peak plasma level of the drug. If the dose of the anticoagulant is higher than the thromboprophylaxis dose, this interval should be carefully assessed and, perhaps, increased until at least 12-16 h.

(2) The removal of a deep catheter must be delayed by an interval of at least two half-lives of the anticoagulant following the last peak plasma level. This is when there is only 25% of the circulating drug remaining and, therefore, offers the optimal risk/benefit ratio. Of course, this rule is only applicable for thromboprophylaxis dosages.

(3) The safety interval between the removal of the catheter and the next anticoagulant administration must be delayed by a period calculated from the hemostasis time minus the peak plasma level of the drug (the longer the peak level, the shorter the time delay). In patients needing “full anticoagulation”, the first dose after the catheter removal should be the half anticoagulation dose, waiting 24 h for the administration of the full dose.

For anticoagulants eliminated predominantly by the kidneys, such as the low molecular weight heparins, unfractionated heparin, dabigatran etexilate or fondaparinux, the relationship between half-life and renal function must be considered.

Conclusions: The incidence of bleeding complications in regional anaesthesia is very low, but nowadays unknown. In patients with hemostatic disorders, receiving anti-haemorrhagic drugs, having anatomical abnormalities of the spine and spinal blood vessels, in elderly patients, or in patients with renal or hepatic impairment, the risk of spinal bleeding is higher. It is necessary to assess individually for the improvement of the outcome with the performance of a neuraxial technique (comfort vs reduced morbidity vs reduced mortality) before the final decision.
References:


TABLE 1. General risk factors associated with spinal hematoma

<table>
<thead>
<tr>
<th>Procedure related</th>
<th>Patient related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhagic puncture</td>
<td>Advanced age (&gt;75 years)</td>
</tr>
<tr>
<td>Multiple punctures</td>
<td>Female sex</td>
</tr>
<tr>
<td>Catheter removal</td>
<td>Ankylosing spondylitis (Morusa Bechterew)</td>
</tr>
<tr>
<td>Catheter insertion during general anesthesia</td>
<td>Spinal column abnormalities</td>
</tr>
</tbody>
</table>

ESRA1-0659
Panel Discussion: Regional anesthesia in children

SAFETY IN PEDIATRIC REGIONAL ANAESTHESIA: CONCEPTS AND EVIDENCE

Ecoffey C. 1
1. Patient Monitoring: Monitors should be applied and functions tested before the block is performed. In particular, the electrocardiogram should be adjusted so that the P wave, QRS complex, and upright T wave can be seen clearly. Baseline systolic blood pressure and heart rates should be noted.
2. Skin Preparation: Bacterial colonization of epidural and caudal catheters in children occurs at a rate of 6% to 35%. Gram-positive organisms are most common, though gram-negative colonization may also occur, particularly with caudal catheters. Children under 3 years of age are also most likely to have colonization of caudal catheters. Despite high rates of colonization, serious epidural infections are exceedingly rare (1, 2). Antiseptics alcoholic solution has proved to be effective in decontaminating the transient skin flora (3), but not the deeply placed resident flora, which remains colonized even after skin disinfection. In addition, insertion of an epidural catheter should be performed under strict aseptic conditions with a daily observation of exit site while the catheter is in place, and for 72 hours after catheter removal.
3. Test Dose: Whilst placement of regional blocks under general anesthesia is considered standard practice in children, the search for the ideal ‘test dose’ to reduce the risk of inadvertent intravascular injection continues. The original ‘test dose’ described an increase in heart rate and blood pressure following intra-venous administration of epinephrine 0.5 µg/kg. In children these hemodynamic changes vary with the anesthetic agent used (halothane, sevoflurane or isoflurane) and whether prior atropine has been administered. However, an increase in heart rate of 10 beats per minute above baseline occurring within 1 minute of injection is a reasonable sign of intravascular injection for children anesthetized with sevoflurane. Monitoring the ECG changes, i.e. >25% change in T wave or ST segment changes irrespective of the ECG lead chosen, is considered by some to be more specific and more reliable (4). In the PRAN database, positive test doses were detected in 0.6% of single injection and 0.7% of catheter blocks (5).

These changes have been questioned recently as it seems that similar changes in heart rate, blood pressure, and T wave may be seen following a painful stimulus (two “light” anesthesia during the performance of the block or intraneural injection). The temporal relationship is important and a secondary drop in pulse rate detected after intravenous epinephrine distinguishes this from the response seen after a painful stimulus (6). Nonetheless, as no method of test dosing is infallible, incremental injection is a critical safety technique over a period of at least 60 to 120 seconds, irrespective of the type of block, with repeated aspirations, whenever large volumes of local anesthetics are injected (7). Direct visualization of the location of the needle tip and the injectate with ultrasound may provide additional or alternative confirmation of lack of intravenous injection (8, 9).
4. Sympathetic Tone: A clinically significant decrease in blood pressure related to sympathetic block from central neuraxial blocks is rare in children younger than 8 years of age (10), except in neonates following spinal block (11, 12). Volume loading before such blocks, commonly practiced in adults, is unnecessary in this age group. In older patients, the sympathetic block results in a slight (20%–25%) but consistent decrease in blood pressure. Even in adolescents, however, fluids or vasopressors are rarely required to treat the hemodynamic effects of central neuraxial blocks, except when clonidine is added to local anesthetics.

5. Contraindications: Contraindications are few and similar to those in adults. These include coagulopathy, infection at the insertion site, true local anesthetic allergy, and abnormal superficial landmarks or lumbar sacral myelomingocoele because of the risk of malposition of the cord or dorsal sac. Progressive neurologic disease is a relative contraindication primarily because of medical-legal concerns.

The safety of central neuraxial techniques in pediatric patients is a venticuloperitoneal shunt, discussed above: indeed, the major risk of performing a caudal or epidural block in a child with a ventricular shunt device is not infection but modifications of intracranial pressure (13). Risks and benefits in these patients should be carefully considered on an individual basis.

Though it is rare to encounter opposition to the use of peripheral nerve blocks, certain conditions may call for an anaesthetic avoidance of these. Relative contraindications include: local infection, generalised sepsis, coagulopathy, pre-disposition to compartment syndrome, and parental or child dissent.

6. Importance of proper education and training: The use of ultrasound to locate nerves is increasingly used in pediatric patients as it increases the speed of onset, reliability and safety of peripheral nerve blocks. However, using this technique to identify the nerve is not a replacement for a good understanding of the anatomy.

New data have emerged suggesting that the novice ultrasonographer makes repeated errors, the two most common being failure to visualize the needle during advancement and unimportant movement of the probe. For this reason, the American Society of Regional Anesthesia and Pain Medicine (ASRA) and the European Society of Regional Anaesthesia (ESRA) created a Joint Committee; the result was a document entitled “a recommendation to members and institutions the scope of practice, the teaching curriculum, and the options for implementing the medical practice of ultrasound guided regional anaesthesia services” (14, 15).

Indeed, training in the use of ultrasound-guided techniques is not easy. Dedicated efforts must be made to allow the education of at least key individuals to attend focused training, so that these people can start to use and teach these techniques in their own institutions.

In conclusion, regional blockade in infants and children appears to have a very high degree of safety. The use of new technologies, such as ultrasound-guided peripheral nerve blockade, has shown some promise toward increasing the safety profile of these already safe techniques. Thus, very reassuring data support the continued use of regional anaesthesia in infants and children.

References

ESRA Abstracts
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ESRA1-0660
Refresher Course: The place of adjuvant drugs in peripheral nerve blocks

THE PLACE OF ADJUVANTS DRUGS IN PERIPHERAL NERVE BLOCKS

Vermeylen K.1 1Anesthesia and Intensive Care, AZ Turnhout, Turnhout, Belgium. Introduction: Surgery is often associated with severe pain that can extend through the first postoperative 48 hours and often requires large amounts of parenteral opioids (1, 2). Peripheral nerve blockade reduces postoperative pain with minimal side effects, after major surgery (3). However, the maximum duration of effective analgesia with long-acting local anaesthetics (e.g., ropivacaine) after a single injection block is only 8-24 hours (4). Therefore, perineal catheters or local anaesthetics in combination with adjuvants are often used to prolong the duration of a single shot peripheral nerve block (5, 6).

Other reasons to use adjuvants can be speed of onset, increased density or quality of the block or improvement of the overall analgesic effect.

Physical characteristics of an “ideal adjuvant”: An “ideal adjuvant” is easily soluble (preferable in water), has an easy miscibility (no precipitation on mixing with local anesthetic solution) and does not irritate when injected. It should enhance onset of action and maintain a rapid and steady peak of action. It prolongs the duration of action without systemic or side effects. The systemic absorption should be minimal with a high protein binding, a rapid redistribution, non-active metabolites, a rapid plasma clearance with simple non-hepatic/non renal dependent excretion. It should also be economically interesting and freely available without any specific conditions for the storage.

Overview of the different adjuvants: Several adjuvants have been examined: epinephrine, sodium bicarbonate, alf-a-agonists, opioids, steroids, midazolam, neostigmine, verapamil, magnesium, ketamine, non-steroids anti-inflammatory drugs, tramadol and probably many more.

They all have their mechanism of action and some of these mechanisms are understood well, yet other mechanisms of action of some adjuvants remain unclear (e.g dexamethasone).

Opioid or weak opioid adjuvants: The use of opioids as adjuvants in peripheral nerve block is not supported by the literature, in contrast with its use in neuraxial nerve blocks.

Many studies have been published in the 1990s showing conflicting results on the efficacy of hypromellose (partial opioid m-receptor agonist and K- and d-receptor antagonist) in prolonging the duration of local anaesthetics with a wide range in the duration of analgesia, from 10 to 50 hours (17, 18). Its use
in the local treatment of chronic pain is probably the most known. Local buprenorphine application to the stellate ganglion proves to be very efficient for the treatment of chronic headache and persistent idiopathic facial pain (19). It is important to avoid its use in opioid-tolerant patients, as it renders other full opioid agonists much less effective.

Neuromuscular blockers like relaxatocurl have been used as neuraxial adjuvants but no data are available for peripheral nerve blocks. This is also true for weak opioid agonists like tramadol. The peripheral analgesic effects of tramadol have not been fully explained but it is a selective agonist of μ-receptor. Tramadol also prevents the uptake of noradrenaline and enhances both serotonin and noradrenaline release. Only a few studies have investigated the effect of tramadol when added to a local anesthetic mixture for peripheral regional anesthesia(20). The currently available data concerning the use tramadol as an adjuvants however are limited.

Non-opioid adjuvants: Non-opioid adjuvants can be divided into vasoconstrictors, clonidine, corticoids and a group of peripheral rarely used adjuvant.
The effect of epinephrine is vasocstriction via α1-activation, which causes a reduced blood flow to the nerve, decreasing clearance or vascular uptake of the local anesthetic and prolonging thus exposure of the nerve to the local anesthetic (7). This effect seems to be much more pronounced with short-acting agents like lidocaine. But the most important use of epinephrine is probably its use as an “intravascular marker” in order to detect intravascular injection or catheter placement (tachycardia). The increment of use of epinephrine is that due to the significant reduction of blood supply to the nerve it can cause nerve injury to some patients (like diabetic).

Clonidine is perhaps the most frequently used adjuvant to local anesthetics (8-10), and is used for neuraxial blocks (e.g., caudal blocks in children) and for peripheral nerve blocks. The analgesic benefit has been demonstrated by multiple meta-analyses and systematic reviews. Despite its frequent use as peripheral anesthetic, (11, 12), its role as adjuvant in peripheral nerve blocks remains controversial, even though side effects are limited at doses below 150 mcg (12). YaDeau et al. showed that block duration was prolonged when 100 mcg of clonidine was added to bupivacaine (8). Nonetheless, the peripheral analgesic effect of clonidine remains unclear and further investigation on its exact mechanism of action is necessary. In particular, clonidine is known to prolong the duration of anesthesia for brachial plexus and popliteal fossa blocks (11), however, some studies have reported no change in onset time or block duration when combined with long-acting local anesthetic (11, 13, 14). This lack of effect has been attributed to methodological issues, e.g., difficulties of data interpretation, lack of systematic controls, or to the specific intermediate and short-acting local anesthetics that were studied. Additionally, many studies were performed prior to the widespread use of ultrasound guided nerve blockade, which may have limited the accuracy of local anesthetic delivery. Clonidine is an α2-agonist with some local anesthetic properties and produces inhibition of hyperpolarization-activated current current. And although many studies have examined the effect of clonidine added to a peripheral nerve block, only a few studies had a control group for systemic effects.

Dexamethasone is a pure α2-agonist with a similar effect to clonidine but the evidence is limited. (15, 16). It has two unique mechanisms for producing analgesia: preventing the transmission of pain impulses by hyperpolarization (G1 protein controlled “gating” mechanism) and regulating calcium channels, mediated through G0 protein controlled N type voltage gated channels. Neither the nerve nor terminal is allowed to get stimulated, nor can it transmit/propagate the signal forward.

Dexamethasone (DXM) has also shown some promise as an adjuvant prolonging analgesia in peripheral nerve blocks (21-24). Recently, Cummings et al. reported prolonged analgesia when DXM was combined with a long-acting local anesthetic during interscalene block. The perineural use of DXM has been widely published. Cummings et al. describe that dexamethasone prolonged the interscalene nerve block nearly 2-fold. The mechanism of action of dexamethasone is still not known. Several hypotheses have been proposed to explain the analgesic effect of DXM. Steroids may induce vasoconstriction leading to substantial reduction in the absorption of local anesthetic solution. However this does not explain the results published by Desmet et al. indicating that IV DXM is equally effective. Alternatively, DXM might block nociceptive impulse transmission along unmynediated C fibers through its anti-inflammatory and/or immune-suppressive effect.

Less common peripheral nerve block used adjuvants: Sodium Bicarbonate increases the non-ionized form of the local anesthetic that causes a speeding onset. By increasing the pH, it makes the solution more lipid soluble and therefore induces an increased penetrability. However, peripheral nerve block duration is not affected.

Ketorolac is a calcium channel blocker, which may play a role in somatic and visceral pain control. However in literature no randomized trial were published concerning a role in peripheral nerve blocks.

The use of intrathecal midazolam (by binding to the benzodiazepine GABA receptor complex) appears to improve perioperative analgesia according to a meta-analysis although limited data is available (REF HO 4Christian). The use in peripheral nerve blocks adjuvant is rare and only case-report based.

This is also the conclusion for the cholinesterase inhibitor neostigmine (action on the muscarinic receptor and the presynaptic nicotinic receptor). Some studies were published involving epidural anaesthesia, intravenous regional anaesthesia or intrarticular injections but current data are insufficient to allow recommendations on the addition of neostigmine in regional anesthesia.

NMDA antagonists like ketamine and magnesium have an NMDA-blocking effect and some evidence exists that these receptors may play a role in the peripheral nervous system as well as the central nervous system (25). Besides the primary NMDA-blocking effect, ketamine has also effects on the sodium and calcium channels and the nicotine, muscularic and opioid receptors. There are some studies on neuraxial use but also for these possible adjuvants no known convincing studies with peripheral nerve blocks exist. An improved analgesic effect has been published when combined with local anesthetics for intravenous regional anesthesia. This is also true for Cox inhibitors like ketorolac and fentanyl. Several hypothesis have been proposed to explain the analgesic effect of DXM. Steroids may induce vasoconstriction leading to substantial reduction in the absorption of local anesthetic solution. However this does not explain the results published by Desmet et al. indicating that IV DXM is equally effective. Alternatively, DXM might block nociceptive impulse transmission along unmynediated C fibers through its anti-inflammatory and/or immune-suppressive effect.

References
ESRA Abstracts

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ESRA1-0664
Symposium: Prospector and ESRA - Linked for the Future

ANALGESIA AND OUTCOME - IS THERE A LINK? THE PROSPECT VIEW

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Approximately 200,000 lower limb arthroplasty procedures are performed in England and Wales annually (roughly 192,000 hip and knee joint arthroplasty) [1]. Given that the majority of patients are elderly and may have other significant co-morbidities, it is important that major procedures such as lower limb arthroplasty have a good evidence-base to make informed choices about the optimal postoperative analgesia, especially at a time of rapidly evolving surgical practice and the development of enhanced recovery (ER) programmes.

Prospect has performed systematic reviews and produced consensus recommendations for both hip (THA) and knee (TKA) arthroplasty, with extensive data available on the Prospect website (www.postoppain.org) and in two published reviews.

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ESRA Abstracts

Since the strength of any systematic review depends entirely on the quality of the published studies and a strict methodology for studies to be included, the review process may be considered too rigid for determining clinically useful advice. A review may be limited by older published data, as standards of care evolve over time. There may be descriptions of interventions, doses or routes of administration in published studies that are no longer appropriate in current practice, or alternatively some pain management techniques may be introduced into current clinical practice without being subjected to a rigorous comparative study, thus decreasing the clinical relevance of the review. By combining procedure-specific evidence, transferable evidence from other appropriate surgical procedures, and current clinical best practice, the PROSPECT group has produced clinically relevant, evidence-based recommendations for postoperative pain management in THA and TKA.

Prospect does not consider postoperative pain in isolation from the influences of the surgical technique and other analgesic interventions in the perioperative period. We therefore review evidence of any positive benefits in the preoperative, intraprocedural and postoperative elements of the patient’s care.

Regional or General anaesthesia?: Systematic reviews show limited benefits of regional over general anaesthesia for THR [2,3] and TKR [3,4], mainly improved pain scores, less blood loss and fewer opioid related adverse events. Older data [3] also identified a reduction in blood transfusions, and the risk of DVT and PE. There is no data to show that RA is superior to GA for longer-term outcome targets, although immediate recovery is better with RA than an opioid-based GA [4]. Prospect reviewed anaesthesia and analgesia for both hip and knee arthroplasty [5,9] and their work, together with other studies [6-8] supports the use of both intrathecal morphine and lumbar plexus block for hip arthroplasty and either local anaesthetic spinal anaesthesia plus intrathecal morphine or spinal anaesthesia plus femoral nerve block for knee arthroplasty. However, these studies pre-date the more recent introduction of Enhanced Recovery (ER) programmes, that rely on minimal use of traditional nerve block techniques. Do these newer techniques make a difference to the recommendations of the Prospect group?

Nerve block, Infiltration or systemic analgesia?: The recommendations for postoperative analgesia were straightforward until recently. Central neuraxial blocks, lumbar plexus block (THR) or femoral nerve block (TKR) offer the best quality of analgesia. With the development of ER programmes for THR and TKR, and the emphasis on early mobilisation, Local Infiltration Analgesia (LIA) offers analgesia [10-13] for up to 24h and can avoid the delayed mobility of nerve blocks, but is it really an improvement over nerve blocks? Further work is required to determine the optimal volumes and concentration of local anaesthetic and whether the use of adjuvant drugs (steroids, vasoconstrictors and anae-
gesics) offers additional benefits. (see Outcome).

Many ER programmes use combinations of oral non-opioid analgesics and co-analgesics. While these have the benefit of convenience, reliable and regular drug administration is essential, and adverse events and patient co-morbidity may limit their utility. Despite these problems, systemic analgesia can be effective, especially for THR.

The evidence for TKR analgesia is more complex. Two systematic reviews support single-shot femoral nerve block (FNB) either with GA or spinal [9,14], as it reduces morphine consumption, dynamic pain scores and nausea at 24 and 48h compared to PCA. Adding a sciatic nerve block or a continuous femoral nerve block, does not significantly improve the pain scores, and may prolong immobility, although heterogeneity between the studies limits the meta-analysis.

Both femoral nerve block and LIA provide effective analgesia with minimal side effects and the more sparing benefits for 24-48 hours. They are relatively simple to learn and can be used safely in patients with significant co-morbidities. For revision surgery or bilateral procedures and for patients with significant cardiovascular co-morbidity other techniques (epidural, CSE) may be justified.

Recently, adductor canal block has been investigated as an analgesic technique for TKR with good postoperative pain management and no adverse effects on mobilisation, compared to femoral nerve block [15], although data remains limited, currently.

Outcome: Prospect has not, to date, looked specifically at the links between optimal analgesia and improvement in outcome from lower limb arthroplasty. Many outcome indicators are multifactorial and therefore focussing on a single parameter (analgesia) may not be very informative. In the TKA review, however, cooling and compression techniques were recommended for their positive effect on early mobilisation rather for any specific analgesic effect; an early example of recommending a non-analgesic intervention for improving early outcome.

Length of Stay: This has become an important indicator for ER, despite a lack of data on its effects on overall recovery. Length of stay can vary, despite effective analgesia and rehabilitation [16], reflecting the influence of other factors: increasing age, female gender, marital status, ASA grade (pre-existing co-morbidity), anaemia, perioperative transfusion, day of the week for operation, preoperative use of walking aids, and time from surgery to fist mobilization [1,16]. LIA is seen by some to be an important contribution to a reduced LOS but with short, protocol driven inpatient episodes and multiple confounding factors, it is difficult to demonstrate that a single parameter can reduce the LOS or improve overall outcome. LOS is reduced even when “traditional” RA techniques are used [17,18], if appropriate rehabilitation programmes are introduced.

Analgesia: Currently, pain control remains the most commonly measured outcome variable in RA studies but the exact role of effective analgesia in improved outcome from THA and TKA cannot be teased out from the background “noise” within an ER regimen. Lumbar plexus block, FNB and intrathecal low dose morphine are evidence-based but may delay early mobilization. Does this matter? While LIA is widely used, its benefit for THR is limited. For TKR, the evidence supports both FNB and LIA as safe and effective techniques within ER. Adductor canal block shows some early potential but despite reducing quadriceps muscle weakness significantly, this does not translate into earlier mobilization [15].

Can we say that patients do better with these techniques and that one is better than the other? The evidence is conflicting. THR patients can mobilise early with appropriate help, despite experiencing moderate pain, leading some to question the value of even LIA [13]. For TKR, LIA may be better than FNB [19] but the reverse is also true [20]. Pain may not be a limiting factor for early discharge [21] but poorly controlled acute postoperative pain is a risk.

FIGURE 1. Prospect Recommendations for Total Hip Replacement: the original review of 2005 was updated on the Web site in 2011

FIGURE 2. Prospect recommendations for total knee replacement 2008: an update of the current recommendations will occur in 2014.
factor for sub-optimal long-term recovery and the development of chronic postoperative pain.[22,23]

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ESRA1-0665
Panel Discussion: Regional anaesthesia in orthopedic surgery

JOINT REPLACEMENT IN ONLY PERINEURAL BLOCKS: FEASIBILITY AND OUTCOME

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Joint arthroplasty in only peripheral nerve block is easily possible where a single injection can be performed to anesthetize like for the shoulder (interscalene block), elbow / wrist (supes- infracubital block) and ankle (popliteal block with or without saphenous block). The hip and the knee joints are innervated by different nerves which cannot be blocked by one single puncture. Additionally, the place of the surgical tourniquet (ankle prosthesis: thigh) does not always allow to perform the surgery in plain peripheral regional anesthesia. Moreover, some surgeons want to check for nerve lesions after surgery and a block is the contraindicated. Additionally, compartment syndrome is always a fear when nerve blocks are used also if there is no evidence that peripheral nerve blocks can mask a compartment syndrome despite there is no evidence for this common hypothesis. [1]

In the lecture the different possible blocks, their indications and if data available the outcome will be presented. This abstract will concentrate on the total knee and total hip arthroplasty.

Total knee arthroplasty (TKA) is a worldwide common and extremely painful surgical procedure which requires good postoperative analgesia to facilitate effective rehabilitation. The number or TKA will increase as the population ages and osteoarthritits, the most common reason for TKA, becomes more prevalent. The increasing pressure on resource utilization asks for a high quality anesthesia and postoperative pain relief which can have an important impact early and mid-term rehabilitation. [2] In fact, studies have also demonstrated that poor pain control after knee replacement is associated with development of chronic pain. [4,5]

The anesthetic management of patients undergoing TKA has undergone several modifications. Previously, general anesthesia (GA) and systemic opioid analgesia were commonly used. Meanwhile, Spinal anesthesia (SPA) has gained prominence for lower limb surgery with important studies demonstrating the superiority of spinal anesthesia over GA in terms of morbidity and mortality. [6-8] The mechanisms underlying these benefits are controversially discussed but may include improvements in cardiorespiratory benefits, blood flow and reduc-}

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Peripheral nerve blocks (PNBs) combining lumbar and sacral plexus blocks can be used as the primary anesthetic for TKA, or combined with GA or SPA to provide postoperative pain relief. PNBs have been shown to have a positive impact on postoperative recovery. [11 14 15] The need for (continuous) sciatic nerve block additional to (continuous) femoral nerve block and the need for an obturator nerve block instead of an sciatic nerve block are controversially discussed in literature. [16-20] Morin et al. showed in a prospective, randomized study on 90 patients that adding a sciatic catheter to a femoral catheter was superior to a continuous psoas compartment with respect to reduced analgesic requirements after TKA, but functional outcome did not differ with those 3 continuous regional analgesia techniques. [21]

However, the debate about the risk/benefit ratio of using regional anesthesia for TKA is controversial. Regional anesthesia imposes risks, such as nerve damage and local anesthetic toxicity. Moreover, the big, long-lasting difference in functional outcome compared to GA has not been shown. [7 22] However, also general anesthesia is not free of risks.

A recent meta-analysis compared regional to general anesthesia for lower limb joint surgery. Due to the limited number of randomized studies and the large variation in endpoints to define complete or poor recovery the final results were not conclusive. However, there was a trend toward poorer cognitive outcome in patients who received only general anesthesia. [15]

The measurement of quality of recovery represents a kind of paradigm shift for anesthesia and surgery practice as the focus on outcomes moves from classical hospital-based (acute pain, morbidity, mortality, length of stay) to more patient-centered (recovery, quality of life) and health-care system-centered (cost utility, cost saving) outcomes. [7 22] However, this also means that the meaning of the term “quality of recovery” is changing in a way that it is not only defined by traditional outcome measures but also by patient-reported outcomes.

A recent study by Liu et al. on patients over 65 years scheduled for TKA showed that lumbar plexus combined with sciatic blocks with sedation facilitated faster postoperative recovery compared to GA. However, there was no difference at 1 week after surgery. In a retrospective study they could also show that for femoral neck fractures a management using PNBs is possible also if they could not show a superiority in mortality and complications compared to GA. [24]

Anesthesiologists should be aware of the fact that the techniques used in the operating room may have an impact on short- and mid-term functional outcome and recovery after the physiological and pharmacological effects of the anesthetic have diminished. Although the use of the PNBs predominantly affects the pain response in the first few hours after surgery, they also reduce the side effects such as nausea, vomiting, hypotension, and respiratory depression. Many PNBs have been shown to have a positive impact on the early joint mobilization [25] and have a positive influence on the inflammatory cascade. [26] If this translates into positive long-term outcomes has still to be proven.

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Delirium is usually apparent on the first or second day postoperatively and symptoms usually worsen at night. Postoperative delirium is seen in 36.8% of surgical patients [2] with a higher incidence in the over 70 years population [3] and in the orthopedic population [20%-52-6%]. [4] There is a strong association between delirium and prolonged hospital stay, persistent functional and cognitive decline, increased morbidity and mortality [5 6] leading to costs ranging from 38 – 152 billion USD / year. [7] In hospitalized patients up to 40% of cases of delirium are thought to be preventable [8 9] but preventions strategies are unproven or even contraindicated. [10] Central nervous system active drugs used in the perioperative period are known to disrupt central nervous system function, cholinergic transmission or excessive dopaminergic tone as an important factor for delirium. [11]

The pathophysiology of delirium after anesthesia and surgery remains unclear and seems to be multifactorial: interaction between medical illness, patient risk factors and therapy might produce this neuropsychiatric syndrome. Theoretical mechanisms for postoperative delirium include disturbed neurotransmission, stress and inflammation. Drugs are probably one of the most common causes in hospitalized elderly patients where polypharmacy, altered pharmacodynamics and additional pathologies will interact to produce delirium. [11] Central nervous system active drugs used in the perioperative period are the most often implicated in postoperative delirium. Evidence suggests reduced cholinergic transmission or excessive dopaminergic tone as an important factor in delirium. [12]

However, the pathophysiology is more complicated as cholinesterase inhibitors do not treat or prevent postoperative delirium. Ischemia and pro-inflammatory cytokines can enhance neurotoxicity, alter neurotransmission, and augment blood-brain barrier permeability. Also genetic factors have been described as risk factors for developing postoperative delirium in the elderly patient. Moreover, the aging brain experiences both quantitative and qualitative changes in neuronal circuitry exposing the patient to a greater sensitivity to delirium. [13-15]

Patient’s related risk factors are hypoxemia, hypotension, metabolic disorders, sepsis and drug or alcohol withdrawal. Intense postoperative pain has been identified as a cause for hyperactive delirium. [16] Also pain due to undiagnosed urinary retention, which is common in the postoperative period, has been described. [17] Non patient-related factors favouring delirium are cardiac surgery, physical restraints, drugs such as anesthetics and sleep deprivation. Hypoxia due to respiratory depression after residual effects of muscle relaxants can lead to agitation and delirium in PACU patients. [18] Ketamine and propofol have been both associated with postoperative delirium. [19-21]

Finally, postoperative delirium has been associated with increased morbidity, mortality, functional deficits and costs. [3 22-24]

Diagnosis

Clinically validated scales have been introduced for the diagnosis of postoperative delirium in the PACU or ICU. However, there is no routine preoperative assessment of patients for delirium or cognitive dysfunction, which complicates the onset time point of symptoms.

The most frequently used scales are The Confusion Assessment Method for Intensive Care Unit Patients Scale, [25] The Nursing Delirium Screening Scale, The Delirium Detection Score [26] and the Intensive Care Delirium Screening Checklist (ICDSC) [27] currently the most accepted tools. They derive from the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM). [28-30] The DSM describes inattention as the key cognitive deficit in delirium. [28] This is according to the results of Rudolph et al. who demonstrated that preoperative impairment in executive function and attention could predispose patients to delirium. [31]

Treatment and prevention

Emergent pharmacologic intervention is only needed for dangerous agitation associated with delirium. [32] Organic issues must be excluded first and alternative strategies should precede pharmacologic treatment. Neurotoxics such as haloperidol, a nonrespiratory depressant butyrophenone antipsychotic, can be used for sedation. [33] It has been shown to decrease the severity and duration but not the incidence of postoperative delirium in high-risk elderly patients after hip replacement if used as prophylactic drug. [34] However, the use of delirium assessment tools in the ICU has been shown to reduce haloperidol dosage and duration of treatment. [35] Treatment of sleep disorders, immobility, dehydration, visual and hearing impairment and cognitive dysfunction have been shown to reduce the incidence of delirium in hospitalized elderly patients. [36]

Recently, a strategy for rehabilitation consisting of interruption of sedation and physical and occupational therapy during the early days of critical illness lead to a reduction in the duration of delirium in ICU patients. [37] Moreover, Marcantonio et al. reported in a randomized study a reduction of postoperative delirium in patients after hip fracture using a geriatric assessment and care plan. It included: treatment of severe pain, fluid and electrolyte balance, regulation of bladder and bowel function, nutritional intake, early mobilization and rehabilitation, central nervous system oxygen delivery, elimination of unnecessary medications, early management of postoperative complications, and appropriate environmental stimuli. [38] Recently, a large cohort study by Pedersen et al. confirmed and extended these important findings. These patients got additional cognitive assessment at regular intervals after surgery. [39]

The prophylactic pharmacologic therapy is unclear. A good pain management is of pivotal importance. The 2-adrenoceptor agonist dexmedetomidine has been shown to increases the number of delirium-free days in mechanically ventilated ICU patients. [40] Dexmedetomidine shows advantages over benzodiazepines, sicne it poduces analgesia, causes less respiratory depression and provides as different type of sedation in which patients are more interactive and so potentially better able to communicate. [41] Compared with midazolam and lorazepam, dexmedetomidine resulted in less delirium and shorter duration of mechanical ventilation without reduction of ICU or hospital stays. [41 42]

A short hospital length of stay and ambulatory surgery seem to prevent cognitive impairment. [43]

A validated model of delirium prediction has been reported based on four criteria evaluated using specific scales, including illness severity (Acute Physiology and Chronic Health Evaluation Score), [44] visual impairment (Snellen test), [45] cognitive impairment (Mini Mental State Evaluation Score), [46] and serum urea/creatinine ratio. [47] For hip fracture surgery, postoperative delirium was reported in 37% of patients in the high-risk group compared with 3.8% in the low-risk group. [48]

In addition to these factors, cognitive impairment is the strongest factor associated with postoperative delirium; dementia and delirium are closely related. [49] 50% of the patients undergoing delirium will develop dementia. [50] Moreover, preoperative depression increases the risk for postoperative delirium. [51] Recently, patients with an overlap syndrome of delirium and depressive symptoms showed a particularly poor outcome prognosis including 1 month functional decline, nursing home placement and 1 year death. [52] Simple questions about familial or professional help, memory complaints, depressive symptoms, activities of daily living and previous postoperative delirium or drug-induced delirium can provide important information for the perioperative care team.

Effects of anaesthesia and its regimen

A recent meta-analysis showed great inconsistencies in incidence, definition, duration and severity of postoperative delirium. [52] Williams-Russo et al. [54] studied the effects of controlled hypotension by epidural anaesthesia on delirium in patients for hip replacement surgery. Their intraoperative mean arterial blood pressure (MAP) was maintained in the range of 45 – 55 mmHg or 55 – 70 mmHg. They found no difference in the incidences of postoperative delirium (8.5% vs 4.2%, MAP 45 – 55 mmHg vs. MAP 55 – 70 mmHg, p = 0.167). However, there...
were many inaccuracies in this study, which was underpowered, had no standardized anesthesia/analgesia regimen and did not analyze the effects of sedation and blood loss on the primary outcome.

According to literature there is no difference in the incidence of postoperative delirium between neuraxial and general anesthesia. [55-58] However, also these studies show relevant limitations and do not focus on major hip surgery, which is known to be a risk for co-occurrence of cognitive dysfunction in elderly patients.

Depth of sedation has recently been shown to correlate with an increased incidence and duration of postoperative delirium. [59] However, these were induced levels of sedation and not normal clinical standard sedation for regional anesthesia.

Nishikawa et al. [21] showed on abdominal surgery patients that the severity of delirium based on the Delirium Rating Scale was higher in the propofol group (intravenous anesthesia) compared to the sevoflurane (inhalative anesthesia) group. However, the incidence was of postoperative delirium was not different between the groups. Additionally, also this study was underpowered.

Three randomized controlled trials in orthopedic and abdominal surgery compared postoperative epidural analgesia to intravenous analgesia and could not find a difference between the groups. However, also these studies were underpowered. [53] Mouzopoulos et al. investigated the effects of additional fascial ilia compartment blocks on postoperative delirium in hip surgery patients. [60] The regional anesthesia group found a decreased incidence, a reduced severity and a shorter duration of delirium. However, the study showed insufficient allocation concealment, blinding and there was no intention-to-treat analysis.

Two recent reviews have shown, that neither the anesthesia technique nor the anesthetic chosen have a significant impact on delirium outcome. [61 62]

**POSTOPERATIVE COGNITIVE DYSFUNCTION (POCD):**

Incidence and pathophysiology

Postoperative cognitive dysfunction (POCD) has been reported to happen in 7% and 25% one week and up to 9.9% - 12.7% 3 months after surgery. [63-65] After hip fracture the incidence of POCD is considerably higher (18-50%). [66] Multiple factors like inflammatory response, drug use, the level of postoperative pain etc. have been described as possible contributing factors. [67] Like for delirium, anticholinergic effects have also been implicated in postoperative cognitive impairment. [68] Delirium seems to be associated to early (7 days post surgery) POCD especially in those who develop long-duration (>3 days) delirium. [10] Other risk factors are age, ASA classification, education level of the patient, length of hospital stay, type and length of surgery, respiratory complications, alcohol abuse and postoperative complications. [69]

**Diagnosis**

POCD is assessed by the performance achieved on a complex battery of neuropsychological tests that evaluate numerous cognitive domains including memory, attention, visuospatial, executive function, language and psychomotor function. [70-72] The International Study of POCD (ISPOCD)-group put a test battery together covering the most important modalities affected by POCD which was used in several clinical trials. This battery could be considered at the moment the reference battery. It includes the following domains [65]:

- Memory and learning: visual verbal learning: Word Learning and Word Recall
- Attention: Concept Shifting Test (TMT)
- Distractibility: Stroop Color Word Interference Test
- Working Memory: Letter Digit Coding

However, there is no optimum, clinically useful screening tool on the market at the moment.

**Treatment and prevention**

Preoperative prevention of POCD

Use short-acting benzodiazepines for premedication (FORST Anaesthes 2010: 25) and avoid if possible drugs associated with POCD. [64 73]

Intraoperative prevention of POCD

If the use of regional anesthesia has positive impact in the incidence of POCD is controversially discussed in literature. [64 66] Also the effects of analgesia techniques are inconclusive. [40 74] In fact, the superiority of regional anesthesia compared to general anesthesia has not been proven. Only in the study of Rasmussen et al. regional anesthesia showed to be superior to general anesthesia concerning the incidence of POCD at postoperative day 7. [75] Three months later, there was no difference. However, important methodological issues compromise the validity of these findings: early interruption of the study and problems in the randomization process. Moreover, the difference was only shown in a subgroup analysis after excluding patients who had not received the treatment planned. A recent reviews has shown, that neither the anesthetic technique nor the anesthetic chosen have a significant impact on delirium outcome. [62] Aguillre et al. demonstrated in a cohort study an impairment in early (24h after surgery) cognitive function the first day after surgery comparing general anesthesia to regional anesthesia in patients scheduled for shoulder surgery in beach chair position and controlled hypotension. However, there was no follow up to verify the duration of this observation. [76] It seems to be appropriate to use drugs with low metabolism and fast pharmacodynamic. However, no difference was found between intravenous and inhalative anesthesia, even compared to Xenon, which shows a fast pharmacodynamic. [77 78] A stable hemostasis has been said to prevent POCD. [79] However, there was no correlation between hypotension and hypoxia. [74]

Moreover, intraoperative hypocapnia does not increase the risk of POCD compared to normocapnia. [80] Short surgery time and minimally invasive procedures seem to reduce the incidence of POCD. [65 81]

Postoperative prevention of POCD

As for the postoperative prevention of delirium, an excellent analgesia, preventing sleep disorders, a lot of attention including involvement of the family and the supply if needed of glasses and hearing aid devices are recognized preventive methods. Basically, as described by Bedford 50 years ago the maintenance of hemostasis before, during and after surgery is of pivotal importance. [82]

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position of axons fluctuates due to constant displacement between different fascicles. The constant variation of the respective topographic map of fascicles may be appreciated in serial cuts of a nerve (3). Sunderland (4-7) observed that the topography of fascicles varied 23 times in just 46 mm of length. This distribution, being an intraneural plexus, may be related to embryonic development. The number of fascicles generally increases and the surface area of each fascicle decreases, in areas where nerve branches emerge and in regions close to joints. In contrast, the number of fascicles decreases and the surface area of each fascicle increases, in areas away from sites of nerve subdivision and joints. Typically, the fascicles plows to thinner and wells numerous in the vicinity of joints and tend to be protected by greater amounts of connective tissue. Variations in topography of the fascicles is caused by the exchange of axons between different nerve fascicles (8-10).

Initially, we observed topograms of the sciatic nerve, and later examined the variations of topograms taken from peripheral nerves on their exit at level of the external intervertebral orifice (8-10). In both cases, the transfer of axons between neighbouring fascicles was analyzed. Finally, further observations aimed at more proximal areas of the nerves in search for evidence of axonal transfer between groups of neighbouring axons (8-10). Fascicles are formed distal to the spinal ganglion because the groups of axones are surrounded by perineuro. As stated above, among these fascicles there is transfer of axons. Proximal to the nerve, there are groups of axons, but they do not constitute fascicles because they are not surrounded by perineurium; instead, they are enclosed by transitional tissue different which differs from perineurium. This area extends from the point of entrance of the ventral and dorsal roots inside the dural sleeve to the spinal ganglion (8-10). Transfer of axons between the groups of axons from the dorsal and ventral roots are also produced in this specific area. It could be noticed the significant number of axonal transfer observed at the level of the spinal ganglion (8-10).

At the distal end of the spinal dorsal root ganglion, the fascicular structure seen in peripheral nerves begins to appear. The number of fascicles increases along the course of the nerves. In mixed nerves, single fascicles, groups of fascicles, and ‘small’ fascicles, may be found (fascicular interconnections) (8-10).

This complex organization of axons originating inside the dural cuffs and in areas more proximal to the dorsal root ganglion, continue along the path of the peripheral nerves. Sunderland (4-7) described the topograms from different peripheral nerves. He demonstrated that the distribution of nerve fascicles in several individuals is identical for the same nerve at the same level of the nerve. He then mapped the numbers, sizes and position of nerve fascicles at different locations in the trajectory of the examined nerve. Probably the interchange of axons between different nerve fascicles may help to establish the interconnections between fascicles and to fix their position within the nerve group.
In conclusion, transfer of axons between groups of neighboring axons has been observed to originate at the entrance of dorsal and ventral roots inside of their respective dural cuffs. These findings may explain the partial success of few techniques applied in the treatment of pain, and may help to establish new therapeutic strategies.

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The perineurium covering each fascicle is formed by cellular layers and collagen fibers interposed between these layers. The perineurium is mainly cellular, and in the human sciatic nerve, is composed of 8-18 alternating concentric layers of cells and connective tissue. Overall, the number of perineurial cell layers is related to the diameter of the fascicles, being higher in fascicles of larger diameter and lower in fascicles of smaller diameter. Perineurial cells are linked by tight junctions and desmosomes, which connect adjacent cells within each layer of perineurium. This allows the perineurium to act as a selective diffusion barrier (1-4).

Epineurium is composed mainly of collagen fibers and few blood vessels. Collagen fibers in the epineurium are similar in size and appearance to collagen fibers from paraneurum. Thickness of the epineurium varies substantially between nerves in various locations (5-6).

Confusion exists because identical techniques are applied to fine nerves composed of few fascicles, and to larger and more complex nerves such as the sciatic nerve or nerve plexi. Groups containing few nerve fascicles may be surrounded by variable amounts of adipocytes, and the resulting structure (interfascicular adipose tissue) is directly enclosed by epineurium. However, some authors differentiate between the “interfascicular epineurium” (adipose component) and the “epi-epineurium” (connective tissue component) (7).

Complex nerves have variable numbers of groups of fascicles that form larger and more complex bundles of nerve fascicles. Ultimately, the resulting structure is surrounded by fat and epineurium.

Staining techniques help to identify structures in more complex nerves such as the sciatic nerve, where variable numbers of fascicles are present. In these types of nerves, EMA (epithelial membrane antigen) staining is exclusive for the perineurium enclosing each nerve fascicle. Masson’s Trichromic stains collagen fibers characteristically present in the epineurium. Thus, connective tissue enclosing each of the nerves inside more complex nerve structures may be identified as epineurium.

Interfascicular tissue is mainly composed of scanty amounts of adipose tissue, fibroblasts and mastocytes, and contains blood vessels and thin nerve fibers. The thickness of the interfascicular tissue varies in each nerve and along its trajectory, measuring on average about 30-75% of the total nerve area.

In relation to paraneurial sheaths and common epineurial sheath, fatty compartments enclosed by layers of collagen fibers surround the nerves. The compartments may be concentric or non-concentric to the nerve, and the enclosing collagen layers are known as “paraneurial sheaths.” These sheaths emit projections that extend toward the adventitia of larger vessels and toward the collagen sheaths of neighboring muscle groups.
Capillaries are often found in the paraneurial layers. The fatty paraneurial tissue allows some mobility between the nerves and their neighboring structures. This mobility is reduced at the exit points of the subdivisions.

Meticulous histological examination of the complete nerve structure and the surrounding tissues revealed that each peripheral nerve at both plexus and terminal sites is encircled by concentric clusters of fat tissue, which often appear a few mm prior to the division of the nerve extending along its collaterals or its terminal branches. The amount and shape of fat tissue within the paraneurial compartment varied along the nerve structure, progressively losing its concentric contour and becoming unevenly distributed.

Both epineurium and paraneurium have similar functions, including insulation and protection of nerves from erosion or injury. Paraneurial compartments facilitate longitudinal displacement of nerves controlling body movement. This movement is necessary to neutralize lateral compression by changing their shape. Tissues exposed to external irritation are subject to interfascicular fibrosis.

References
PARAVERTEBRAL BLOCKS: SINGLE SHOTS AND CATHETERS: INDICATIONS AND LIMITATIONS

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PVB has a considerable evidence base of clinical effectiveness for several unilateral thoraco-abdominal procedures, and many bilateral ones, in a variety of respects1,[21]. PVB is not just an analgesic technique, but may also reduce PONV, chronic pain, tumour recurrence, flap hypoxia and length of hospital stay1,[3]. Significant complications are rare and there are very few contraindications1,[3]. Alternative non-neuraxial techniques do not have such a robust evidence base and should therefore be used with caution until they have been adequately compared with the PVB gold standard in all the above respects1.[3].

When deciding between a single shot PVB and catheter insertion, the primary consideration will be the duration of analgesia required. A catheter may be indicated when acceptable analgesia cannot be achieved for a sufficient duration after a single shot block and multi-modal oral analgesics (MMAs), without excessive use of systemic opiates. A further consideration in this latter respect might be to minimize the risk of local anaesthetic toxicity in susceptible patients, or when patients are intolerant of MMA (oral opiates or NSAIDS).

Acceptable analgesia has been defined as an average NRS of ≤4/10 and an NRS of 6/10 on movement4. At these levels, the majority of patients do not request additional analgesia and are highly satisfied (NRS 10-15/15). It is likely, therefore, that the benefits of analgesic therapy to achieve a mean NRS <4 will be outweighed by the risks.

The duration of sensory block after a single shot PVB is less relevant than the duration of acceptable analgesia achieved, probably explaining the paucity of studies which have specifically assessed sensory block. Duration of detectable sensory block varies from 2.5[5] to 24[6] hours, but much depends on the choice of local anaesthetic, the dose and the use of additives. Ropivacaine, bupivacaine and L-bupivacaine have been widely used in concentrations from 0.25 to 0.5% and in volumes from 13 to 30[7] ml. It seems logical that higher doses and volumes of longer acting agents will result in wider spread and longer duration, but this has not been assessed. Higher doses are associated with significantly improved analgesia8. Various additives have been shown to increase analgesia8, including clonidine[9], fentanyl[10] and magnesium8. Dexamethasone has not been studied, other than in a combination which included epinephrine, clonidine and fentanyl[11]., but it has been shown to extend the duration of other blocks considerably[12]. None of the studies involving additives have included a systemic control, so it is unknown if any effects are locally or centrally mediated. Epinephrine is used widely to reduce LAT[13], but no study has examined the effect on analgesia. The technique of single shot PVB may also be relevant. Multiple blocks may result in wider dermatomal spread than a single landmark injection and are therefore more likely to cover the surgical stimulus[14], but this has been challenged1.[2]. Ultrasound may result in more reliable block, but this has not been compared to the landmark approach for single shot PVB. It is currently unknown which exact technique of single shot PVB results in the longest duration of analgesic action or sensory block.

For breast surgery, Möller et al demonstrated in an elegant placebo controlled RCT, that a single shot PVB with 30 ml of ropivacaine 0.5% provided significant analgesia for up to 2 hours only2.[1]. However, using MMA in addition, 75% of control patients had NRS <4 for all subsequent time periods and more patients in the control group had simple mastectomy. Only 25% of patients would have benefitted from a catheter according to the above definition of acceptable analgesia. If a multiple level block had been performed, using additional epinephrine, clonidine, fentanyl, magnesium and/or dexamethasone, the number of patients with an NRS <4 would probably have increased further.

In the meta-analysis by Schnabel et al, it is notable that the control group mean NRS at 2-24 and 24-48 hours was near 4 or less in all but one RCT with single shot blocks15.[1].

Buckenmaier et al performed a double blind RCT of multiple level PVB for mastectomy, followed by a PVB catheter infusion of ropivacaine or saline, plus MMAs16.[16]. There were no significant differences in any measured parameters. Bleday et al performed a similar study, but reported significantly improved pain scores on day one with a catheter infusion of ropivacaine (mean NRS 2 v.4, max 5 v 7 on movement17.[17]). In addition, the Brief Pain Inventory measured 14 v. 57. There were no other differences up to 8 days postoperatively and there was no difference in chronic pain incidence at 4 weeks. However, the initial PVB was a single shot with only 15 ml, 60% of patients had bilateral mastectomy and MMA was not added. The control group NRS was <4, suggesting that they already had acceptable pain scores and any significant additional catheter benefit was for 12 hours only.

It would therefore seem that on the balance of the evidence available, PVB catheters are not necessary for most major breast surgery. For major breast reconstruction, Buggy et al have shown that a catheter may be indicated, both to extend the duration of analgesia, minimize toxicity and increase flap viability18.[18]. However, dynamic pain scores in the control group were within the above definition of acceptability (NRS <6).

For thoracotomy, there seems little doubt that PVB catheters are indicated. The PROSPECT report on thoracic surgery stated that 5 of 9 PVB RCTs provided significant catheter based analgesia lasting for 2 days or more, although the control group NRS was not much greater than 419.[19]. For other less invasive thoracic procedures, single shot PVB is usually described20.[20].

For rib fractures, there is no doubt that the stimulus exceeds the duration of even the most prolonged single shot block and that PVB catheters are strongly indicated10,[21].

PVB has been described for a variety of other procedures, including open nephrectomy22,[22], nephrolithotomy23,[23], laparoscopic24 open cholecystectomy25,[25], inguinal hernia repair26,[26], major abdominal procedures27[27],28 and major gynaecological surgery29.[29]. Most of these descriptions have been with single shot approaches. The more major, open procedures may benefit from catheter techniques, but within the concept of Enhanced Recovery After Surgery (ERAS), this is debatable30.[30].

PVB catheters have several limitations. Full sterile precautions are essential and ultrasound catheter insertion takes a lot more time than a landmark single shot block. Loyet et al have shown that with landmark catheter insertion to 5 cm, 29% were misplaced and 23% provided insufficient analgesia31.[31]. The same authors have increased the success rate to 100% in cadavers with the use of ultrasound and a coiled catheter32,[32], but this needs confirmation in vivo. It is likely that catheter insertion should be ≤2 cm from the incision, to avoid epidural or other complications33.[33].

Catheters require either intermittent boluses or an expensive infusion pump. Pump attachments inhibit mobility and are against ERAS principles34.[34]. Catheters are easily displaced and often leak. Most PVB LAT ≤2 cm have been associated with catheter insertions by surgeons under direct vision. Catheters are also associated with an infection risk37.[37]. The initial block, not catheter prolongation, is associated with any chronic pain reduction38 and this may be the same for tumour recurrence, if this exists38.[38].

Taking the above into account, the risk to benefit ratio is probably in favor of PVB catheters for rib fractures and thoracotomy, as absolute indications. Relative indications include major breast reconstruction, open nephrectomy, open cholecystectomy, laparotomy, patients intolerant of MMA (eg NSAIDS, opiates) and those at risk of LAT with a single shot block. There is considerable potential to increase the duration of action of single shot PVBs. If this duration is insufficient to provide mean pain NRS <4 without systemic opiates, then a catheter should be considered. This should be inserted ≤2 cm with full sterile precautions using ultrasound and a coiled catheter. The block should be established with the catheter to prove effectiveness, using a low concentration of local anaesthetic. Care should be taken to prevent misplacement and leakage. The catheter should be removed as soon as mean pain NRS is <4 using MMA.

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It should be noted in presenting this manuscript that I do not have any conflicts of interest to disclose; however, I will be discussing the ‘off-label’ use of several medications. Furthermore, although the presentation is titled “An ASRA Perspective,” the discussion is strongly influenced by my perspective.

Over the past few decades, the definition of an ambulatory procedure has evolved significantly. A procedure that just few years ago would have required a prolonged hospital stay is now performed with the expectation that the patient will be discharged on the day of surgery. There are financial benefits to insurers and hospitals to keep the length of stay as short as possible (with an ambulatory procedure being the shortest stay possible). There is also the perception that shorter stays are equivalent to “better care.” This may or may not necessarily be true. In any case, there is a definitive and focused effort to discharge patients as soon as possible following an increasing number of surgical cases. There is also a misconception that a procedure that is “ambulatory” is brief. While this may be true for some procedures, there is tremendous variability in the duration of ambulatory procedures. Data from HSS reveals that while the mean “OR time” of a knee arthroscopy is just under an hour, a unicollary knee replacement (also considered and reimbursed as an ambulatory procedure) is nearly two and a half hours. The spinal level necessary to perform certain ambulatory procedures varies greatly as well. A foot procedure performed using an ankle tourniquet may require an L4 level while a hip arthroscopy may require a T10 level. Finally, the degree of expected post-operative pain following “ambulatory procedures” has tremendous variation as well. For example, a knee arthroscopy for meniscectomy may require very little post discharge pain medication, an ankle fusion may require significant post-operative analgesic techniques to ensure a safe and timely discharge. It is clear from the preceding discussion that “ambulatory surgical procedures” are an extremely heterogeneous group; therefore, we should not expect to find a drug or technique for ambulatory spinal anesthesia that adheres to the “one size fits all concept.”

Spinal anesthesia has been shown to provide tremendous advantages compared to general anesthesia for many “in-patient” procedures, such as hip and knee arthroplasty (while some institutions perform hip and knee arthroplasty as ambulatory cases, the majority of sites still consider these procedures “in-patient” cases). A recent study by Lemaitre and colleagues found that several significant medical complications were much less common when spinal or epidural anesthesia was used compared with general anesthesia in patients having hip or knee arthroplasty. Furthermore, Chang and colleagues found that the surgical site infection rate was significantly lower in patients anesthetized with a neuraxial technique compared to general anesthesia. An accompanying editorial placed the magnitude of this reduction as equivalent to what is expected from using pre-operative antibiotics.

While the advantages of spinal anesthesia for hip and knee replacements are becoming increasingly clear, the evidence for superiority of spinal anesthesia in ambulatory cases is less robust. While spinal anesthesia is relatively easy to perform, it can be executed rapidly, and there may be a lower incidence of PONV compared with general anesthesia, evidence of significant and major advantages over general anesthesia or peripheral nerve blocks is lacking. Furthermore, potential for prolonged recovery and urinary retention can cause some practitioners to avoid spinal anesthesia completely in some situations.

There are many factors that should be considered in choosing what drug or drugs to use for ambulatory spinal anesthesia. These include the correct duration of action, rapid onset, reliable spinal level, favorable recovery profile, and minimal side effects. Because however, other anesthetic options exist that may or may not be superior to spinal anesthesia for ambulatory surgery, the most important factor in choosing the “right” local anesthetic, is adherence to the concept that we should “first do no harm.” The documented safety of local anesthetics used for spinal anesthesia is the most important factor in which medication to use.

Studying local anesthetic toxicity in spinal anesthesia models is challenging. A 2002 editorial by Eisenach and Yaksh reminds us that human models of local anesthetic spinal toxicity will never exist; therefore, animal, isolated nerve and cell line models are our best option for predicting spinal anesthetic toxicity in humans. A review of the literature of comparative “toxicity” of various local anesthetics is presented below. The definition of “toxicity” in each of the studies varies depending on the model chosen. For example, Kasab’s 2003 study used collapse of growth cones and neurites in cultured neurons, while Takenami et al. 2005 report utilized a pathological and functional model of rat spinal cords. Although the data is quite variable, several patterns are discernable. First, with few exceptions, lidocaine and tetracaine are the most toxic local anesthetics studied. Second, with few exceptions, mepivacaine and procaine are the least toxic local anesthetics studied. Finally, 2-chloroprocaine is not well studied at all.

Given this in-vitro data, our next step would be to look for significant human experience with these medications (realizing, as previously noted, that randomized controlled studies of comparative toxicity are unavailable.) In recent (and not so recent) case studies, mepivacaine, bupivacaine and 2-chloroprocaine have been used in “thousands” and “tens of thousands” of case series without serious complications.

Given the previously noted variability in the duration of ambulatory cases, an argument can therefore be made to use three medications for ambulatory spinal anesthetics: 2-chloroprocaine for procedures of short duration, mepivacaine for procedures of intermediate duration, and bupivacaine for procedures of long duration. Of the remaining local anesthetics available, lidocaine and tetracaine are associated with unacceptable toxicity, levobupivacaine and ropivacaine have limited human experience, procaine is associated with nausea, and prilocaine is not widely available in the US.

A common side effect of ambulatory spinal anesthesia is transient neurologic symptoms (TNS). This side effect was first described in the late 1990s and has been associated with most spinal anesthetics when used in ambulatory cases in the lithotomy or “knee arthroscopy” positions. Both bupivacaine and 2-chloroprocaine are associated with a minimal incidence of TNS in a number of studies. The incidence of TNS with mepivacaine, on the other hand, is reported in the range of 0% to 37%. The reason for this variability is unclear; however, the largest study evaluating the incidence of TNS with mepivacaine (Yadeau et al) revealed a rate of approximately 6%. This rate is not unimportant, but certainly lower than what is reported with lidocaine.

A discussion of side effects of ambulatory spinal anesthesia is not complete without a discussion of post-dural puncture headaches. This complication remains an “annoying” issue for both the patient and the anesthesiologist. The primary factor in the development of a PDPH is the size of the spinal needle. When performing spinal anesthesia in young ambulatory patients a small gauge (27g) pencil point needle should be the routine. If a PDPH does occur with a 27g pencil point needle, conservative management is often highly effective.

Finally, several additives have been proposed for use to enhance ambulatory spinal anesthetics. These additives include epinephrine, phenylephrine, clonidine, midazolam, neostigmine and fentanyl. The indications to use an additive with a given spinal anesthetic vary greatly. Epinephrine, for example, has been used to increase the duration of a spinal block. However, given evidence of toxicity issues with intrathecally administered epinephrine, it seems prudent to avoid its use altogether and simply choose a local anesthetic that matches the duration of the procedure. Other arguments for using additives are to decrease sedative requirements or enhance hemodynamic stability. However, these goals can best be achieved through controlled IV supplementation. Finally, a reasonable argument for the addition of an additive would be to assist with post-operative analgesia. While narcotics have been used successfully for this indication, one must also consider the side effects (sedation, respiratory depression, pruritis) and the alternative of using a peripheral nerve block to assist with post-operative analgesia. In sum, the benefits of any additive should be weighed against the risks of that additive in ambulatory spinal anesthesia.

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ESRA Abstracts

Regional Anesthesia and Pain Medicine

Ask the Expert:

RISK OF INFECTION AFTER NEURAXIAL BLOCK IN INFECTED ORTHOPEDIC SURGERIES

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It is controversial whether neuraxial anesthetics (spinals, epidurals, and combined spinal epidurals) should be performed in patients who are infected. The risk of seeding the epidural space or CSF with bacteria must be weighed against the benefits of neuraxial anesthesia in a given population for a given procedure. Furthermore, the term “infected patient” may range from a patient with a localized infection and no systemic manifestations to a patient who is bacteremic and overtly septic.

Hip and knee arthroplasty are two of the most common orthopedic procedures performed in the world. In 2010, nearly 700,000 combined total hip and knee replacements were performed in the US. By the year 2025, that number is expected to exceed 2.5 million. Given current anti-infective measures, infection rates for these procedures should not exceed 1%. Therefore, anesthesiologists may expect to encounter tens of thousands of patients presenting for an I&D or explant of infected joint prostheses.

Current literature gives strong support for the use of neuraxial anesthesia in orthopedic surgical cases. A lower incidence of pulmonary complications, acute renal failure, and transfusion requirements have been demonstrated with neuraxial anesthesia compared with general anesthesia for primary hip and knee replacements. It is unclear whether these benefits can be extrapolated to the removal of infected hip and knee prosthesis.

The data on the use of neuraxial anesthetics in infected patients is quite limited. Goodman et al report the safety of spinal and epidural anesthesia in parturients with chorioamnionitis. Kotze et al also report on the safety of epidural anesthesia and analgesia in children with empyema. In a recent report in the British Journal of Anesthesia, Grytenko et al look specifically at the infected hip and knee population. This retrospective study of 474 patients with a documented infection of an implanted hip or knee prosthesis revealed no cases of meningitis or epidural abscess following removal of the infected prosthesis under neuraxial anesthesia (the 95% CI was 0.6%).

ASRA has developed guidelines on Infectious Complications of Regional Anesthesia. The specific recommendations for the performance of neuraxial anesthetics in patients with infections are somewhat vague. Furthermore, the strength of the evidence supporting these recommendations is weak and dominated by expert opinion. More studies, preferably prospective with larger cohorts (RCT’s), are necessary to determine the true risks of performing neuraxial anesthesia in infected patients. Other variables and outcomes including the use and timing of antibiotics, the severity and localization of the infection, specific bacterial organisms and sources, and the use of a single shot versus continuous technique should also be evaluated.

Selected References

Neuromodulation Staged Implantation: The retrograde approach was performed percutaneously. With the patient in prone position an introducer needle was placed in the lumbar interlaminar space but in the opposite direction compared to a classic epidural approach. The epidural space was approached through L2–L3, L3–L4, L4–L5 interlaminar space, using the “loss of resistance” technique. When the epidural space was localized, the electrode was inserted through the needle and directed, using real time fluoroscopic vision, toward the lumbar caudal, lumbar transforminal or sacral, according neural target. The specific material used was the 1x4 Pisces Compact lead model 3887 for selective radicular stimulation and 1x8 Compact Percutaneous Lead Model 3778 for midline lumbosacral retrograde stimulation (Medtronic. Minneapolis, USA). When the electrode reached the exact neural target and the patient experiences good paresthesia coverage the needle was withdrawn, the electrode was fixed and connected to a temporary pulse generator for the trial period.

It is unclear whether there is an advantage to either unilateral or bilateral neuromodulation in patients with pelvic pain syndromes. It seems logical to offer bilateral stimulation to patients with bilateral symptoms. Based on some reported series, we apply bilateral stimulation to patients with truly refractory pelvic pain syndromes.

All patients were tested with a temporary neurostimulator and only after a positive trial period the definitive system was implanted. Positive trial was considered reporting more than 50% pain relief as well as about 60% of improvement in activities of daily living.

Neuromodulation in Genitourinary Syndromes: Pelvic pain syndrome is a condition characterized by neuropathic pain with hyperesthesia and allodynia similarly to CRPS affecting the extremities. The syndromes compromise the quality of life of the patient and are very difficult to treat with conventional therapy.

Selective stimulation of sacral nerve roots has been advocated as the procedure of choice for the treatment of perineal pain and pelvic organic dysfunction. The U.S. FDA supports sacral neuromodulation for certain disorders of the urinary tract, such as idiopathic overactive bladder, urinary incontinence, or chronic non-obstructive urinary retention; however, pelvic floor disorders have not been approved as an indication for this technique. The applications of sacral neuromodulation are now extensible to sexual dysfunctions and neurogenic disorders, with promising results. The advantage of sacral neuromodulation is the possibility to treat all these disorders simultaneously.

De Andrés et al emphasized that sacral neuromodulation is approved by the FDA for idiopathic overactive bladder, urge urinary incontinence, and chronic non-obstructive urinary retention (not yet approved for the treatment of other pelvic disorders). It could also prove useful in the treatment of pelvic floor, bladder and urethral musculature. Fariello et al reviewed the use of sacral neuromodulation and concluded that it could prove beneficial in painful bladder syndrome, interstitial cystitis, chronic pelvic pain, and sexual dysfunction. These authors admit, however, that larger, multicenter pilot trials with long-term follow-up periods are needed. Alo et al conducted a study in 5 women with chronic pelvic pain treated with lumbar and sacral nerve root stimulation. Paresthesia coverage was adequate in all patients and VAS scores declined from 9 to 2. These authors performed more selective root stimulation to improve paresthesia coverage in areas which cannot be covered effectively by spinal cord stimulation. Nair et al have reported successful spinal cord stimulation in a woman who had failed to respond to conservative treatment, with 80% improvement in pain.

Peripheral nerve stimulation (PNS) has been particularly successful in the treatment of mononeuropathies in the lower addominal area like persistent post-herniorrhaphy pain. de Andrés et al have reported clinical success in a woman with vulvodynia for whom medical treatment and interventional procedures had failed. Subcutaneous vulvar stimulation is a safe and simple technique, with few side effects, providing 80% improvement in pain. In relation to the possible mechanism of action involved, Snellings et al used an animal model showed specific results with implications on the selection of anatomical target and device programming of sacral neuromodulation for treatment of symptoms in the perineal area. We Moreover, Kothari concluded that the introduction of a stimulating electrode directly to the center of peripherally affected painful areas, thereby bypassing the spinal cord and peripheral nerves is a novel simple procedure with effectiveness in the control of intractable neuropathic pain.

Although sacral neuromodulation allow reaching sacral neural structure in a relatively easy way, the technique has some technical limitations. First, the cerebrospinal fluid layer in the cocus is quite thick and can contribute to insulate the target structure from the electrodes; second, neural structure at this level are relatively mobile and can result difficult maintain the electrode perfectly coupled.

Genitourinary Neuromodulation

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INTRODUCTION: Chronic pelvic pain (CPP) is non-malignant pain perceived in structures related to the pelvis of either men or women, associated with symptoms suggestive of lower urinary tract, sexual, bowel or gynaecological dysfunction. In all cases, there may be associated negative cognitive, behavioural and social consequences.

Sacral neuromodulation (SNM) is an accepted treatment for lower urinary tract dysfunction, fecal incontinence and functional bowel disorders, refractory to conservative treatment. It has also proven to be an effective treatment in chronic pelvic pain conditions.

Selective stimulation of sacral nerve roots involves placing electrodes in the painful area to stimulate the affected region, and has been used in a number of chronic pain conditions. Development of paraspinal maps, related with pain maps and pain visual analog scale resulted in adequate paresthesia coverage and effective pain relief. According results presented by Alo et al, detailed mapping studies are useful for establishing relationship between electrode placement and paresthesia patterns as well as the optimal stimulation parameters, for selective stimulation of sacral nerve roots.

Innervation of the Pelvis: The pelvis is a complex, neurophysiologic region, and sources of pain may arise from somatic, visceral, and/or neurogenic structures. Somatic sources include muscles, pelvic bones and joints, ligaments, and fascia. Visceral sources of CPP include the reproductive, gastrointestinal, and urologic systems. Broadly, dual projections from the thoracolumbar and sacral portions of the spinal cord innervate the pelvis and then coalesce into neuronal plexuses that send fibers throughout the pelvis. The pelvic visceral receive neurons from the sympathetic (thoracolumbar) and parasympathetic (craniocaudal) systems. More specifically, visceral afferent fibers that travel in the sympathetic trunk contain their cell bodies in the dorsal root ganglia between T10 and L2. Similarly, visceral afferents traveling with parasympathetic fibers contain their cell bodies in the dorsal root ganglia between T10 and L2. These fibers coalesce to form the superior hypogastric plexus (SHP), which lies immediately anterior to sacral promontory at the L5–S1 level. The SHP transmits sensory input from the descending and sigmoid colon, rectum, vaginal fundus, bladder, prostate, prostatic urethra, testes, seminal vesicles, urethra, and ovaries. This plexus then divides into hypogastric nerves that eventually form the inferior hypogastric plexus (IHP), which lies immediately anterior to sacral promontory at the L5–S1 level. These fibers are then projected to the sacral segments S2-S4, where the midline structures of the pelvis receive most of their input from sympathetic fibers arising from T10–L1. These fibers coalesce to form the inferior hypogastric plexus (IHP). The IHP is the primary neural, autonomic coordinating center in the pelvis that integrates both parasympathetic and sympathetic output. Effenter fibers that derive from the IHP innervate the clitoris, vagina, and urethra in women and the prostate, seminal vesicles, vas deferens, epididymis, and penis in men.

The termination of the paired paravertebral sympathetic chains occurs at the sacrococcygeal junction and is called the ganglion impar (ganglion of Walther). The neural connections of this ganglion are poorly understood.

Painful sensations from the pelvis to the brain travel through dorsal root ganglion cells (sensory neurons) located in the thoracolumbar and sacral portions of the spinal cord. Certain CPP syndromes such as interstitial cystitis, irritable bowel syndrome, and prostatodynia (prostatitis) may be associated with neurogenic inflammation. This process is initiated by neuropeptides such as substance P, calcitonin gene-related peptide (CGRP), and neurokinin A and B, which are released by primary afferent neurons. Primarily C-fibers and some Ad-fibers are believed to be the primary afferent fibers involved in the process of neurogenic inflammation. Within the pelvis, neurogenic inflammation has been described in the digestive, genitourinary, and reproductive systems.
with its target; third, stimulating the pelvic area can produces paresthesia in un- desirable region provoking patient discomfort[20]. In addition, a complex network of peripheral nervous structures innervates pelvis. S3 root is the typical target of peripheral nerve field stimulation for persistent post-herniorrhaphy pain. [20]

Sacral neuromodulation seems to be effective for the treatment of pelvic pain and voiding dysfunction in patients with interstitial cystitis refractory to conventional therapy[21,22]. Usually patients with interstitial cystitis had a history of many years of uncontrollable pain and of ineffective therapy such as hydro distension, bladder instillation and cystectomy[23].

It is important to emphasize the role of different medical specialists in the diagnosis and prognosis of these pathologies. Usually it is the urologist, gastroenterologist or gynecologist, or even the general practitioner, who performs the primary diagnosis. From that point, reference specialist subjects the patient to a unidisciplinary treatment. Unfortunately, some patients are refractory to standard treatments. Multidisciplinary evaluation and treatment of patients must start as early as possible and should include urologists, gynecologists, gastroenterologists,

Final consideration concerns the psychological aspect of the patients' candidate to neuromodulation protocol. As literature suggests[24] a psychological assessment of patients candidate to implant of neuromodulation device is nowadays mandatory. Especially considering chronic pain, the multifactorial experience including behavioral, emotional and cognitive contributions have to be considered because at the base of modern pain concept. In our hospital we habitually perform a psychological evaluation of patients candidate to neuromodulation therapy. This kind of comprehensive evaluation is necessary because psychological assessment is one variable predicting implant success[25].

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ESRA1-0673

Refresher Course:

CANCER PAIN: THERAPEUTIC OPTIONS

De Negri P, Tirri T, Amadio R. Surgical Oncology and Pain Medicine, IRCCS Centro di Riferimento Oncologico della Basilicata, Rionero in Vulture, Italy. Despite the enormous advances in medicine in recent decades, cancer is still the most terrible diagnosis for patients. In the period 2000-2004 it has been calculated an incidence of neoplastic disease amounting to 21,375,222 new cases out of a population of 252 376 000 (Eurocare 4, 2004, Eurocare 5, 2013). In 2012, in Italy, 364 000 new diagnoses for malignancy (with the exception of skin cancers, which are estimated separately in approximately 67 000 cases) have been reported separately, with a higher incidence among men (56%) than women (44%). Excluding skin cancers, the most frequent cancer was colorectal cancer (more than 50 000 new cases), followed by breast cancer (46 000 new cases), lung cancer (38 000 new cases) and cancer prostate (36 000 new cases). (Report AIRTUM "The numbers of cancer in Italy 2012").

It has been estimated that there are 17.3 cancer deaths per 10,000 people in Europe, while in Italy the standardized mortality rate for cancer was 26.6 deaths per 10,000 inhabitants, with a higher incidence in men (37.3) than women (19.4).

Despite the enormous advances in medicine in recent decades, cancer is still the most terrible diagnosis for patients. In the period 2000-2004 it has been calculated an incidence of neoplastic disease amounting to 21,375,222 new cases out of a population of 252 376 000 (Eurocare 4, 2004, Eurocare 5, 2013). In 2012, in Italy, 364 000 new diagnoses for malignancy (with the exception of skin cancers, which are estimated separately in approximately 67 000 cases) have been reported separately, with a higher incidence among men (56%) than women (44%). Excluding skin cancers, the most frequent cancer was colorectal cancer (more than 50 000 new cases), followed by breast cancer (46 000 new cases), lung cancer (38 000 new cases) and cancer prostate (36 000 new cases). (Report AIRTUM "The numbers of cancer in Italy 2012").

It has been estimated that there are 17.3 cancer deaths per 10,000 people in Europe, while in Italy the standardized mortality rate for cancer was 26.6 deaths per 10,000 inhabitants, with a higher incidence in men (37.3) than women (19.4).
All experiments were performed in anesthetized male Sprague-Dawley rats after approval by the local animal care committee. General anesthesia was induced by intramuscular urethane and ketamine. Continuous hemodynamic monitoring was provided by arterial and venous cannulation. Tracheostomy of animals allowed mechanical ventilation with 30% oxygen. Endotoxemia was induced by an intravenous bolus injection of Escherichia coli lipopolysaccharide (50 mg kg⁻¹, serotype 026:B6). Either lidocaine 2% or normal saline were injected as a bolus followed by a continuous infusion via an epidural catheter. 300 minutes after injection of lipopolysaccharide or normal saline, gut epithelial permeability to fluorescein isothiocyanate-dextran (4 kDa), intestinal expression of inducible nitric oxide synthase by macrophages, and intestinal lipid peroxidation represented by 8-isoprostane tissue concentration were quantified.

Methods: All experiments were performed in anesthetized male Sprague-Dawley rats after approval by the local animal care committee. General anesthesia was induced by intramuscular urethane and ketamine. Continuous hemodynamic monitoring was provided by arterial and venous cannulation. Tracheostomy of animals allowed mechanical ventilation with 30% oxygen. Endotoxemia was induced by an intravenous bolus injection of Escherichia coli lipopolysaccharide (50 mg kg⁻¹, serotype 026:B6). Either lidocaine 2% or normal saline were injected as a bolus followed by a continuous infusion via an epidural catheter. 300 minutes after injection of lipopolysaccharide or normal saline, gut epithelial permeability to fluorescein isothiocyanate-dextran (4 kDa), intestinal expression of inducible nitric oxide synthase by macrophages, and intestinal lipid peroxidation represented by 8-isoprostane tissue concentration were quantified.

Results: Intravenous infusion of lipopolysaccharide was associated with a temporary drop in mean arterial pressure and a normotensive further course. pH decreased in all animals receiving lipopolysaccharide. Furthermore, gut epithelial permeability, intestinal monocyte expression of nitric oxide and lipid peroxidation increased during endotoxia. Thoracic epidural anesthesia significantly attenuated the endotoxin-induced increases in gut epithelial permeability (437 [293,492] vs. 628 [532,1042] ng ml⁻¹, median [quartiles], p=0.03), expression of nitric oxide synthase (2 [1,2] vs. 7 [5,8] cells per 384 μm², p=0.003), macrophage infiltration, and lipid peroxidation (22,460±11,476 vs. 37,840±17,551 px ml⁻¹, mean±SD, p=0.05).

Conclusions: Thoracic epidural anesthesia attenuates endotoxin-induced gut epithelial injury. This is likely due to a decrease in monocyte extravasation and intestinal nitrosative stress. As possible mechanisms, direct nerve-immune-interplay, a reduction in plasma catecholamines, or a systemic lidocaine effect, have to be considered.

Literature:

ESRAI-0674
Albert Van Steenberge Lecture
REGIONAL SYMPATHETIC BLOCKADE ATTENUATES ACTIVATION OF INTESTINAL MACROPHAGES AND REDUCES GUT BARRIER FAILURE

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Background: Failure of the epithelial gut barrier with subsequent translocation of enteric bacteria into the mesenteric lymph nodes or the portal system is suggested to be a key phenomenon for the propagation and aggravation of sepsis and the development of septic organ failure (1,2,3). Endotoxin of gram-negative bacterial cell walls activates monocyctic cells and endothelial cells leading to extravasation of immune cells with oxidative and nitrosative injury of the intestinal tissue. The endotoxin-induced excessive production of nitric oxide in monocyctic cells damages the epithelial cytoskeleton, which causes an increase in epithelial permeability (4). Regional sympathetic blockade using thoracic epidural anesthesia has been implicated to protect the epithelial barrier (5,6).

This study tested the hypothesis that the proposed protective effects of thoracic epidural anesthesia are due to an attenuation of monocyte nitrosative stress with a subsequent decrease in epithelial permeability.

Methods: All experiments were performed in anesthetized male Sprague-Dawley rats after approval by the local animal care committee. General anesthesia was induced by intramuscular urethane and ketamine. Continuous hemodynamic monitoring was provided by arterial and venous cannulation. Tracheostomy of animals allowed mechanical ventilation with 30% oxygen. Endotoxemia was induced by an intravenous bolus injection of Escherichia coli lipopolysaccharide (50 mg kg⁻¹, serotype 026:B6). Either lidocaine 2% or normal saline were injected as a bolus followed by a continuous infusion via an epidural catheter. 300 minutes after injection of lipopolysaccharide or normal saline, gut epithelial permeability to fluorescein isothiocyanate-dextran (4 kDa), intestinal expression of inducible nitric oxide synthase by macrophages, and intestinal lipid peroxidation represented by 8-isoprostane tissue concentration were quantified.

Results: Intravenous infusion of lipopolysaccharide was associated with a temporary drop in mean arterial pressure and a normotensive further course. pH decreased in all animals receiving lipopolysaccharide. Furthermore, gut epithelial permeability, intestinal monocyte expression of nitric oxide and lipid peroxidation increased during endotoxia. Thoracic epidural anesthesia significantly attenuated the endotoxin-induced increases in gut epithelial permeability (437 [293,492] vs. 628 [532,1042] ng ml⁻¹, median [quartiles], p=0.03), expression of nitric oxide synthase (2 [1,2] vs. 7 [5,8] cells per 384 μm², p=0.003), macrophage infiltration, and lipid peroxidation (22,460±11,476 vs. 37,840±17,551 px ml⁻¹, mean±SD, p=0.05).

Conclusions: Thoracic epidural anesthesia attenuates endotoxin-induced gut epithelial injury. This is likely due to a decrease in monocyte extravasation and intestinal nitrosative stress. As possible mechanisms, direct nerve-immune-interplay, a reduction in plasma catecholamines, or a systemic lidocaine effect, have to be considered.

Literature:
regarding the choice of anesthetic technique for surgery. This presupposes that the patient has the knowledge and intellectual capacity to play this collaborative or active role in the decision making process during the preoperative visit. (2) Unfortunately not all patients do have these skills. Previous negative experiences with either technique influences the decision making. But most patients are neutral about the anesthetic procedure and are more fearful of anesthesia in general. (3) The patient’s concern about pain at the puncture site, fear for needles or being awake during surgery influences the final decision. (4) Unfortunately the conceptions about regional anesthesia are greatly distorted. Regional anesthesiologist’s have not succeeded in educating the public about issues concerning regional anesthesia. Therefore future anesthesia related educational programs should address the concerns of the public about regional anesthesia. (5)

Education of other physicians.

Surgeons may influence the patient’s preference on the choice of anesthetic technique. Surgeons establish a relationship with patients in advance of surgery and have hereby a means of influencing a patient’s choice. Therefore it is important that surgeons are aware of the benefits of regional anesthesia. (6) In the education of orthopedic or trauma surgeons little attention is paid to this issue.

Also knowledge about complications and side-effects of regional anesthesia should be known by other medical specialists. For example physicians in other specialties who regularly use local anesthetics are responsible for knowing maximum dosage, recognizing the signs and symptoms of toxicity and being able to manage these should it arise. Unfortunately only 61% of non-anesthesiologists knew the maximum safe dose of lidocaine. Other complications of regional anesthesia are hardly known by non-anesthesiologists. So increasing awareness by non-anesthesiologist physicians about the advantages and disadvantages of regional anesthesia may result in improved safety and better outcome. (7)

Education of anesthesiologist not familiar with regional anesthesia.

The last decade due to introduction of ultrasound guidance a renaissance of regional anesthesia has occurred. Competence in regional anesthesia has become a necessity in modern anesthesia practice. It is known that previous years anesthesia training programs did not provide satisfactory exposure to regional anesthesia techniques. (8) These anesthesiologists are now working in daily practice and need to be re-educated in mainly peripheral nerve blocks. Learning these techniques is not more difficult than other manual anesthesia skills as endotracheal intubation, or arterial and central venous cannulation. (9)

The skills required to perform ultrasound guided peripheral nerve blocks can be learnt faster and lead to a higher final success rate compared to nerve stimulator guided techniques. (10) Moreover these experienced general anesthesiologists have extensive experience in manual skills so that the learning curves for learning new skills will not start at the bottom. Hence the minimum number of blocks to reach proficiency will be lower than the number for inexperienced residents. However learning new skills in practice is much different than during residency training.

Regional anesthesia fellowship programs.

Residency training or regional anesthesia fellowship training has undergone substantial changes. In 2005 formal guidelines for training were proposed by regional anesthesia fellowship directors and other advocates of regional anesthesia. (11) The purpose of this document was to recommend an organizational and educational framework to promote modern and comprehensive fellowship training in regional anesthesia and acute pain management. The guidelines recommend a number of scholarly and practice-based learning activities. A recently performed survey showed that present regional anesthesia fellowships offer a wide range of block experience. (12) There is up to now no consensus on the optimum number of block required to achieve competency in regional anesthesia.

Probably due to a longer resident training in anesthesia, formal fellowship programs are less often offered in Europe. However clinical training in regional anesthesia is achieved during residency or post-graduate clinical training.

Regional anesthesia curriculum for residents.

Initiatives have been undertaken to design and implementing a comprehensive learner-centered regional anesthesia curriculum for residents. The primary educational objectives of this curriculum includes the following: Standardized educational content, preclinical educational program, formal evaluation of residents in which resident performance, knowledge, clinical performance, technical skills. Also patient rapport and professional interactions with other health professionals is evaluated. (13)

Various learner-centered components may be added to the curriculum, including hands-on workshops, simulated training sessions, cadaveric sections, internet-based e-learning modules and simulation software.

Blended learning.

Blended learning is formal education in which resident learn, at least in part, through online delivery of educational content and instructions in which the students controls, time, place and content. Theoretical and practical face-to-face education is combined with computer assisted and mediated activities. The latter consist of full-time online learning in which a structured educational program about all theoretical aspects in regional anesthesia is offered and an informal online learning in which the students use the computer to learn outside a structured education program, e.g. computer games, online lectures visit websites etc. (14)

The international association for K-12 Online Learning has brought out national standards for the quality of online courses. (15)

Three online tools may be relevant as additional tools in the education of regional anesthesia, video lessons, podcasts and online quizzes. Every online tool seems to have a positive impact on learning as long as the tools are used to meet a given learning objective. The ESRA is offering an educational platform, the ESRA Academy, in which an interactive and educational tool is offered with podcasts, video’s, quizzes etc. In the future online courses may be developed and introduced in anaesthesiology residency programs. Societies of regional anesthesia have to play an important role in developing these courses.

Clinical teaching.

Teaching and learning on patients is the heart of medical education. Learning in a clinical environment has many strengths. It is the only setting in which all skills as history taking, physical examination, clinical reasoning, decision making, empathy and professionalism can be taught and learnt as an integrated whole. (16) The most efficient learning process in the clinical environment should follow an experiential learning cycle. The cycle follows four major steps: theory, planning, experience and reflection. Utilizing this framework transforms the learning into an active process.

For medical students and residents, the role of the teacher/supervisor is to keep the process going and complete the cycle. Experienced anesthesiologists have to go through this process on their own motivation.

Conclusion: In conclusion, curriculum guidelines and structured fellowship programs in regional anesthesia are available. Residents and fellows are offered a broad range of educational and practical experiences. However individual institutions are still responsible for maintaining and developing regional anesthesia training programs and should ensure that the set standards are achieved by the students. Teaching strategies should be incorporated into regional anesthesia training programs to improve the quality and efficacy of the learning process.

References

INTRODUCTION: Regional anesthesia is performed in many cases in pa-
tients on chronic anticoagulation. The interruption of anticoagulant and antibrading therapy is a common and challenging problem. These patients could
require temporary interruption of the administration of the anticoagulant drug, being necessary to balance the risk of a thromboembolic event during the inter-
ruption of the therapy with the risk for bleeding when the antithrombotic drug is administered too close to surgery.

Most patients receive oral and chronic anticoagulation due to atrial fibrilla-
tion or a mechanical heart valve, although other indications for it include cere-
brovascular pathologies (repeated strokes) or prevention of recurrences of previous thromboembolic events. Nowadays, the anticoagulant therapy could be
made by VKAs or by any of the new oral anticoagulants (DOAC), as dabigatran, rivaroxaban or apixaban, which are recently accepted or waiting their approval for these indications.

Current guidelines for the management of these patients are revised. Since
most of them refer to surgery as a whole, and could be applied for neuaraxial anes-
thesia, we will review also the specific recommendations for peripheral blocks.

MANAGEMENT OF PATIENTS UNDER THE EFFECT VITAMIN K ANTAGONIST: The perioperative management of VKAs is well established and
nearly no change has been done in the lately recommendations (1-3). Rational
decisions are made depending on the risks of thrombosis and bleeding associated with the different alternatives. To date, there are no validated risk stratification
schemes to reliably classify VKA-treated patients based on their risk for thrombo-
embolism and bleeding. The 9th ACCP offers risk stratification schemes (Table 3
and 4) to provide general guidance, based on indirect evidence and clinical expe-
rience (4, 5). Nevertheless, these patients will always benefit from management according to standardized and institution specific protocols.

In general the interruption of VKAs is required to achieve normal or near-
normal hemostasis at the time of surgery (INR 1.5 or below). This time must be
estimated based on the elimination half-life of VKA, 8-11 h for acenocumarol and 36 to 42 h for warfarin. Then, after stopping VKAs, between 3 and at least
5 days will be required for most anticoagulant effect to be eliminated. The 9th ACCP
recommends in patients who require temporary interruption of a VKA be-
fore surgery, stopping VKAs approximately 5 days before surgery instead of stop-
ping VKAs a shorter time before surgery (Grade 1C). After surgery, it is
recommended resuming VKA 12 to 24 h postoperative, when oral intake is per-
mittted and there is adequate hemostasis (grade 2C). In some cases with very
low hemorrhagic risk, as minor dermatologic or dental procedures or cataract sur-
gery, VKAs can be continued around the time of the procedure, optimizing the lo-
cal hemostasis if necessary (recommendation grade 3C in the 9th ACCP).

The temporary discontinuation of VKAs exposes patients to a risk of thrombo-
embolism since the INR is 1.5 before surgery till INR 2 is reached when
VKAs are restarted postoperatively. Then, for patients with a mechanical heart
valve, atrial fibrillation, or VTE at high risk for thromboembolism, there is a need of bridging anticoagulation (administration of a short-acting anticoagu-
ant) during interruption of VKA therapy. On the other hand, in patients at low risk for thromboembolism, the bridging can be avoided. When there is a
moderate risk for thromboembolism, the bridging or no-bridging approach cho-
sen should be based on an assessment of individual patient- and surgery-related factors. If the surgery or procedures is a low risk for bleeding, the bridging may
be considered; but if it is of high-bleeding-risk (major cardiac surgery, carotid
endarterectomy surgery), no bridging therapy may be better.

The bridging therapy can be performed with therapeutic-dose IV UFH or
therapeutic-dose sc LMWH. Both should be stopped before surgery time
enough to ensure normal hemostasis that is 4 to 6 hours for UFH and 24 hours for
LMWH. After surgery, therapeutic-dose LMWH should be resumed 24 h postoperatively in non-high-bleeding-risk surgery. In patients who are undergo-
ing high-bleeding-risk surgery, the resumption of therapeutic-dose LMWH
should be delayed 48 to 72 h after surgery.

In nonbridging clinical settings, according to the 8th ACCP (2), clinicians may
consider using low-dose LMWH for VKA-treated patients with prior VTE, in order to reduce the incidence of postoperative VTE. In these patients, low-dose LMWH will minimize the risk of postoperative major bleeding, espe-
cially for patients undergoing major surgery, with probably achieving much of
the benefit of therapeutic-dose anticoagulation. However, after surgery, resump-
tion of VKA therapy alone also may be considered as a method of prophylaxis against postoperative VTE.

MANAGEMENT OF PATIENTS UNDER NEW DIRECT ORAL ANTICOAGULANT (DOAC): New direct oral anticoagulants, with possi-
blities to be used as chronic medication for anticoagulation in the current indi-
cations for warfarin or acenocumarol are: rivaroxaban, apixaban and dabigatran.
They have in common they are given orally and they do not need antithrombin for their action, but they act in different targets of the coagulation cascade: rivaroxaban and apixaban directly inhibit factor Xa; dabigatran is a direct inhib-
itor of factor IIa. Several studies are being conducted with these drugs (table 6),
and some indications have been approved in some countries (6-11).

There is no experience about the perioperative management of DOAC.
Then, it is necessary to highlight some points:

1. There is no antidote for these drugs. Nowadays, although there are some pa-
pers with the use of PCC or factor VIIa, none of them could be considered as
antidote (12,13).

2. The dosage used for the chronic anticoagulation is quiet different to the dos-
ages used for thromboprophylaxis. In the tables it’s shown the main proposed
dosage for these drugs.

3. The safety objective to be reached in patients receiving new DOAC for “full”
anticoagulation is, in these days, unknown. The reason is that the use of any bi-
ological test with this objective implies the previous definition of the safety
threshold. Today it is not possible to define the minimal plasmatic concentration
of the drug or the range of Units of anti-IIa (dabigatran) or anti-Xa (rivaroxaban
or apixaban) to have the same hemorrhagic risk to a non-treated patient.

Due to the lack of experience with the management of these drugs as chronic
treatment, the main objective must be the safety considered as hemorrhage asso-
ciated to the surgery, the invasive procedure or a regional anesthesia. Of
course, the necessary antithrombotic protection should be in mind. With these
initial points, the main recommendations could be divided in two:

1. Stop the anticoagulant 4-5 days before surgery and make the bridging
with LMWH, as if it was AVK.

The rationale for this protocol, replacing the drug during some days before
surgery with a LMWH, raises from the difficulty to best balance both the throm-
botic and the bleeding risk in these groups of patients. This possibility has been
proposed by the French (14) and the Spanish anesthesiology societies (15). It
could be the best one (the most safety one) to manage the three DOAC as
one. In all cases the treatment is stopped at least 3 times the half-life (in fact,
more than three times), so the anticoagulant effect of any of them should be min-
imal (with 5 half lives the plasmatic level of the drug is less than 15%). Neverthe-
less, the last recommendations tends to suggest a preprocedural bridging strategy
for selected patients at high thrombotic risk (defined as a CHADS2-VASc score
more than 4 (16) or CHADS2, more than 2 (17)) or, with moderate to severe renal
impairment (defined as a creatinine clearance bellow 50 ml/min) (17).

In addition, it is necessary to administrate a LMWH to bridge the anticoagu-
lant effect (in a similar way it occurs with VKAs). The dosage of the LMWH
will be based on the thrombotic risk of the patient. The last dose of LMWH will
be 24 hours before surgery (when anticoagulant dosage is used).

Stopping the drug 4 or 5 days before surgery are both good choices, and it
could depend on the decision of each group. As general guide, the timing of
stopping and administration of LMWH could be drawn as shows table 1.

2. Stop the drug before surgery without bridge.

Based on DOAC rapid onset of action and short half-life, it has been pro-
posed their withdrawal some days before surgery or an invasive procedure
without the administration of LMWH (18). As DOAC have different half-lives and different renal clearance rates, this proposal must be adapted to each drug, the patient, the creatinine clearance and procedure’s bleeding risk. Nevertheless, there is no consensus on the “exact” time for this management. Moreover, the lack of experience and data in patients undergoing high risk bleeding procedures (neurosurgery, cardiac surgery, etc.) demands to be extremely careful in those scenarios.

In the case of rivaroxaban, it has been proposed discontinuing the treatment at least 24 hours (19). Also with dabigatran, a recently published revision proposed stopping between 1 and more than 5 days depending on the renal function and the risk of bleeding (20.21).

With so many different guidelines and so scarce experience, a local protocol is needed. Our consensus proposal based on recent articles and large discussions within the Spanish Forum is summarized in table 2 (15-17, 21-23). The bridging therapy is also reflected as an option in this decision algorithm, mainly for patients at high thrombotic risk. This protocol should be considered provisional until more clinical or research data on the use of DOAC in high-risk surgical patients help to reach a better consensus. In the meantime, our protocol proposes the minimal time without drug before surgery.

3. Time to resume the DOAC after surgery

Many concerns have been raised about the best moment for the anticoagulation resumption after surgery. The most frequent recommendation is to “resume the anticoagulation as soon as possible when the haemostasis is under control” (17, 24). But this is a subjective recommendation. Nowadays there are no specific indications for the post-operative use of DOAC at therapeutic dose, but we can summarize the main proposals as follows (assuming that the haemostasis is guaranteed in all cases) (16,25,26):

- Resume DOAC at half dose 24 hours after surgery. Full dose can be given by the second or third day.
- Administer prophylactic doses of a LMWH early after surgery (about 12 hours from the end of surgery) before restarting a DOAC at full doses some days after.
- If DOAC resumption is not considered for any reason and thromboprophylaxis is needed postoperatively, LMWH should be used.
- If there has been a bridging with LMWH an option would be the maintenance of LMWH during 2-3 days after surgery. Then, the beginning of the administration of the DOAC would be at 3rd or 4th day after surgery (this day, without administration of the LMWH, the DOAC would be instead).

THE CASE OF NEURAXIAL ANAESTHESIA: Neuraxial anaesthesia is widely used, mainly in patients undergoing an orthopaedic procedure. Haemostatic competence is required to avoid spinal/epidural bleeding. Although the incidence of spinal/epidural hematoma after a spinal puncture or an epidural catheter placement is relatively rare, they may lead to permanent paralysis if adequate treatment is not instituted promptly.

The VKAs effect is monitored by INR, and the therapeutic level of INR aimed at is generally 2.0-3.0 for the prevention of venous thrombosis and 2.5-3.5 for the prevention of arterial thrombosis. The reference value in untreated people is ≤1.2 (2). In major surgery, the preoperative INR aimed at is normally ≤1.5, which is managed as explained before. This would be also the INR aimed at for neuraxial anesthesia, but, depending on the technique and the strength of indication, the Scandinavian guidelines would recommend upper INR levels (table 3) (27).

The incidence of spinal/epidural hematoma in patients receiving chronically a DOAC is completely unknown. Some recommendations have been published for the management of neuraxial anaesthesia in patients receiving a DOAC for thromboprophylaxis (27-29), based on each DOAC pharmacological profile (pharmacokinetics and pharmacodynamics). In general, they follow the rule that it is necessary to wait at least two half-lives from the last DOAC intake before performing neuraxial puncture or removing a epidural catheter (30). Although it is quite difficult to reach evidence, the practice based on these recommendations is probably safe and does not increase the risk of neuraxial bleeding (31). But for patients receiving a DOAC for the prevention of a thrombotic complication in the setting of an atrial fibrillation or a venous thromboembolism, the higher dose, the chronic administration, the pharmacokinetic variability, etc., have moved to recommend a free interval of at least three half-lives before the puncture associated with standard coagulation tests in the normal range (PT:ratio and aPTT-ratio ≤ 1.2) (14,15). A more logical and compromise recommendation for scheduled surgery, could be to consider the neuraxial puncture as a “high risk” procedure, similar to an intervention in the spine, applying the same safety time recommended for these kind of surgeries before the puncture performance. This point of view means to overtake the three half-lives, having a free interval of 2 days for rivaroxaban and apixaban and 3 days for dabigatran, in a patient with a normal renal function (CrCl ≥ 50 ml/min). Finally, some authors have suggested a longer free window, with a more conservative recommendation of four to six half-lives before neuraxial injection or removal of epidural catheter (32,33).

THE CASE OF PERIPHERAL NERVES BLOCKS: Upon performing peripheral nerve blocks, bleeding complications are usually less important than those associated with neuraxial blocks. But, an eventual bleed can lead to a mechanical compression of the nerve with nerve palsy and could even lead to life-threatening bleeding if undiagnosed (34).

Recently ultrasound-guided peripheral nerve blockade has become a valuable tool that shows great promise given its success regarding the insertion of catheters and the result of the block. Nevertheless, it cannot be assumed in clinical practice as the new gold-standard for peripheral regional anaesthesia in absolute terms of efficacy and safety. This question is of paramount importance when we describe the guidelines for the performance of peripheral blockades in the setting of a patient under anticoagulation.

The proposal for the practice of deep plexus or peripheral nerve block by the ASA (35) states that it must have the same safety profile as neuraxial blocks. Thus, it seems necessary to maintain caution at least in some kind of blocks performed in a non-compressible area: posterior lumbar plexus, sciatic paracaecal or infraclavicular blocks so as to emulate the safety profile of neuraxial blocks (28).

In this line, the bleeding risk of a peripheral block should be evaluated. A good scheme could be the one proposed by the Spanish Forum on Anticoagulants and Anaesthesia for the risk of bleeding of surgery (table 4) (16).

CONCLUSION: Perioperative management of anticoagulation has been reviewed. The interruption of VKAs is required to achieve normal or near-normal haemostasis at the time of surgery (INR 1.5 or bellow). This time must be estimated based on the elimination half-life of VKA, then, a VKAs stop, between 3 for acenocoumarol and at least 5 days for warfarin will be required. Bridging therapy may be used to avoid thrombosis, mainly in patients with high thrombotic risk. DOAC management still remains controversial. Proposals are based on expert recommendations because there is very little experience in this scenario. The published proposals are aimed to maintain safety during surgery minimizing the bleeding risk, but also assuring a good antithrombotic protection. The final decision about DOAC management must be based on an individual and careful assessment in each particular scenario and be tailored for the safety of each patient in each particular situation.

REFERENCES:

If necessary, surgical haemostasia can be difficult. A perioperative bleeding may put at risk the patient's life or the outcome. A possible bleeding does not expose the patient to a vital risk nor put at risk the surgery outcome. A possible bleeding increases the need of transfusion or it implies a need of intervention. A perioperative bleeding may put at risk the patient's life or the outcome.

**TABLE 1.** Scheme of the recommendations based and modified from the Spanish Forum on Anticoagulants and Anesthesia for bridging therapy (15, 16).

<table>
<thead>
<tr>
<th>Last dose LMWH</th>
<th>First dose LMWH</th>
<th>DOAC</th>
<th>Recommended levels of INR for neuraxial block at different levels of benefit (modified from 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INR &lt; 1.4</td>
<td>INR &lt; 1.8</td>
<td>INR &lt; 1.2</td>
<td><strong>Suggested minimal time from last intake before surgery</strong></td>
</tr>
<tr>
<td>Comfort</td>
<td>Morbidity</td>
<td>Mortality</td>
<td><strong>TABLE 2. Proposed preoperative discontinuation time of direct oral anticoagulants based on renal function and bleeding risk.</strong></td>
</tr>
<tr>
<td>Single-shot spinal anaesthesia</td>
<td>Epidural and combined spinal-epidural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td>Morbidity</td>
<td>Mortality</td>
<td><strong>TABLE 4. A proposal for hemorrhagic risk classification (modified from 16)</strong></td>
</tr>
<tr>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td><strong>TABLE 3. Recommended levels of INR for neuraxial block at different levels of benefit (modified from 27)</strong></td>
</tr>
<tr>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td><strong>TABLE 3. Recommended levels of INR for neuraxial block at different levels of benefit (modified from 27)</strong></td>
</tr>
<tr>
<td>- If necessary, appropriate haemostasis can be made. - A possible bleeding does not expose the patient to a vital risk nor put at risk the surgery outcome. - A perioperative bleeding may put at risk the patient's life or the outcome.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>- If necessary, surgical haemostasis can be difficult. - A possible bleeding increases the need of transfusion or it implies a need of intervention.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>- A perioperative bleeding may put at risk the patient's life or the outcome.</td>
<td></td>
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ESRA1-0678
Symposium: Topics of future research for regional anaesthesia

WHAT KIND OF RESEARCH WE NEED IN REGIONAL ANAESTHESIA?

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tal, Helsinki, Finland.

Introduction: Due to global economic crisis and increased bureaucracy, re-
search, especially the clinical research, has become more difficult in recent
years. However, high standard research work is important in order to further im-
prove the patient care with regional anaesthesia and evaluate the possible bene-
cfits in clinical outcome. Regional anaesthesia societies have an important role in
generating international networks and supporting possible multi-centre trials.
One of the goals of ESRA is “To encourage specialization and research in the
techniques of regional anaesthesia for surgery, obstetrics and pain control” (1)
and also ASRAs vision is: “To be the leader in regional anaesthesia and acute
and chronic pain medicine through innovations in patient care and education,
and support of research and investigating the scientific basis of the specialty.”
(2). Even Wikipedia states: “Regional anaesthesia (or regional anesthesia) is an-
aesthesia affecting a large…strides in encouraging specialization and research
in regional anaesthesia (3).”

Traditionally, the anaesthesiologists have had fruitful collaboration with sur-
geons, pharmacologists, physiologists, statisticians etc. This collaboration re-
mains important part of high standard research and is especially important
during the planning of the studies.

Basic science: Basic science is still fundamental to the study of mechanisms
behind the clinical phenomena. Some old “truths” can be challenged and we
can also gain new knowledge about our everyday routines. Examples of this
are, for instance, the studies by Ban Tsui and colleagues about electrophysi-
ology of nerve stimulation (4) and Andersen and colleagues where they gained
new knowledge about sciatic nerve anatomy by using gross dissection, ultra-
sound examination, and histologic study (5).

We need more knowledge about the mechanisms behind development of
chronic pain or even worse syndrome like CRPS after trauma or operation
and if regional anaesthesia/analgiesia has a role in preventing them. Local anae-
thetic intoxication is a potentially life threatening but fortunately rare complica-
tion. Due to ethical reasons and rarity of this complication, no clinical randomised
controlled studies can be executed. At the moment, there are differ-
cent animal models that have given somehow contradicting results. I think that
we need more studies until the possible mechanism is clear and we can be cer-
tain that lipid is the first-line treatment for local anaesthetic toxicity.

New local anaesthetics have not appeared in the market for a long time. De-
veloping a new medicine is expensive and time demanding and it seems that
the industry, at the moment, does not consider the development of a new local an-
aesthetic to be economically sound. We still lack a perfect local anaesthetic.
There is a need for non-toxic, reliable and versatile local anaesthetic. Maybe
we need a couple of new local anaesthetics for different purposes. For postoper-
avie analgesia the differential block should be more profound than we have with
the present local anaesthetics. Then we could mobilize our patients pain free
without motor block and possible complications associated with it. An ultra-
short acting, non-cumulative local anaesthetic could be used as an infusion dur-
ing the operation as long as the operation lasts. If the block would wear out a
when the infusion is stopped the regional anaesthesia would have the predict-
ability of general anaesthesia.

Outcome studies: We think that regional anaesthesia has a potential to im-
prove postoperative analgesia and physiological homeostasis. With these
goals achieved, hopefully, there will be improvement in surgical outcome.
Also, economic impact of regional anaesthesia and analgesia has become
more and more important in recent years. I think that more European
multi-centre randomised studies are needed in order to observe the impact
of regional anaesthesia on important variables where the anaesthesia or an-
algiesia method can have impact.

Almost fifteen years ago Wu and Fleisher (6) stated that “Many questions
involved study design, data analysis and sample size contribute to the uncer-
tainty of the benefits of regional anaesthesia-analgiesia on patient outcomes. Little
has been done to determine the consequences of regional anaesthesia and postop-
erative analgesia on “non-traditional” patient outcomes, such as health-related
quality-of-life (HRQL) measurements, patient satisfaction, and economic as-
sements”. Since, a lot of research has been performed with these topics but
their statement has a lot of relevance even today. They also presented a nice fig-
ure, how these studies should be performed.

ESRA1-0679
Refresher Course: How to give a good scientific presentation

HOW TO GIVE A GOOD SCIENTIFIC PRESENTATION
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Speaking in public is according to the “Book of Lists” the second most fear of people. Being afraid of something is not easy to tackle but might influence the performance when giving a talk. However, numerous other factors contributing to the quality of a presentation are easy to modulate. The following summary will highlight the most important issues to consider when preparing or giving a lecture.

If you want people to understand and become interested in your work, your lecture should not only be clear, concise and focus on a limited number of points, it should also engage and inspire the audience. You should look at your talk as being a mission rather than a duty. The most common presentation problems are that they are boring, too complicated, consist of too many data and ignore the audience’s needs. Typical speaker problems are that they do not look at their audience, lack dynamic speaking, seem not interested in their own presentation and are badly prepared. Especially the latter can be prevented by making your presentation far in advance to allow for enough practice (use mirror, videotaping, proof presentations in front of family and friends). You should never use notes at hand during your presentation. However, it might be useful to write down the key messages per slide upfront, or at least prepare navigation phrases (how to make the transition from one slide to the next). When preparing your slides take into account, that people remember approximately 10% of what they read, 20% of what they hear, 30% of what they see and 60% of what they hear and see. After having selected an intriguing title for your talk, estimate one slide per minute speaking time. You should maximally use 6 lines covering 6 key words. Make use of the whole slide with adequate spacing. This does not only look more accurate and will be easier to read, it appears also more relaxed. Never write full sentences on a slide, since this would only lead to people reading instead of listening to your talk. In general, use as less text as possible. Try to cover most information/data using figures. You should employ at least 24 point font with different sizes for main and secondary points. As lettertype use cover most information/data using figures. You should employ at least 24 point

ESRA1-0680
Symposium: Topics of future research for regional anaesthesia
THE IMMUNOMODULATOR PROPERTIES OF LA AND ITS SIGNIFICANCE
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Blockade of voltage-gated sodium channels, leading to inhibition of nerve impulse conduction, is probably the most important effect of local anaesthetics (LA) and is the major mechanism underlying their well-known antinociceptive and anti-haemorrhagic effects. However, LA affect other cellular systems as well, amongst others K+ and Ca2+ channels, G-protein coupled (e.g. muscarinic m1 and m3, thromboxane A2, lysophosphatidate and platelet-activating factor receptors) and ionotropic receptors (e.g. NMDA receptors).1-2 These interactions may contribute to antinociception and anti-haemorrhagic actions, but could also explain some other LA properties and side effects.

In this lecture, I will highlight some actions of LA that are less well known to most anaesthesiologists. Most important, I would like to focus on the immunomodulatory properties of LA, that might contribute to their clinically observed effects on (inflammatory) pain, shortened recovery of gastro-intestinal function after surgery and their possible beneficial modulation of tumour biology.

Using systemic lidocaine perioperatively has been shown to reduce opioid consumption, decrease resting and dynamic pain, improve postoperative nausea and vomiting, fasten recovery of bowel function and shorten length of hospital stay by one day in numerous systematic reviews and meta-analyses.3-6 These beneficial effects hold primarily true for patients undergoing open or laparoscopic abdominal surgery. Less favourable results were reported for tonsillectomy, hip replacement and cardiac surgery.6 Although this pain improvement does at least partially result from LA interaction with NMDA receptor signaling, modulation of the inflammatory response leading to a reduction in inflammatory pain might also contribute to this phenomenon.1,2,7 In particular, the long lasting effects reported for a short acting drug like lidocaine point to a different direction than just a pure agonist-receptor interaction. Modulation of the inflammatory response is a potential underlying mechanism for the long lasting pain improving effects of lidocaine described in literature. This hypothesis is supported by the fact that patients undergoing surgery associated with a marked (excessive) stimulation of the inflammatory response (e.g. abdominal surgery) benefit more from systemic administration of lidocaine than patients with minor surgery and as such less pro-inflammatory stimulation.6

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Koppen et al. and Groudeva and cowokers report a significant and clinically relevant improvement in pain management even 36 and 72 hours after discontinuation of intravenous lidocaine.8-9 Moreover, 3 months after surgery, less chronic post surgical pain (CPSIP) was reported for patients undergoing breast cancer and complex spine surgery, following a short lasting perioperative administration of systemic lidocaine, suggesting a mode of action independent of LA being present in the blood, such as modulation of the inflammatory response at a molecular level.10-11 In the latter study even a significant reduction in overall 30 day complication and an improved SF-12 score after 3 month have been reported.11

With respect to modulation of inflammation, LA have been shown to interfere with almost all steps of the inflammatory cascade at least in vitro. In short, various LA were shown to inhibit leukocyte adhesion by an impaired expression of adhesion molecules (e.g. CD11b).12-15 Lidocaine pretreatment was shown to inhibit leukocyte chemotaxis, thus directed motility in a concentration-dependent manner.5 Within the innate immune response, pathogens are coated (opsonized) with specific serum proteins and neutrophils are primed. Priming refers to a process whereby the response of neutrophils to a subsequent activating stimulus is potentiated. Release of oxygen metabolites is markedly enhanced when activated neutrophils have been primed previously. Importantly, the priming process has been shown to be a critical component of neutrophil-mediated tissue injury both in vitro and in vivo. LA have been shown to block the priming of neutrophils by lysophosphatidic acid (LPA) and PAF with half-maximal inhibition concentrations (IC50) of approximately 1 mM. NADPH-oxidase activity, Ca2+ and PKC, all likely to be involved in the priming process, have also been described to be inhibited by several LA. It is conceivable that inhibition of priming contributes to the anti-inflammatory action of LA, and in particular suppresses the deleterious effects of the uncontrolled, overactive response of inflammatory cells to a stimulating agent. A specific interaction of LA with G-protein subunits, most likely the Gq subunit, underlies this inhibition of neutrophil priming.15-16

Beneficial effects of LA have been reported for three different types of inflammatory lung injury, namely hydrochloric acid (HCl), endotoxin- and hypoxia-induce lung injury in various animal models. Not only neutrophil accumulation, free radical production, pulmonary edema and cytokine levels in bronchoalveolar fluid were reduced, but also lung function was improved, indicated by an increase in PaO2 and attenuation of both decreased compliance and increased resistance.17-19 In addition, in a murine septic peritonitis model, LA were shown to reduce mortality and protect against renal and hepatic dysfunction supposedly by lowering cytokine levels and a reduced expression of adhesion molecules.20

One of the main causes of morbidity and prolonged convalescence after major surgery was found to be postoperative ileus. LA also shortened the duration of postoperative ileus in patients undergoing major abdominal surgery. In this era of evidence based medicine, where measurable improvements in patient outcome become ever more the yardstick by which therapeutic interventions are evaluated, the study by Groudeva et al. is of great importance.5 They demonstrated in patients undergoing radical retropubic prostatectomy, that systemic lidocaine administration during and shortly after the procedure (plasma concentration between 1.3-3.7 mg/ml) shortens return of bowel function, reduces postoperative pain and, most impressively, decreases hospital stay. The return to normal bowel function in this regard might be explained in part by a direct excitatory effect on intestinal smooth muscle as a result of a blockade of inhibitory reflexes from the myenteric plexus. However, the effect on bowel function persists for 36 hours after the infusion was discontinued. Since anti-inflammatory effects of LA are prolonged and remain measurable even after several hours have decreased this might be a more likely underlying mechanism for the observed effect, consistent with the observation that non-steroidal anti-inflammatory drugs are similarly effective. These beneficial effects of LA on return of bowel function, less postoperative pain and shortened length of hospital stay were confirmed by other authors as well and supported by recent meta-analyses.20,21

Even compared to epidural analgesia, systemic administration of LA was similar in effect size with respect to return of bowel function, management of postoperative pain and length of hospital stay, but lacking the hemodynamic effects of sympathetic block and even more important the at times devastating serious neurologic complications associated with epidural analgesia.22-27 While waiting for results concerning considering patient safety, Vigneault et al. concluded from their systematic review of 29 studies that the incidence of adverse events between the systemic lidocaine and control groups was comparable.8 Since LA impair neutrophil presence and function, concerns arose that LA might increase the susceptibility to infections. Although in theory an increased risk of infection might be expected, several studies suggest that the remaining neutrophil function is sufficient to minimize the risk. Nonetheless, LA should be employed with caution in settings of gross bacterial contamination. However, their use in sterile inflammation appears to be beneficial, since LA are known for inhibition of excessive inflammatory responses without significant impair- ment of the host’s immune system. Antimicrobial actions by LA reported in vitro and in vivo are obtained only at millimolar concentrations. Finally, LA impact on tumour biology should be addressed. Whether regional anaesthesia has the potential to improve outcome in cancer patients has been a topic of intense discussion and research efforts ever since a retrospective study demonstrated survival benefits in patients subjected to perioperative paravertebral anaesthesia during mastectomy.28 Since then, some studies have confirmed this promising trend, others have failed to detect beneficial effects of regional anaesthesia, and some have found benefits only in specific patient subgroups.29-32 The mechanisms by which regional anaesthesia may theoretically affect tumour progression are threefold. First, perioperative suppression of the surgical stress response by regional anaesthesia improves host defence, and may protect against circulating tumour cells. Second, opioids have arguably been linked to promote tumour growth and regional anaesthesia allows for dose-minimization of opiates, but it is unclear whether opiates clinically affect cancer recurrence. Third and most important for this lecture, LA present in the systemic circulation may directly limit viability of tumour cells by interaction with natural killer (NK) cell activity or modulation of src signalling, or sensitize them against chemotherapeutics.30-32

Conclusions: I have summarized several interesting and potentially important "alternative" effects of LA, not explained by their well-known antinoceptive and antiarrhythmic actions. The most remarkable observation is that LA are able to prevent pathological changes such as excessive stimulation of the inflammatory system, without impairment of host defense. This sets them apart from drugs currently in use for treatment of such disorders, and points the way to potential therapeutic application. Indeed, we use intravenous LA infusions in patients who would benefit from epidural anaesthesia/analgiesia but are not candidates for the technique. I hope that this lecture will urge some listeners to investigate these effects in more detail, because much more research is needed on basic mechanisms. What does seem clear is that Na+ channel blockade plays only a limited, if any, role in these effects. Further research should determine which molecular determinants of the LA structure exert these effects and where the corresponding site of action is. This might eventually lead to development of new drugs, selective for treatment of these disorders, but without the "side effect" of Na+ channel blockade. In addition, LA ability to affect tumor biology is poorly understood and limited to experimental research, thus requires determination of its clinical impact in human studies.

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application has been expanded from the extremities to the trunk (paravertebral, TAP, rectus sheath). Unfortunately, a lot has been learned from battlefield and disaster medicine where peripheral nerve blocks are increasingly utilised under difficult conditions. The use of regional techniques in the emergency setting significantly reduces the length of stay in the ED by avoiding opioid related side effects resulting in enhanced patient throughput. Fascia iliaca compartment block (FICB) or femoral nerve block provide excellent pain relief in patients with fractured hips. In some medical emergency systems the latter techniques are used by physicians on-scene to provide immediate pain relief for evacuation and transport. Recently, emergency departments have started to implement protocols based on regional techniques to guarantee rapid access to anaesthetic management for elderly patients with hip fractures.

Chest trauma is a frequent diagnosis in severely injured patients and causes multiple problems in the acute and late phase of trauma. Severe pain, difficult respiratory weaning and further respiratory therapy, pulmonary complications, delayed mobilisation, and a high risk for developing chronic pain are some of them. Regional anaesthesia be it epidural or paravertebral should be part of a multimodal regimen. It has been shown that both techniques are equal in terms of analgesia and given the better safety profile of thoracic paravertebral block, the latter technique should be first choice in the treatment of unilateral chest trauma. Nevertheless, thoracic epidural analgesia seems to be the more effective in patients with bilateral chest trauma including sternum fracture. Severe injury to limbs, extensive soft tissue trauma and traumatic amputations are significant sources of pain. Continuous peripheral nerve blocks tailored to the site of injury provide superior pain relief and “top-ups” can be used for follow up surgery/painful procedures in the injured area (dressings, debridements). Catheter techniques are often used in combination in trauma patients (e.g. femoral/sciatic) over a longer period of time and despite considerable amounts of local anaesthetics being infused serum free concentrations remain well below toxic thresholds. In the context of damage control surgery treatment of none-life-threatening injuries is often postponed beyond the acute phase of trauma when patients are resuscitated, weaned from mechanical ventilation and sedation. Regional techniques are regarded beneficial compared to general anaesthesia during this early and vulnerable stage of convalescence. Patients do require neither airway management nor mechanical ventilation when gas exchange may be still impaired.

Compartment syndrome (CS) is a feared problem in severely injured patients as it represents the second most common complication after DVT in patients with lower limb injuries. If not diagnosed and treated promptly it may lead to life-long disability. There is an ongoing controversy about masking early symptoms of CS by regional techniques but without any convincing evidence. Continuous techniques using low concentrated local anaesthetics (e.g. 0.2% ropivacaine) allow the appearance of breakthrough pain as one of the most significant early signs of CS. Nevertheless, patients at risk have to be identified early and monitored closely. General Surgery. Thoracic epidural analgesia is still regarded as method of choice after major upper abdominal surgery. In surgical patients epidural analgesia is frequently initiated in the operating room and follow-up management is transferred to ICU staff. Surgical patients presenting with (pan)tylneous major fractures may benefit from initiating epidural analgesia by improving gastrointestinal motility. Acute pancreatitis and severe sepsis are possible indications for thoracic epidural analgesia by decreasing regional sympathetic activity. Although experimental results in this field of research are promising it is too early to draw any conclusions on outcome.

Vascular/ Cardiac Surgery. Most continuous techniques are already started in the operating room and have to be continued in the ICU. Acute ischaemic limb pain as one of the most painful conditions remains a challenge in terms of pain management. Regional anaesthesia not only controls pain but also improves arterial perfusion by vasodilatation through sympathetic blockade. Peripheral nerve blocks are regarded as safe in the presence of anticoagulation and should therefore be considered as first line option in the treatment of these patients. Anti-coagulation often limits the use of regional techniques in patients after cardiac surgery. Post-thoracotomy pain or painful chest drains can be safely managed by means of intercostal nerve blocks if necessary. Epidural analgesia reduces cardiac oxygen demand along with coronary vasodilatation.

References

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ESRA1-0682
Ask the Expert:

SONO-ANATOMY OF THE UPPER EXTREMITY: IMPORTANT CONSIDERATIONS FOR CLINICAL PRACTICE
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The subspecialties of regional anaesthesia and interventional pain management challenge clinicians with a „must have“ of profound anatomical knowledge. The rapid development of ultrasound guided techniques and their increasing popularity has brought answers but questions concerning (sono-)anatomy as well. Modern ultrasound devices are able to provide images in excellent quality that even small peripheral nerves/ cutaneous branches can be visualised. Thus, a thorough understanding and detailed knowledge of topographical anatomy is mandatory for clinicians as well as for instructors. The following abstract provides a brief summary of the most frequent anatomical variations that may be encountered during the performance of common peripheral nerve blocks on the upper limb.

The brachial plexus is formed by the ventral rami of the spinal nerves C3-Th1. The term „prefixed“ refers to a contribution of C4 to the brachial plexus (41/100 cases) whereas „postfixed“ means that T2 is involved in the formation of brachial plexus (4/100 cases). Significant variations in brachial plexus anatomy have been found in up to 53,5% of plexuses examined in cadaver studies.

• Interscalene: The most frequent variant involves the C5 and/or C6 roots. Both roots (together or separately) can be found within the substance of the anterior scalene muscle and pierce the latter on its anterior surface. The C5 as well as C6 root may pass distally on the anterior surface of the anterior scalene muscle. A frequent finding during an ultrasound guided interscalene brachial plexus block are bridges of muscular tissue between the roots of the brachial plexus (most often between C5/C6 and the remaining roots). These bridges may limit the spread of local anaesthetics to deeper parts of the brachial plexus to some extent. The phrenic nerve pierces the brachial plexus and therefore does not represent an anatomical variant.

• Suprascapular: in most instances the trunks are arranged lateral to the subclavian artery. The suprascapular nerve originates from the superior trunk and shows some variability concerning its level of origin. The dorsal scapular artery if present in the suprascapular region regularly pierces the brachial plexus and therefore does not represent an anatomical variant.

• Infraclavicular: variation of plexus anatomy mainly regards the position and arrangement of the three fascicles in relation to the axillary artery.

• Axillary: the positions of the median, ulnar, radial and musculocutaneous nerves in relation to the brachial artery show a remarkable degree of variability. The location of the radial nerve is quite constant within a small range of variability whereas the median and ulnar nerves are frequently found at different positions. The musculocutaneous nerve normally passes distally through the substance of the coracobrachialis muscle in between the coracobrachialis and biceps muscles. It can also accompany the brachial artery for a longer distance. Branches of the musculocutaneous nerve are sometimes visualised within the substance of the biceps muscle.

In rare instances the brachial plexus may exist as a single trunk.

References:

ESRA1-0683
Symposium: RA for thoracic Surgery/anaesthesia
CONTINUOUS WOUND INFUSION FOR THORACIC/HEART SURGERY: EVIDENCE?
Garatti L.1, Gonzalez-Aragoneses F.2, Benito C.3, Olmedilla L.1, Cruz P.1, Puñido P.1, De la Gala F.J.1, Duque P.1, Peñalver R.2, Simon C.2. Anesthesi- sia and Reanimation, Hospital General Universitario Gregorio Marañón, Madrid, Spain, 2Thoracic Surgery, Hospital General Universitario Gregorio Marañón, Madrid, Spain.

Pain is considered one of the main factors responsible for morbidity after thoracic surgery. The most obvious direct effects of thoracotomy, pain are objet-
tified in observing changes in ventilatory mechanics, shallow breathing and difficulty coughing. Its impact on the body is deep and is considered the most important to decrease lung function after thoracotomy, although there are obviously other factors (additives) that explain this respiratory deterioration factor.

Both thoracic surgeons and anesthesiologists are responsible for perioperative care of patients in thoracic surgery, and we clearly accept that patient satisfaction improved when any regional technique is used to treat pain post-thoracotomy. Many studies comparing the two-analgesic anesthetic (regional versus intravenous) techniques show mostly favourable results for regional analgesia. While resting analgesia provided by high doses of intravenous opioids could be similar to that of regional analgesia, the most important differences have been demonstrated during the postoperative respiratory physiotherapy (cough, mobilization, sigh). It’s considered that necessary doses of opioids for proper respiratory therapy are not compatible with safe clinical practice. We know that during intravenous analgesia the painful stimulus reaches the central nervous system structures (CNS), however with regional analgesia, a large proportion or even completely, nerve signal don’t reach CNS. This is the main reason to explain a greater (deleterious) neuroendocrine response in patients managed with intravenous analgesia.

Recent reviews describe still in 30 to 86% of patients complain of moderate to severe pain after thoracic surgery. Given the importance of further improving analgesic quality and comfort of our patients postoperatively, continue to appear in our therapeutic arsenal for new tools aimed at this. One of them are the elastomeric pumps.

Elastomeric Pumps
These pumps are devices for continuous administration of drugs and have been a major breakthrough for cancer patients and in the treatment of acute postoperative pain:

1. Efficacy. Constant by continuous infusion of the drug plasma levels will be achieved, whereby the “peaks” associated with bolus administration is avoided. This facilitates particularly the treatment of pain and anesthesia.
2. Use of lower doses and less aggressive. Continuous infusion over a time al-

...
2. Reservoir bag. It is the place in which the drug is stored. It is able to create a continuous positive pressure sufficient to propel the solution containing, at a uniform speed, to the tube connecting the patient's catheter. The reservoir of the pump is made of elastomeric polyisoprene material because of its low reactivity, allows an adequate stability of the drugs inside. The elastomeric pumps habitually use of infusion pumps. The changes of precipitation increased proportionally to the number of medications and their doses mixed. The physicochemical compatibility of substances does not mean that the mixture is stable in the short or long term.

3. Connection tube to the patient's catheter. It is the part that connects the reservoir with the connector, also type luer-lock, which connects to the patient's catheter. Through this tube circulates medication from the reservoir with constant positive pressure.

4. Flow restrictor. It is a capillary, usually glass, which is joined to the luer-lock connector to the outlet end of the infuser. It’s calibrated to maintain the nominal flow rate is.

5. External housing. Protects the reservoir and permits control of pouring, as it will produce drug instillation.

**USE OF ELASTOMERIC PUMPS IN THORACIC SURGERY IN**

Elastomeric pumps can play a good role in improving the comfort and rehabilitation of patients undergoing thoracotomy. In our hospital, these pumps are used in the following circumstances:

1. To provide analgesia through catheters placed by the surgeon before commencing the closure of the thoracotomy. The surgeons can insert two catheters multiorifice of 12.5 cm in length in the surgical area. Catheters were placed above and below the anterior thoracotomy and progress backwards. The first catheter is placed along as close as possible to the intercostal nerve to achieve union costotransverse rib. The second catheter was placed in the subcutaneous tissue plane above the latisimus dorsi muscle in its entire length. The subcutaneous tissue is richly vascularized by capillary blood and lymphatic systems, enabling a high capacity for absorption of substances, with an estimated 2 ml / h maximum flow, if administered as a bolus, 2 ml each. This technique is widely used pro analgesic effective ness and a potential aid to complete analgesia administered by other routes and reduce the need for opioids and their side effects. It can be used for several days and allows ambulation (patient are not connected to other electric pumps with wires). Postoperative analgesia is applied with 0.25% bupivacaine (0.15 ml/kg/h) through an elastomeric pump that joins the two catheters through a double-pass key.

2) Two catheters are placed under direct vision into the ipsilateral thoracotomy with a 6.5 cm paravertebral space (typically T5-T6). With the aid of a tun nel (provided in the kit the device) catheters are positioned above and below the rear end of the thoracotomy. The extrapleural dissection is performed to create two tunnels reaching the heads of the ribs, anterior to the transverse process, up to paravertebral thoracotomy space. Two catheters were progressing from the parietal pleura using introducers that come in its entire length. The subcutaneous tissue is richly vascularized by capillary blood and lymphatic systems, enabling a high capacity for absorption of substances, with an estimated 2 ml / h maximum flow, if administered as a bolus, 2 ml each. This technique is widely used pro analgesic effective ness and a potential aid to complete analgesia administered by other routes and reduce the need for opioids and their side effects. It can be used for several days and allows ambulation (patient are not connected to other electric pumps with wires). Postoperative analgesia is applied with 0.25% bupivacaine (0.15 ml/kg/h) through an elastomeric pump that joins the two catheters through a double-pass key.

3) Also we can use these elastomeric pumps provide analgesia through the paravertebral catheter placed in the operating room the anesthesiologist. To provide analgesia with this infusion pumps the flow rate are needed at least 6 to 8 ml/hr.

**Pump elastomeric Weakness:**

- The dosage changes must be made depending on the concentration in the on going management of fixed devices, not the variable administration.
- Default bolus volume depending on the selected device.
- Once medication is loaded with an infusion, is usually not possible to add more if the analgesic regimen was insufficient. For this reason, the doctor will prescribe a regimen rescue. Otherwise (excessive analgesic regimen) the dose should be reduced in the following infusion.
- There is a permissible error of plus / minus 15% in the flow rate.
- Do not have alarms to alert the malfunction.

**Conclusions** Continuous infusion of local anesthetics through elastomeric pumps is an effective and safe to provide postoperative analgesia in patients undergoing thoracic surgery. Furthermore, the use of these pumps provides patients greater convenience to facilitate early ambulation, not having to rely on electric pumps. The nurses should be familiar with the use of these systems.

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**References**

- Ilfeld BM, Morey TE, Enneking FK. The delivery rate accuracy of portable infusion pumps is an effective and safe to provide postoperative analgesia in patients undergoing thoracotomy. In our hospital, these pumps are used in the following circumstances:


1. Abdominal surgery is characterized for a long time ago by moderate to severe postoperative pain, mainly induced by mobilization. Postoperative pain relief, besides to improving patient’s comfort, is likely to have beneficial effects on postoperative recovery course (1). But abdominal surgery is moving to less invasive procedures, as illustrated by the development of laparoscopic approach. In this context, anesthesiologists have to think about the development of new strategies to manage postoperative pain.

2. Epidural analgesia (EA) is a well-established technique and has been for a long time the gold standard for pain management after major abdominal surgery (2). Besides to analgesic effects, EA has demonstrated beneficial impact on postoperative outcomes, including a decrease on pulmonary complications, a reduction of the duration of intestinal ileus, and some beneficial metabolic properties (3). The development of parietal infiltration (Surgical Site Catheter Analgesia = SSCA) was based on the recognition that a major component of postoperative pain arises from surgical wound incision (4), and also from the need for our analgesic strategies to follow the surgical evolution toward less invasive procedures (5). Above all, unlike EA, SSCA is very easy to implement, can be performed in almost all patients, has a very low failure rate and is quite harmless.

3. Undoubtedly, EA remains the best analgesic technique for a lot of procedures, such as major perineal surgery, upper abdominal and esophageal surgery as well as thoracic surgery. In these indications, the benefit/risk ratio is clearly in favor of using EA as the first line analgesic treatment. Conversely, the beneficial effect of EA is questionable after less invasive procedures. For instance, EA after laparoscopic colorectal resection seems worthless (6) and not better than intravenous lidocaine (7). Consistently, international recommendation for pain treatment after laparoscopic colorectal surgery do not mention EA anymore (8). This is an illustration of the concept of “no pain – no gain” associating EA to an unfavorable benefit-risk ratio in the setting of mini-invasive surgery.

4. Some recent reports have shown SSCA to be able to an efficient alternative to EA after abdominal surgery (9). When the same local anesthetic regimen (10 ml/h ropivacaine 0.2%) was administered either by SSCA or EA routes, no difference was observed on pain relief or recovery course.

5. The development of parietal infiltration (Surgical Site Catheter Analgesia = SSCA) was based on the recognition that a major component of postoperative pain arises from surgical wound incision (4), and also from the need for our analgesic strategies to follow the surgical evolution toward less invasive procedures (5). Above all, unlike EA, SSCA is very easy to implement, can be performed in almost all patients, has a very low failure rate and is quite harmless.

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relief and recovery course was observed as compared to the preperitoneal continuous administration of ropivacaine during the postoperative period (10). Recent pathophysiologic data have highlighted that at least a part of the nociceptive inputs coming from the peritoneum and abdominal viscera do not pass along the spinal nociceptive pathway and could be blocked by direct peritoneal administration (11). In this perspective, SSCA would be able to provide additional benefits in combination with EA (12).

The place of SSCA is still the subject of many controversies. Firstly because there is still a lot of unresolved questions about the best modality to use it. There is huge discrepancies between trials on SSCA (catheter placement, flow rate, type of surgery…), making meta-analysis not really informative (13,14). The preperitoneal placement of the catheter (i.e. between the peritoneum and the muscular-aponeurosis layer) seems associated with a better efficacy than the subcutaneous placement (15). A high flow rate of local anesthetic (5-10 ml/h) seems associated with better algiesmic results. Data on the benefit of using SSCA for pain relief after laparoscopic colorectal resection (surgical piece removal incision) are still lacking.

In conclusion, SSCA presents a favorable benefit/risk ratio, especially during mini-invasive surgery or in several specific populations (antithrombotic therapy, elderly patients…). SSCA has to be viewed as a component of a multimodal analgesic strategy that could be considered as a suitable and efficient analgesic technique. Still a lot of works have to be done on SSCA in order to improve our knowledge about the best way to use it.

References
fibrosis, scarring dural sac deformities, pachymeningitis, pseudomeningocele, and syringomyelia.

Although reports of acute chemical meningitis have nearly disappeared after the widespread adoption of disposable needles and syringes in the early 1970s, the development of adhesive arachnoiditis and its link to chemical dextrose has not been convincingly established in patients [6,7].

Regarding neuraxial block performed for chronic pain very few data are available. The total number of such procedures was low and the high complication incidence estimates are therefore uncertain also because in some countries non-anaesthesiologists, even physiotherapists, inject local anaesthetics with and without epidural steroids for ‘back pain’. Until now only a study was available: a 2006–2007 national UK audit. In this study resulted that complications from neuraxial procedures for chronic pain were not more common than for other indications [8].

Reagarding severe complication after peripheral nerve block a primary and potentially modifiable risk factor for neurological complications after nerve blockade is direct intraneural needle trauma or injection [9]. Direct nerve trauma may be particularly important during proximal brachial plexus block as these blocks have the highest incidence (1–6%) of neurological complications [10]. Anatomical studies have noted that the amount of non-neural tissue around the brachial plexus is least at proximal sites (such as the interscalene area) and increases distally (axillary). Although a recent study demonstrates 85% incidence of unintentional intraneural injection with anatomical landmark guidance for axillary block and an 88% incidence with nerve stimulator for popliteal block as noted on subsequent ultrasound imaging. With ultrasound guide some Authors noted that unintentional nerve injection may happen but with with no neurological complications at early and late follow-ups and other human experience demonstrated that intraneural injection of 2–5 ml of local anaesthetic solution in the brachial plexus [11], [12] and 4–40 ml in the sciatic nerve [13] results in ultrasound images of nerve swelling, but without subsequent neurological complications. Several explanation were possible. First of all, intraneural injection is likely to be placed harmlessly in intraneural connective tissue with out disrupting nerve fascicles and causing nerve injury. Functional cadaveric studies suggest that intraneural injection is rare and difficult to accomplish with blunt-tipped block needles. The incidence of permanent peripheral nerve injury after regional anaesthesia is inherently low (estimates range from 1:1000 to 1:30 000).

Most of the injuries from regional anaesthesia are temporary. High severity injuries continue to result from neuraxial cardiac arrest and neuraxial hematomas associated with coagulopathy. Heightened vigilance and prompt diagnosis and treatment may improve outcome in these cases.

References


PULSED RADIOFREQUENCY FOR NON-AXIAL NERVES

Bertini L1, Cozzani V, Mancini S, Martini G, Giannuario A. “Chronic Pain Management and Day Surgery Anaesthesia, Presidio S. Caterina della Rosa, ILSLRC, Rome, Italy.”

Radiofrequency current was introduced as a modality to make therapeutic lesions at various target nerves throughout the body. Cosman and his associates built the first CRF lesion generator in the early 1950s, but CRF was first used to treat pain in 1974 [1]. The routine use of RF current for treatment of chronic pain began in 1980 when Sluijter and Metta introduced a 22g cannula through which a thermocouple probe could be inserted [2]. Its mode of action has been presumed to be entirely due to its effect of producing thermal lesions in neural tissue, but in 1996 Ayrapatyan, a scientist from Armenia, proposed that the clinical effect of CRF might be secondary to magnetic field exposure rather than tissue destruction [3]. Cosman later showed that the magnetic field produced by CRF was most likely too weak to have a biological effect, but that the rapidly changing electrical field was perhaps significant enough to do so. Few months later the same authors demonstrated that CRF was capable of delivering radiofrequency energy sufficient to modulate the electrical field, but insufficient to cause tissue thermoconagulation. Radiomics engineered a prototype RF generator and Sluijter performed the first spinal ganglion pulsed RF lesion in 1996 [4].

Pulsed RF is delivered in short (200ms) bursts twice per second followed by a quiet phase (lasting 480ms) in which no current is applied. This allows for heat dissipation thus keeping the tissue temperature below the neurodestructive threshold of 45°C. Pulsing the current also allows the power output of the generator to be substantially increased. The usual output of voltage in the continuous mode is 15-25 volts while a pulsed radiofrequency lesion is usually performed at 45 volts.

Until now the role of pulsed RF in clinical practice has been discussed. The effects of pulsed RF applied to the peripheral nerve have not been confirmed. Several authors have reported that the antinociceptive actions induced by pulsed RF would be the enhancement of noradrenergic and serotoninergic descending pain inhibitory pathways and the inhibition of excitatory c-fiber.

Pulsed RF was originally thought to be a totally non-destructive procedure. But Cosman and Cosman [5] demonstrated that even PRF can produce bursts of heat within the range requisite for tissue destruction. The possibility of tissue destruction with PRF is substantiated by in vitro egg white studies using PRF electrodes at 60°C or higher [6]. However, histopathologic work on rat dorsal root ganglia and sciatic nerves using PRF electrodes at 42°C has shown that PRF causes only transient endoneurial edema; this in contrast with the wallerian degeneration effected by CRF at 80°C. The notion that the electrical fields generated by PRF can affect neuronal membranes is supported by neurophysiological studies that demonstrate PRF changes synaptic signaling and causes electroporation. A popular theory is that the rapidly changing electric fields produced by PRF alter the transmission of pain signals via a pathway involving c-Fos, a so-called immediate early gene [7]. This study contradicts a previous study conducted by Higuchi et al. [8], who found increased c-Fos immunoreactivity in laminae I and II of the rat dorsal horn only in rats treated with PRF at 38°C and not in those treated with CRF at 38°C or sham. Changes in c-Fos are associated with a number of cellular processes and that the upregulation of c-Fos observed with PRF may be unrelated to the mechanism by which PRF produces its therapeutic effect.

All these effects are not temperature dependent and seem to occur as a result of current fluctuations, not because of tissue heating. Other proteins are also
produced in response to pulsed RF current. However, it remains unclear whether any of these changes are responsible for the observed therapeutic effect. In addition, it is believed that strong electrical fields alter the nerve cell membranes so as to affect the technique using light and electron microscopy has found minimal neuronal damage compared to conventional radiofrequency (14), but alterations in mitochondrial structures and microfilaments nervous transmission. Evaluation of mitochondrial and microtubules Signal interruption in small nerve fibers and alterations of c-fos levels in the dorsal horn have been seen as well. For pulsed RF to be effective, the electrode must be carefully and meticulously positioned, pointing directly perpendicular and very close to the targeted nerve. The operator should have very soft hands and excellent needle handling skills before attempting this procedure. The patient must also be warned just prior to eliciting a paresthesia and told not to make any sudden movements.

Several indications have been described for PRF particularly for peripheral nerve damage. There are currently few options for patients suffering from peripheral nerve damage, and the available methods are complicated, risky, and/or expensive. PRF is a relatively simple, inexpensive procedure that can produce long-term pain relief without the risks that frequently accompany other methods. The technique can be used on a number of peripheral nerves including the occipital nerve, lateral femoral cutaneous nerve, ilioinguinal nerve, tibial nerve, and others. The anatomy and indications vary depending on the involved nerve.

Recently also an intrarticular PRF was proposed. In the intra-articular technique the tip of the cannula lies within a space surrounded by synovium, cartilage, and bone. In large joints such as the knee, the articular capsule, which is richly innervated, is quite distant from the tip of the cannula, so that nerves are not in close proximity. For this reason, a direct influence by the electric field on pain-generating nerves would appear to be unlikely. The authors postulated that electric fields from the low range of the spectrum may influence the production of pro-inflammatory cytokines, which are in the bone, cartilage, synovium, and the immune system [9].

Although the clinical evidence showing its efficacy is still accumulating, there is currently enough evidence to recommend use of PRF in the treatment of pain [10]. At this point, its best potential is in the treatment of radicular pain and peripheral nerve damage. PRF can be used in cases of peripheral nerve damage as a safe alternative to more aggressive treatments such as chemical neurolysis, which can result in further injury. Additionally, PRF is considerably less expensive than spinal cord and peripheral nerve stimulation. PRF can be used in cases of peripheral nerve neurolysis, which can result in further injury. Additionally, PRF is considerably less expensive than spinal cord and peripheral nerve stimulators, which have traditionally been options. As new studies are conducted and the modality is more widely utilized in clinical practice, new uses will be uncovered.

References
Intrafascicular injections are quite uncommon and difficult to perform outside of a laboratory setting. Sala Blanch et al. demonstrated that intentional impalement of a human sciatic nerve from cryopreserved cadavers results in damage of only 3% of nerve fascicles when using a long-beveled (15°) needle; no fascicle damage was found after impalement with 30°-bevel needles 13. Farber et al. employed real-time light microscopy to perform intrafascicular injections in rats; despite actively seeking them with a sharp needle, Hadzic, Kapur and coll. obtained intrafascicular injections in only 50% of intrafascicular injections into dogs’ sciatic nerves 14,15. In a study where block dynamics were examined in US real-time imaging after NS-guided needle positioning, the whole sciatic nerve was seen moving away from the needle, thus causing an intrafascular needle tip to become extraneural, in 27% of cases 16.

Do intraneural injections have advantages? Recently, a lot of research has been devoted to defining the characteristics of LA injections beneath a common investing connective layer surrounding the components of the sciatic nerve at the popliteal level. Andersen et al. have shown that such sheath is present from the nerve’s origin in the lumbosacral plexus to its division into tibial and peroneal branches 17, although the most commonly used term to define this layer is paraneurium, some scholars propose that if we are to consider the sciatic nerve as a single anatomical unit, then it is an ‘epineurial cover’ surrounding epineurium in which the two branches of the sciatic nerve may be found 18. Injection beneath this fascia will be a circular expansion of the sheath on US imaging, and Tron et al. have demonstrated the feasibility of this approach for popliteal sciatic nerve blocks performed either at or proximal to the neuromuscular junction, showing comparable success rates and total anesthesia-related times 19. It has also been shown that an injection of LA within the outermost connective layer at the sciatic nerve bifurcation is advantageous, in terms of onset, with respect to injections around each single branch of the nerve just distal to its division 20. When trying to inject the local anesthetic solution outside the paraneurium for sciatic nerve, block onset times reach values which are not acceptable in daily clinical practice: Lopez et al. demonstrated that for successful sciatic popliteal block in less than 30 min, local anesthetic should be injected acceptable in daily clinical practice: Lopez et al. demonstrated that for successful sciatic popliteal block in less than 30 min, local anesthetic should be injected within the sheath 21. Authors from major working groups believe that subparaneural injections at the sciatic bifurcation should not be considered intraneural. In fact, in a recent study with either US guidance or US imaging and NS guidance, only subepineurial (i.e., truly intraneural) injections of LA resulted in acceptable success rates of surgical anesthesia 18.

The concept of considering the epineurium as a barrier to drug diffusion may be used with caution, but may lead to advantageous effects in select cases. For example, intraneural, but not perineural injection of dexamethasone may modulate the effects of chronic constriction injury in rats’ sciatic nerves 22. Intraneural catheterization may lead to greater stability and reduced drug requirements in continuous sciatic nerve blocks, which may be particularly significant for patients receiving long-term infusions 23. Intraneural electrodes may be used for peripheral nerve stimulation at much reduced current intensities; although their biocompatibility has yet to be verified in real-world applications, these devices have the potential for greater selectivity and lower energy consumption 24.

Is it ethical to perform intraneural injections? Many papers about the effects of intraneural injections into peripheral nerves state that such techniques have not been employed on purpose but, rather, have been studied as they occurred inadvertently. The adjective inadvertent is used here in its original Latin sense of someone who won’t turn their mind (i.e., their attention) towards something. For example, in one recent trial, the authors deemed it unethical to purposely perform intraneural injections in their patients 25. Still, they used a technique which carries a 94% risk of causing them; moreover, patients received contrast medium mixed in their LA (which carries a risk of anaphylaxis, albeit small), in order to evaluate injectate spread in a computed tomography scan which was not part of the patients’ clinical pathway, and did not add substantial evidence to the study results. It has been stated by many that current US technology does not allow us to discern individual fascicles and, thus, distinguish between extra- and intrafascicular injections, which in turn should be a reason not to perform intraneural injections 26. Still, current state-of-the-art imaging systems cannot discern fascicles much smaller than the minimum size that might be practically impaled and injected into by a 22 gauge nerve block needle 27. Practitioners should only actively pursue extra- or intrafascicular injections of LA per se but, rather weigh risks and benefits of each approach according to their own experience and patients’ needs. Intra- and extraneural injections of LA may be considered two very similar procedures which differ in invasiveness and effectiveness, but not necessarily in safety. In the light of current evidence, which mainly involves peripheral, non-plexus nerves such as the median nerve at the elbow and the sciatic nerve in the lower extremity, the unquantified, but small risk of nerve injury after intraneural injection should be weighed against that (which is greater) of failure to achieve surgical anesthesia with perineural injections. If the PNB is only performed for analgesia, then perineural injections are likely to be as effective as intraneural ones, as it seems that peripheral deposition of ropivacaine or mepivacaine have much slower onset times, but similar success rates ~3 h post-injection (Baciarello et al., unpublished data).

References
Anatomy of the upper part of the lumbar plexus (L1-L4): The upper rami of the lumbar plexus (L2-L4) form the femoral, obturator and lateral femoral cutaneous nerves which emerge between the anterior and posterior laminae of the psosas major muscle. The nerves emerge from the psosas major at the level of the transverse process of vertebra L5 and descend in the coccygeal sacral compartment (PC) posterior to the masor major together with the lumboSacral trunc (L4- L5) that makes the upper part of the sacral plexus. The PC can be accessed via the interspace between the transverse process of L5 and the upper margin of the sacrum.

The femoral nerve (FN) runs deep to the iliac fascia and the inguinal ligament, lateral to the femoral vessels and supplies sensory-motor innervation to the hip joint (via the three vasti branches), anterior thigh and knee. The saphenous branch of the FN runs subcutaneously first at the level of the femoral triangle then in the adductor canal (AC). It supplies sensory innervation to the anteromedial part of the thigh. The two ON branches descend anterior and posterior to the adductor brevis and innervate the adductor muscles. The terminal posterior branch innervates the posterior part of the knee joint.

The lateral femoral cutaneous nerve (LFCN) emerges from the lateral margin of the psosas major, runs deep to the iliac fascia and passes under or through the inguinal ligament medial to the ASIS. It runs across the sartorius a few centimeters distal to the ASIS and sandwiched between the fascia lata and muscle fascia. It supplies sensory innervation to the lateral thigh from the greater trochanter to the knee. The obturator nerve (ON) exits the obturator canal and becomes sandwiched between the external obturator and the pectineus. A branch from the anterior division innervates the anteromedial part of the hip joint. The two ON branches descend anterior and posterior to the adductor brevis and innervate the adductor muscles. The terminal posterior branch innervates the posterior part of the knee joint.

Anatomy of the sacral plexus (L4-S4): The sacral plexus (SP) is formed on the deep side of the piriformis muscle from the lumboSacral trunc (LST, L4-L5) and the anterior rami of S1-S4. The SP converges towards the greater sacral foramen, where the main trunc continues as the sacral nerve (SN) down along the posterior surface of the ischium into the posterior compartment of the thigh posterior to the quadratus femoris and adductor magnus. In the popliteal fossa the SN bifurcates into the tibial and common peroneal nerves (TN L4-S3 and CPN L4-S2). The SN innervates the posterior part of the hip joint via direct branches and also a branch from the nerve to the quadratus femoris. The SN also innervates the knee via genicular branches from the TN and CPN in the popliteal fossa (2). And the SN innervates the ankle joint via branches from the TN and CPN and the sural nerve (1).

The other major branches from the SP are the superior gluteal nerve (SGN, L4-S1), the inferior gluteal nerve (IGN, L5-S2), the posterior femoral cutaneous nerve (PFCN, S1-S3), and the pudendal nerve (PuN, S2-S4). The SGN and IGN innervate the gluteal muscles and the tensor fascia lata - and the hip joint (3). The PFCN descends below the fascia lata in the midline of the posterior thigh from the subgluteal crease to the midcalf. It innervates the fascia and skin along the posterior surface of the thigh and the upper calf. The PuN exits the pelvis through the greater sciatic foramen below the inferior margin of the piriformis, winds around the ischial spine or the sacrospinous ligament and enters the ischiorectal fossa via the lesser sciatic foramen which is the opening between the sacrospinous and sacrotuberous ligaments. The nerve descends into the pudendal (Alcock’s) canal, which is a splitting of the internal obturator fascia on the medial side of the ischiococcygeus. The PuN innervates the perineum via the three branches: the inferior rectal nerve, the perineal nerve, and the dorsal nerve of the penis (clitoris). The pelvic floor (levator ani and coccygeus) is innervated by muscular branches directly from S3-S4 and from the coccygeal plexus respectively. The SP also supply somatic nerves to the perineum, quadratus femoris, gemelli and obturator internus.
Ultrasound guided regional analgesia techniques T12-L1 blockade: The upper part of the lumbar plexus and the SC nerve can be anaesthetized proximal to the point where the lateral cutaneous branches branch off either with the transmuscular quadratus lumborum (TQL) block (5) or the fascia transversalis plane block (6) indicated for iliac crest bone harvesting. The LH and IL nerves can be blocked with ultrasound guidance medial to the ASIS indicated for open and laparoscopic inguinal hernia repair (7). The upper part of the lumbar plexus cannot be expected to be anaesthetized by a lumbar plexus blockade. With the TQL block the local anaesthetic is deposited between the ventral proper fascia of the quadratus lumborum and the transversalis fascia. The transversalis fascia is continuous with the endodermatic fascia posterior to the diaphragm, and the injection will spread cranially behind the arcuate ligaments to the thoracic paravertebral space and produce somatic and visceral anaesthesia from Th4 to Th15 (5). When 30 mL 0.75% ropivacaine is injected unilaterally the maximum dermal motor spread is reached after 20 minutes compared with 10 minutes when an ultrasound guided thoracic paravertebral block is performed (Borglum, personal communication). This is the primary indication for TQL block. However, it will also anaesthetize the SC, IH, and II nerves effectively on the anterior surface of the quadratus lumborum muscle, where the three nerves are sandwiched between the ventral proper fascia of the quadratus lumborum and the transversalis fascia. With this indication the target nerves are typically anaesthetized after five minutes. The effect of ropivacaine can be prolonged with dexamethasone from 10–15 hours to more than 24 hours (unpublished data).

Lumbar plexus blockade: The lumbar plexus (LP) can be blocked between the anterior and posterior layers of the psosas major with combined ultrasound and electrical nerve stimulation guidance using either the Shamrock technique (8) or the lumbar ultrasound test (LUT) technique (9). The LP block is indicated for surgical anaesthesia of the hip when combined with the sacral plexus. The terminal nerves of the LP (FN, ON, and sometimes LFCN) can be anaesthetized together with the LST in the socalled psosas compartment using the socalled suprasacral parallel shift (SSPS) technique (10). This block anaesthetizes selectively the majority of the nerves from the lumbar and sacral plexuses that innervate the hip joint with one single injection. Selective FN block is indicated for hip or anterior thigh analgesia. LFCN block is indicated for analgesia of the lateral thigh after hip fracture surgery or skin harvesting. Obturator block is indicated for analgesia after total knee replacement as a supplement to a subsartorial saphenous nerve block (preliminary unpublished data).

In an RCT the quality of the LUT and SSPS techniques was equally high with success rates (SR) for senior-motor blockade of the FN and the ON of approximately 90-100% 30 minutes after the blockade. The SR of LFCN block is moderately high with both techniques. The SR of block of the lumboSacral trunk is moderately high with SSPS and zero with LUT (10).

Sacral plexus blockade: The sacral plexus can be blocked guided by ultrasound with the socalled parasacral parallel shift technique (11). It is indicated in combination with a lumbar plexus block for surgical anaesthesia of the hip. It is also effective as a proximal sciatic nerve block. The sacral plexus blockade does not consistently anaesthetize the pudendal nerve and never the coccgeal plexus. Thus, the perineum cannot be expected to be anaesthetized with the SSPS.

Both lumbar (Shamrock), sacral plexus (PSPS) and lumboSacral (SSPS) blockade can be extended with catheter technique.

Pudendal blockade: Ultrasound guided block of the pudendal nerve can be performed proximal to the pudendal canal at the level of the ischial spine (12,13) or transperineally distal to the pudendal canal (14). Pudendal blockade is indicated for analgesia after perineal surgery. It does not anaesthetize the postanal area which requires a supplementary coccgeal plexus blockade.

Coccygeal plexus blockade: The coccygeal plexus can be blocked with an ultrasound guided caudal epidural block (15). This block is indicated for analgesia of the pelvic floor (levator ani and coccygeus) and for blockade of the postanal area. A caudal epidural block with 20 mL of ropivacaine 0.2% does typically not extend to anaesthetize the sacral plexus.

Blockade of the terminal nerves from the lumbar plexus: The terminal nerves of the lumbar plexus innervating the lower limb (FN, OB, and LFCN) can be anaesthetized effectively in the subinguinal region. The saphenous nerve can be anaesthetized subauricularly in the proximal thigh.

The duration of analgesia of all the LP terminal nerve blocks can be effectively and consistently extended to more than 24 hours by mixing of ropivacaine with dexamethasone (preliminary data).

Mixing of lidocaine with long acting analgesics such as ropivacaine or bupivacaine reduces both onset time and block duration for femoral nerve block (16).


ESRA1-0689 Refresher Course: Peri- and intraoperative regional anaesthesia in hip surgery

PERI- AND INTRAOPERATIVE REGIONAL ANAESTHESIA IN HIP SURGERY

Bendtsen T. (1) Anaesthesiology, Aarhus University Hospital, Aarhus C, Denmark. Introduction: Old and fragile patients suffering from cardiac comorbidity are often admitted for emergency hip surgery. Blockade of the lumbar sacral plexus (LSP) is considered an alternative to general or spinal anaesthesia due to presumed better hemodynamic stability and effective perioperative pain management without opioids. At present major elective hip surgery is not performed with LSP blockade. Ultrasound/MRI real time image fusion guidance of regional anaesthesia presumably has a potential for more effective and safer surgical anaesthesia compared to ultrasound guidance for major elective hip surgery.

Ultrasound guided regional analgesia is suitable for analgesia after hip surgery. The nerve target of preoperative regional analgesia differs compared to postoperative analgesia in relation to hip fracture surgery.

The aim is to present new techniques for ultrasound and real-time ultrasound/MR image fusion guided blockade of the lumbar sacral plexus and analgesia in hip surgery.

Anatomy: The lumbar plexus (L.P, L2-L4) innervates the hip via the femoral nerve and the obturator nerve. Another LP branch – the lateral femoral cutaneous nerve – sometimes has to be blocked separately for the surgical skin incision on the upper lateral thigh, when the nerve descends too proximal to be anaesthetized by a LP block. The hip is also innervated by the sacral plexus (SP) via the femoral nerve and the obturator nerve. Another LP branch - the lateral femoral cutaneous nerve and the obturator nerve. Another LP branch - the lateral femoral cutaneous nerve and the obturator nerve. Another LP branch - the lateral femoral cutaneous nerve and the obturator nerve.


been reported. New lumbosacral plexus block techniques - such as the Shamrock, SSPPS and PSSPS techniques maybe combined with real time image fusion - have the potential to allow effective and safe surgical anasthesia for elective hip surgery.

Our research group is currently exploring the efficacy and safety of real-time ultrasound/MR image fusion compared to the new ultrasound techniques presented above.

Conclusion: The efficacy, safety and feasibility of providing anaesthesia for hip surgery and postoperative analgesia with ultrasound-guided lumbosacral plexus blocks requires further studies which are currently under way.

References

ESRA Abstracts

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fibers for LA, increased residence time of LA in the nerve due to impaired microcirculation, or the fact that the sensory area was already partly anesthetized at baseline due to neuropathy.20

Future research will need to be carried out to gain better insight into nerve stimulation patterns and thresholds, and into the reasons for prolonged block duration in diabetic neuropathic patients.

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ESRA1-0691 Refresher Course: Toxicity of local anesthetics: local and systemic considerations

TOXICITY OF LOCAL ANAESTHETICS: LOCAL AND SYSTEMIC CONSIDERATIONS

Lirk P1, Picardi S2, Hollmann MW1 1Dept. of Anaesthesiology, Academic Medical Center University of Amsterdam, Amsterdam, Netherlands, 2Dept. of Anaesthesiology, University of Heidelberg, Heidelberg, Germany. Abstract Administration of local anesthetics can lead to local or systemic toxicity. Local toxicity Local anesthetic (LA)-induced tissue injury has been reported for nerves and muscles. It should be noted that LA-induced neurotoxicity is just one of a multitude of factors that can lead to perioperative nerve damage, such as needle trauma, nerve stretch or compression, and local ischemia. For a summary of incidences of new-onset neurological symptoms after varying forms of Regional Anesthesia, the reader is referred to the review by Brull et al.2 All LA are toxic on virtually any tissue, depending in a dose- and time-dependent manner.3 While some studies demonstrate neurotoxic equipotency between different local anesthetics, other experimental and observations suggest that lidocaine is more likely to cause neurological sequelae than, e.g., bupivacaine.4,5 Myotoxicity is considered to be of minor clinical relevance because of the relatively small functional impact and enormous regenerative potential of muscles. However, in the case of very small muscles, such as encountered during peribulbar anesthesia, functional deficits indicative of transient muscle impairment after regional anesthesia can frequently be observed.6 Among the potentially available adjuvants for regional anesthesia, ketamine and midazolam should not be used because they strongly increase experimental neurotoxicity,7 and there is evidence for a dose-dependent neurotoxicity of dexmethasone.8 Other adjuvants such as opioids, clonidine and dexmedetomidine do not seem to increase neurotoxicity.

The concern whether neurotoxicity is aggravated by pre-existing neurologic disease was sparked by the landmark study by Kalichman and Calcutt showing excessive neurotoxicity of 4% lidocaine in diabetic versus healthy rats undergoing sciatic nerve block.9 However, these results have not been replicated using conventional (lower) doses of local anesthetics in experimental models of Type I,10 and Type II diabetes.11 What has been found in experimental12 and clinical13 studies is an increased block duration in diabetic neuropathic nerves, suggesting increased sensitivity of diabetic nerves to LA.

Intraneural injection has the potential of aggravating dose- and time-dependent LA-induced neurotoxicity and should be avoided,14 with the sole potential exception of injecting within the common connective tissue sheath surrounding the tibial and common peroneal nerve at the popliteal level.15 Systemic toxicity Systemic toxicity secondary to administration of LA can result from direct intravenous injection, excessive absorption, or decreased metabolism.16 Toxicity is determined by the free, unbound, fraction of LA in the systemic circulation. The classic sequence of events during systemic toxicity is central nervous system excitation followed by cardiovascular depression and cardiovascular collapse. However, dependent on the exact scenario, the presenting signs can be either cardiovascular, central nervous, or both simultaneously.17 Importantly, up to 60% of toxicity symptoms are delayed,18 and therefore, monitoring any patient for at least 30 minutes after block performance is mandatory. Intravenous gavage of lidocaine perioperatively as part of a multimodal pain treatment regimen is typically associated with lidocaine levels well below the toxic threshold.19

Cardiovascular toxicity correlates closely with lipohilicity. However, the mechanism of toxicity is differential as well. Whereas less lipophilic substances such as lidocaine and mepivacaine typically cause myocardial depression, more lipophilic substances such as bupivacaine, levobupivacaine and ropivacaine cause both myocardial depression and arrhythmia.20 Treatment of LA-induced systemic toxicity (LAST) consists of general supportive measures to stabilize hemodynamics and terminate seizures, and the preservation of normocapnia. In addition, most international guidelines advocate use of Intralipid, which was first shown in 1998 to alleviate bupivacaine-induced toxicity in a rodent model of LAST.21 Since then, several potential pathways of action have been explored, including lipid sink, direct interactions with sodium channels, and improvement in cardiac metabolism.20 Intralipid® has generally shown beneficial effects in rats, but not in pigs, and the debate which model is more relevant continues.21 The only human trial on effects of Intralipid® was conducted by Litoumis and co-workers, who demonstrated reduced context-sensitive half-life of
bupivacaine, potentially due to increased tissue distribution, but no relevant lipid sink effect. Therefore, the evidence-base concerning Intralipid® effects remains ambiguous. However, the risks of Intralipid administration are considered small (allergy, pancreatitis) considering the life-threatening nature of LAST, such that Intralipid remains part of most guidelines. Importantly, recent pharmacokinetic models suggest that Intralipid® decreases the cardiac bupivacaine concentration by 11% within 3 minutes of administration, and cerebral bupivacaine content by 18% within 15 minutes. Despite the theoretic nature of these findings, they are notable because they underline that Intralipid® reduces, but does not eliminate bupivacaine. Intralipid® should not be considered an antidote for LA with full antagonistic properties. Intralipid® is a valuable contribution to, but not a substitute for, careful and meticulous conduct of regional anesthesia.

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study by Freund et al., reductions were achieved in expiratory reserve volume of 48% with spinal compared to 21% with epidural anesthesia to similar sensory levels.

There is evidence that regional anesthesia may result in a reduction in postoperative pulmonary morbidity and mortality. Yeager et al. found a much higher incidence of pneumonia, prolonged ventilation, and reintubation in high-risk surgical patients who had general compared to epidural anesthesia. In a large retrospective review of patients with chronic obstructive pulmonary disease, Tarhan et al. found no respiratory mortality in 121 patients receiving spinal or epidural anesthesia compared to 33 deaths in 464 patients who received general anesthesia. In a very large retrospective review of patients who underwent total hip or knee arthroplasty, Williams-Russo et al. found less pulmonary-related mortality (pulmonary embolism and pneumonia) in patients who received epidural compared to general anesthesia.

Peripheral Nerve Blocks: Technique for providing lower extremity analgesia by long-acting or continuous peripheral nerve blocks have allowed for extended pain relief into the postoperative period. Adequate analgesia often makes it possible to discharge patients who would otherwise be admitted to the hospital only for pain treatment.

Regional anesthesia offers many advantages over general anesthesia for the outpatient, as listed in Table 1.

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<thead>
<tr>
<th>TABLE 1. Advantages of Regional Anesthesia Compared to General Anesthesia</th>
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<td>Early discharge for outpatients</td>
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<td>Smooth transition to pain control</td>
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<td>Increased blood flow to extremity (les)</td>
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<td>Theoretical decrease in reflex sympathetic dystrophy</td>
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<td>Decreased nausea/vomiting</td>
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<td>Decreased drowsiness</td>
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<td>Decreased urinary retention</td>
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<td>Avoids endotracheal intubation</td>
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<td>Lower admission rate</td>
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Regional anesthetics promote a smooth transition to postoperative analgesia by regional, parenteral, or oral administration of analgesics. Some regional anesthetic techniques, e.g. ankle blocks, can provide long lasting postoperative analgesia while allowing the patient to return home with adequate function.

Although many of the advantages of regional anesthesia for the outpatient surgery are obvious, there has been an inadequate number of prospective, controlled studies published to date. This is in part due to the fact that the outpatient is a relatively new concept. With the rapid expansion of outpatient surgery and ambulatory centers, we are just beginning to generate the necessary clinical and academic experience to begin defining the relevant issues for study.

In a recent study of the factors affecting discharge time in adult outpatients by Pavlin et al., the anesthetic technique was found to be the most important determinant of discharge time (p < 0.001). Further, the three most common causes of delay in outpatient discharge were 1) pain, 2) drowsiness, and 3) nausea/vomiting. Pain control postoperatively (Table 2) was the most significant factor determining recovery after outpatient surgery.

<table>
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<th>TABLE 2. Reasons for Duration of Recovery 250 Minutes in Phase 1 and 270 Minutes in Phase 2</th>
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<td>Reasons</td>
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<td>Pain</td>
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<td>Drowsy</td>
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<td>Nausea/vomiting</td>
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<td>Unspecified</td>
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The goals of outpatient anesthesia are listed below (Table 3). The techniques discussed below will help to attain these goals for your outpatients.

<table>
<thead>
<tr>
<th>TABLE 3. Goals of Outpatient Anesthesia</th>
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<tbody>
<tr>
<td>Excellent surgical anesthesia</td>
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<tr>
<td>Smooth transition to PACU/pain control</td>
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<tr>
<td>Minimal side effects (edation, nausea, vomiting, urinary retention, delirium, airway problem)</td>
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<tr>
<td>Very low admission rate</td>
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<tr>
<td>Very low complication rate</td>
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<td>Quick onset and offset of anesthesia</td>
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Brachial Plexus Block: Brannl and Taeager compared interscalene block with general to general anesthesia alone in patients undergoing shoulder surgery. In their study, they noted that 35% of patients with the interscalene block did not require additional analgesics in the first 24 hours postoperatively and only 32% needed opioids. This contrasted to the standard general anesthesia patients, in whom 95% required analgesia in the first 24 hours, with 86% needing opioids. This may be attributed in part to a pre-emptive analgesic effect similar to that measured following other regional anesthetic techniques.

Procedures expected to cause more postoperative pain (e.g. bunionectomy) are better managed with a long acting local anesthetic (e.g. bupivacaine) which can lead to greater than 24 hours of postoperative analgesia.

Femoral Nerve Block: This technically easy and highly effective regional anesthetic technique can be used for surgical anesthesia for anterior lower extremity procedures or in combination with sciatic nerve block. Local anesthetic blockade of the femoral nerve is an excellent technique for anesthesia of the knee. Femoral nerve block provides analgesia for femoral fracture.

The femoral nerve is relatively superficial and may be blocked just below the inguinal ligament, approximately one centimeter lateral to the femoral artery. Blocking the nerve proximally is important, because it quickly divides into anterior and posterior divisions as it courses distally.

The femoral nerve supplies motor innervation to the sartorius, quadriiceps femoris, and pectineus muscles. It supplies sensory innervation to the anterior thigh and knee, but terminates in the saphenous nerve which supplies sensory innervation to the instep. Since it supplies the large quadriceps muscles, the femoral nerve may be thought of as a predominantly motor nerve and therefore an inability to straight leg raise may be used to assess success of the block.

The nerve is located in the neurovascular sheath and therefore the perivascular concept described by Winnie can be applied to help determine its position. The perivascular and perineural ensheathed spaces surrounding the femoral nerve provide potential spaces along which injected local anesthetic can track along the sheath's axis. The femoral nerve is enveloped by a fascial layer, separating it from the femoral artery, contrary to the situation in the brachial plexus. For this reason, a transarterial technique for femoral nerve block is unreliable and cannot be recommended.

Femoral nerve block has been demonstrated to be a very effective component of multi-modal pain management regimens following total knee arthroplasty. However, local anesthetic blockade of the femoral nerve results in paralysis of the quadriceps muscles. Quadriceps paresis resulting from femoral nerve block may inhibit rehabilitation and has been implicated in traumatic patient falls in the early postoperative period. In addition, femoral nerve block has been implicated as a possible cause of “quadriiceps shutdown” or persistent weakness of the quadriceps muscles that may have a negative impact upon recovery and functional outcome following knee surgery.

Following the advent of the use of ultrasonographic guidance to assist peripheral nerve blockade, an increasingly popular method of providing postoperative pain relief following knee surgery includes the use of an adductor canal block. This block is performed by injecting local anesthetic into the neurovascular sheath in the adductor canal, targeting the saphenous nerve (a purely sensory nerve) in the mid to distal thigh. This results in pain management with less or possibly no effect on motor function of the quadriceps muscles.

Continuous femoral nerve block was first reported in 1980. It has been used to provide postoperative analgesia following total knee arthroplasty. It is very effective when the surgery concentrates on the anterior aspect of the knee as in anterior cruciate ligament reconstruction or patellar realignment.

Edkin, et al. found that 92% of patients required no additional analgesia. They found that bupivacaine 0.5% with epinephrine resulted in a mean duration of analgesia of 29 hours. Femoral nerve block reduced parental analgesic use by
80% in recovery room and 40% overall in another study. Similar findings have been reported by Tiemeijer, et al.

**Popliteal Fossa Sciatic Nerve Block:** Block of the sciatic or tibial/peroneal nerves at the popliteal fossa is a very effective and safe analgesic technique for the outpatient having foot or ankle surgery. The tibial/common peroneal nerves and the sural nerve, comprising most of the nerves that innervate the foot and ankle. These nerves are relatively superficial and lateral to the popliteal artery at this point. The tibial component or tibial nerve lies medial to the peroneal component of the sciatic nerve or peroneal nerve. Plantar flexion results mainly from muscles supplied by the tibial nerve whereas eversion and dorsiflexion are more dependent on the muscles innervated by the peroneal nerve. The conventional technique of popliteal fossa block (preferred by this author) requires that the patient be in the prone or lateral decubitus position. An alternative technique can be performed by a lateral approach. With the lateral approach, the patient is in the supine position.

Bupivacaine or ropivacaine 0.5% (30 mL) with epinephrine can result in greater than 24 hours of postoperative analgesia with few side effects. The patient must maintain a non-weight bearing status on the operative foot. The patient will be unable to plantar or dorsiflex the foot throughout the blocks duration.

**Anesthesia for Ankle and Foot Surgery:** Anesthesia for foot surgery is more often provided by ankle block or by ankle block. In laparoscopic surgery, bupivacaine or ropivacaine, long-lasting analgesia can be obtained. The midtarsal block described by Sharrock results in more reliable complete anesthesia to the foot. Midtarsal block has been associated with very low local anesthetic plasma concentrations.

20 to 25 mL of 0.75% bupivacaine or ropivacaine or the same volume of 1.5 - 2.0% mepivacaine or lidocaine results in successful blockade of the foot. The longer acting agents usually provide greater than 24 hours of postoperative pain relief. It is theoretically important to avoid the use of epinephrine with ankle or midtarsal block, especially in patients with peripheral vascular disease.

**Conclusion:** We are only beginning to perform the proper clinical outcome studies necessary to validate our clinical impressions that regional analgesia results in improved outcome for many types of surgery. However, there are already excellent data that demonstrate improved out-come in some selected but important areas. Deep venous thrombosis and blood loss following total hip arthroplasty are both clearly lessened by the use of regional anesthetic techniques. Epidural analgesia decreases the pulmonary compromise following upper abdominal or thoracic surgical procedures. With well-conducted regional anesthetics, it is possible for the outpatient to be discharged earlier with fewer complications. The surgical stress response can be effectively attenuated and this may translate to improved outcome, although this has yet to be proven. Regional techniques for providing effective analgesia may extend the advantages to the postoperative period and may result in improved outcome and earlier discharge.

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**ESRA1-0693**

**Symposium: RA for thoracic Surgery/anaesthesia**

**INTRAVENOUS LIDOCAINE FOR THORACIC AND MAJOR VISCERAL SURGERY**

**Link P.** Picardi S, Hollmann MW. 1 Dept. of Anaesthesiology, Academic Medical Center University of Amsterdam, Amsterdam, Netherlands. "Dept. of Anaesthesiology, University of Heidelberg, Heidelberg, Germany.

Ten years ago, Hollmann, Strumper and Durieux proposed intravenous lidocaine as the “poor man’s epidural.” 3 Rationale for this hypothesis was the fact that lidocaine had been shown to attenuate the inflammatory overshoot following surgery. 2 During the past years, it has become evident that a substantial share of the effects of classical regional anesthesia can be duplicated by systemic local anesthetics (LA). At clinically relevant concentrations, systemic LA mitigate the surgical stress response without impairing physiologic host response. Also, they have been shown to decrease hypercoagulability after several types of surgery without causing bleeding. 8 Interestingly, the effects of peritonsillar lidocaine are still discernible after 2 – 3 days in some settings, opening up the possibility that lidocaine can modulate molecular pathways during administration which mediate prolonged effects. Importantly, from a safety perspective, intravenous gavage of lidocaine peripherally as part of a multimodal pain treatment regimen is typically associated with lidocaine levels well below the toxic threshold.

A recent Cochrane review showed a potential benefit of thoracic epidural anesthesia for preventing post-thoracotomy pain. 7 There are no studies directly comparing epidural analgesia to intravenous lidocaine for thoracotomy, but Cui demonstrated that when added to total intravenous anesthesia for thoracic surgery, lidocaine improved postoperative pain scores and analgesic requirements. 8 Thoracotomy remains an indication for thoracic epidural analgesia, with intravenous multimodal analgesia as alternative. 9

Following both laparoscopic and open abdominal surgery, when compared to placebo, systemic administration of lidocaine reduces analgesic use, decreases duration of ileus, and consistently decreases length of hospital stay. 10, 11 Kuo et al. randomized patients to undergo major abdominal surgery under epidural anesthesia, intravenous lidocaine, or placebo. In this study, the most pronounced effect on pain and inflammatory were found with epidural, followed by intravenous anesthesia. 12 Even though not designed to compare intravenous and epidural LA administration, Lavand’homme and colleagues demonstrated good efficacy of a combination of epidural analgesia and ketamine infusion to prevent hyperalgesia after major visceral surgery. 13 However, the superiority of epidural anesthesia does not hold true for laparoscopic surgery of the bowel, where Woyingsinn and colleagues found comparable benefits of epidural analgesia and intravenous lidocaine. 14 For major upper abdominal open surgery, current evidence seems to favor thoracic epidural analgesia, but there are very few trials comparing epidural analgesia with contemporary multimodal analgesia approaches. With the cholecystectomy, in the US, regional anesthesia is the first choice is generally intravenous analgesia, with regional analgesia such as truncal blocks reserved for individual patients at high risk of postoperative pain (such as chronic pain patients) and as postoperative rescue. Since laparoscopy is increasingly used for abdominal surgery, 15, 16 the number of procedures eligible for first-line treatment with v. lidocaine will increase. In a very recent review, Barreved and colleagues showed that 13 out of 16 trials comparing intravenous lidocaine showed a therapeutic benefit. 17

In open hysterectomy, intravenous lidocaine was shown to improve immediate postoperative outcome, 18 but a recent study failed to demonstrate benefits on early functional recovery. 19 A recent subgroup analysis of the LACE trial questioned the beneficial effects of epidural analgesia in the immediate postoperative period, and on quality of life after surgery. 20 Most patients undergoing lower abdominal surgery can be adequately managed with intravenous lidocaine as part of a multimodal pain treatment regimen, and regional analgesia (truncal blocks) may be considered for individual patients or as postoperative analgesic rescue.

**Conclusion:** Beneficial effects of regional anesthesia can be duplicated to a substantial extent by systemic LA, depending on the specific indication. Ten years after being considered a “poor man’s epidural”, intravenous administration of LA has become an own recognized treatment modality. Considering the risk:benefit ratio, epidural anesthesia and analgesia can still be recommended as first line of analgesic treatment in patients undergoing open thoracic and probably open major upper abdominal visceral surgery, whereas lower abdominal and laparoscopic procedures can be adequately managed in a majority of cases using intravenous lidocaine as part of a multimodal treatment regimen.

**References**


This is not unexpected, given the widespread use of continuous pop-

continuous peripheral nerve blocks (CPNB) are usually achieved by the percutaneous insertion of a flexible catheter through the skin and guided to the desired neural structure using ultrasound or fluoroscopy. CPNB techniques involve the delivery of local anesthetic agents to provide analgesia for a specific area of the body, such as the arm, leg, or foot. CPNB can be performed using a variety of techniques, including stimulating catheters, nerve stimulators, and percutaneous approaches.

Continuous Peripheral Nerve Blocks (CPNB):
Continuous peripheral nerve blocks are a popular choice for pain management in the ambulatory surgery setting. CPNB can be performed by anesthesiologists or pain management specialists and are often used for surgeries involving the extremities, such as knee or ankle surgery. CPNB can provide effective pain relief and allow for earlier discharge from the hospital.

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Ultrasonographic guidance of conventional peripheral nerve catheters has been difficult to date. Ilfeld, et al., found that “catheters tend to exit the needle and traverse past any nerve that is perpendicular to the needle itself.” They also observed that: “unlike needles, flexible peripheral nerve catheters rarely remain within a 2-dimensional ultrasound view, making it difficult to observe catheter tip placement relative to the target nerve.” Similarly, Swenson, et al., concluded that “The ability to visualize peripheral nerve catheters using ultrasonography is limited.”

Urmey and Grossi described a novel catheter-over-needle system, that allows the percutaneous placement of a longer, flexible, peripheral nerve catheter utilizing ultrasonographic and/or electrical nerve stimulation. This addresses the disadvantages of conventional peripheral nerve catheters that were discussed above. This system is similar to a single-shot peripheral nerve or plexus block in that it allows the operator to direct rather than “thread” the catheter to the desired position near the targeted nerve or nerves. It does not require the use of large, blunt, traumatic needles and the associated iaternal threat that occurs when pushing such needles through tissue planes. By using an extra-catheter system, it eliminates much of the technical difficulty associated with CPNB placement and eliminates leakage due to placing a smaller catheter through a larger needle. By being able to control the catheter tip placement as with a needle, a theoretical diminution in secondary block failure would be expected, but this has yet to be studied.

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T10 with a rising e87

ANESTHESIA FOR CATEGORY 1 C-SECTION: GA, RAPID SPINAL OR SOMETHING ELSE?
Sng B.L.1 Women's Anaesthesia, KK Women's and Children's Hospital, Singapore, Singapore.

Caesarean section (CS) rates are rapidly increasing necessitating a concerted effort to manage resources and expedite delivery especially during an emergency. To better prioritise resources and manage urgent CS, Lucas et al. developed a 4-point classification system to describe the urgency of CS that was also recommended for use in the UK by the National Institute for Clinical Excellence. The term category-1 CS refers to the subset of cases where there is immediate risk and life threatening circumstances of either the mother or foetus and delivery must be undertaken as quickly as possible after the decision and the recommendation is to have decision to delivery interval (DDI) to be less than 30 minutes.

A UK survey found that 10% of CS performed was classified as category-1 and these were associated with a higher morbidity and mortality. There is a 15-fold increased risk of maternal death in category-1 patients compared with category-3. However, it remains controversial whether this increased risk is due to a pre-existing condition or as a direct consequence of the need for the category-1 CS. Hence, category-1 CS necessitate a co-ordinated multidisciplinary team-based approach, with good communication, training and locally relevant protocols so as to ensure a speedy and yet safe process for both the mother and the foetus.

Communication within the team is crucial to achieving a short DDI while avoiding unnecessary risks. Good communication should be fast and clear. A public announcement system can be used to inform the entire team immediately after a decision for emergency CS is made. A prospective study adopting an emergency CS protocol involving the PA system demonstrated a short mean DDI of 7.7 minutes. A classification system tailored to local practice may also improve communication on the precise degree of urgency of the CS.

As an integral part of the team, the anaesthetist is often stressed for time and general anaesthesia is frequently the technique of choice. Recent literature has also suggested alternatives including rapid sequence spinal anaesthesia and epidural extension of existing neuraxial labour analgesia. The time taken to achieve surgical anaesthesia from initial decision should be expedited to meet the obstetric indication. However, the most appropriate form of anaesthesia must be considered on a case-by-case basis with reference to the team practice and institutional background. It is essential when attempting regional anaesthesia (RA) for category-1 CS to pre-oxygenate the mother and have emergency airway trolley on standby in case emergent conversion to general anaesthesia is required.

General anaesthesia (GA) using a rapid sequence induction is perceived to be the ‘gold standard’ for category-1 CS owing to the timely manner in which surgical anaesthesia can be achieved in the emergency situation. However, it is therefore important to consider the mixing of drugs in a time-pressed situation leading to drug errors. Lam et al. have shown that the time needed to adequately achieve surgical block also suggested alternatives including rapid sequence spinal anaesthesia and epidural extension of neuraxial labour analgesia persists. A statistically significant difference in the time taken to prepare the patient was found between non performing and poorly functioning ones. The debate over drug choice for fast and safe epidural extension have been found to be a higher number of top-ups in labour ward and a higher pain score in the two hours preceding the section. Therefore, it is important to regularly review labour epidurals to be aware of poorly functioning ones. The debate over drug choice for fast and safe epidural extension of neuraxial labour analgesia persists. A statistically significant difference in time of onset has failed to be proven between different types of solutions. Lam et al. have shown that the time needed to adequately achieve surgical block can be reduced with the addition of an alkalinising agent to a 2% lignocaine/adrenaline/fentanyl combination. Due to the instability of local anaesthetics and additives, they cannot be prepared in advance therefore concern exists regarding the mixing of drugs in a time-pressured situation leading to drug errors. Hence, the time-saving of a quicker onset of block may be offset by the increased risk of aspiration of gastric contents. An increased risk is due to a pre-existing condition or as a direct consequence of the need for the category-1 CS. Hence, category-1 CS necessitate a co-ordinated multidisciplinary team-based approach, with good communication, training and locally relevant protocols so as to ensure a speedy and yet safe process for both the mother and the foetus.

Management of post-operative pain is critical in mothers undergoing caesarean delivery, as adequate pain relief is required for mothers to quickly regain mobility and begin to care for the new born. An ideal analgesia regimen would provide optimal pain relief with minimal maternal side effects and minimal infant exposure via breast milk, and is easy to administer. While the approach to post-caesarean pain has evolved significantly over the years encompassing a wide variety of analgesics, techniques, and regimens being used, current trend is towards the use of a balanced, multimodal analgesia.

Opioids adverse effects such as nausea, vomiting, pruritus, urinary retention, constipation, sedation, respiratory depression and transfer of opioids during breastfeeding are of significant concerns to the anaesthetist. Hence, achieving opioid free post caesarean analgesia for opioid sparing effect is of paramount importance. The choice of opioid free analgesia would include: paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), low dose ketamine, wound infiltration, peripheral nerve blocks and transversus abdominis plane (TAP) blocks.

Among the common post-caesarean analgesics, paracetamol and NSAIDs are considered generally safe at maternal therapeutic doses with few reported side effects to the infant, hence should be started for breastfeeding mothers without contraindications to these drugs. Paracetamol is thought to produce analgesia both as a selective COX-2 inhibitor as well as through central mechanisms, although the exact mechanism of action of paracetamol is still unclear. Unlike opioids and NSAIDs, it produces very few side effects at therapeutic doses, making it a popular analgesic choice for post-operative mild to moderate pain, frequently as part of a multimodal analgesia regimen. A Cochrane review of 51 randomized placebo-controlled studies shows that a single dose of paracetamol provides effective analgesia for about half of patients with acute postoperative pain, for a period of about four hours, and is associated with few, mainly mild, adverse events. Recently, availability of the parenteral formulation of paracetamol provides an attractive option to treat immediate post-surgical pain due to faster onset and higher bioavailability. However, the evidence is less straightforward in the setting of post-caesarean analgesia, where paracetamol and diclofenac combination is favoured over monotherapy with either drug. Also, the opioid-sparing effect of paracetamol over placebo is controversial.

NSAIDs are effective in reducing visceral pain after caesarean section and have a well-known opioid-sparing effect associated with reduced opioid-related side effects when used in multimodal analgesia. Of concern, NSAIDs may be
associated with undesirable side effects such as platelet, gastrointestinal and renal dysfunction. Ketorolac has been shown to have significant opioid-sparing effect in both intravenous PCA and patient-controlled epidural analgesia after caesarean delivery. Ketorolac has received a ‘black-box’ warning from FDA in which it is contraindicated in labour and delivery due to concerns of uterine haemorrhage. For non-opioid oral analgesic, fixed-interval oral ibuprofen produces lower pain scores and higher maternal satisfaction than a regimen based on patient demand for post-caesarean pain A recent systematic review of 21 randomised control trials found that NSAIDs and paracetamol combination produces superior post-operative analgesia compared to monotherapy.

Low dose intravenous ketamine given during spinal anaesthesia given pre-emptively has been proposed to prolong post-caesarean analgesia and reduce opioid consumption. Ketamine, an N-methyl-D-aspartate antagonist, exerts its analgesic effect mainly through central desensitization and reducing opioid tolerance. A 2006 Cochrane review found that ketamine in sub-anaesthetic dose is effective in reducing morphine requirements in the first 24 hours after surgery. Evidence among caesarean delivery patients is mixed, primarily due to difference in method of anaesthesia and concomitant modalities used. Evidence supporting the use of low dose ketamine appears to come from studies where spinal anaesthesia was administered without addition of local acting intrathecal opioids.

Nerve blocks have been used for post caesarean analgesia including ilioinguinal, ilio-hypogastric and TAP blocks. The benefits of these blocks are that they can be performed on patients under general anaesthesia, in situ catheters allow for continuous analgesia and they are less invasive than neuraxial blocks. These blocks aim to reduce the pain arising from the surgical site through the anterior/lateral abdominal wall. Innervation of the abdominal wall arises from spinal nerves T7-L1. These include the intercostal nerves (T7-T11), subcostal nerves (T12) and ilioinguinal and iliohypogastric nerves (L1).

TAP blocks can be performed using a blind landmark technique or under ultrasound guidance. Two recent systematic reviews investigated the efficacy of the TAP block compared with placebo and in the presence and absence of intrathecal morphine with 24hr morphine consumption as their primary outcomes. TAP block reduced morphine consumption when intrathecal morphine was not used. TAP block also reduced visual analogue score pain scores and reduced opioid related side effects. However, in the presence of intrathecal morphine, there was no significant difference between the two groups. Tan et al compared TAP block with no block in 40 women undergoing caesarean section under general anaesthesia and found the patients who received the TAP block used significantly less morphine in 24 h than those in the control group and had higher satisfaction scores.

Continuous wound infiltration can be given with infusion catheters but they have yielded mixed results. This may be due to differences in technique and placement of catheter such as subcutaneous, subfascial or sub-rectus as well as differences in administration with choices such as single bolus, continuous infusion and patient controlled boluses. Another study investigating wound instillation of diclofenac, ropivacaine or saline with the latter groups also receiving intravenous diclofenac, found that not only was the diclofenac infusion group equivalent to ropivacaine and more effective than systemic diclofenac alone to reduce morphine consumption but it significantly reduced the incidence of residual pain at one and six months postoperatively.

Post Caesarean Analgesia should take a multimodal approach with a combination of techniques which should limit adverse effects but provide high quality analgesia. This can be accomplished with neuraxial anaesthesia during Caesarean section in which neuraxial opioids are commonly used but with opioid dose related side effects. Also, in the absence of a neuraxial anaesthetic technique utilised for Caesarean section, peripheral blocks such as the TAP block will also provide effective analgesia as well as systemic analgesics.

MAINTAINING LABOUR ANAESTHESIA: OLD AND NEW SOLUTIONS

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Labour pain is one of the most painful experiences a woman can undergo; many factors have been shown to influence the extent and severity of pain suffered. Although neuraxial analgesia is relatively invasive, with years of medical research and improved safety, epidural analgesia is now considered the gold standard of labour pain relief. Pharmacological choices during maintenance of labour epidural analgesia may affect the efficacy and safety of the analgesic regimen. Mixtures of low concentration local anaesthetics and lipophilic opioids have formed the mainstay of labour epidural analgesia regimes, although evidence in favour of using recently introduced adjuvant medications may require more extensive research.

Apart from providing the desired degree of pain relief, the other objectives of maintaining an effective neuraxial block include rendering the parturient the ability to analgesia to the most satisfactory level whilst producing minimal side effects such as motor blockade. With the introduction of patient controlled epidural analgesia, parturient ‘self-titrations’ of analgesia was made possible. In spite of that, some parturients may still require unscheduled epidural supplemnetations from ‘breakthrough’ pain. The effectiveness of the maintenance of neuraxial blocks is dependent on a variety factors, including the ability to seamlessly extend the initiation of analgesia, the use of an appropriate epidural maintenance analgesic solution and the utilization of newer drug delivery systems and technology to enhance our ability to individualize therapy. With the advent of automated infusion pumps, it became possible to administer a continuous infusion of an analgesic solution via an indwelling epidural catheter.

Patient-controlled epidural analgesia (PCEA) is a mode of epidural drug delivery that allows the parturient to administer intermittent boluses of epidural solution herself. This provides flexibility to accommodate escalating analgesic requirements as labour progresses or with the use of maternal analgesic and sedation regimens. PCEA has been shown to reduce consumption of local anaesthetics, reduce motor blockade, reduce pain scores, reduce clinician and midwife workload and increase maternal satisfaction when compared to continuous epidural infusion. Most studies seem to suggest a moderate basal infusion for benefits of reduced pain scores and reduced incidence of breakthrough pain without increasing the risk of side effects or overall local analgesic consumption. However, increasing background infusion rates may lead to greater local anaesthetic consumption.

Recently, due to increasing awareness of the benefits of providing parturients greater autonomy over their own labour analgesic regimens, more interactive and flexible analgesic modalities have been developed such as the computer-integrated patient controlled epidural analgesia (CIPCEA) and automated mandatory boluses.

The CIPCEA hardware utilises a laptop computer with a programmed algorithm to run a standard epidural infusion pump. This interactive programme records the history of the patient’s analgesic requirements over the past hour and increases the magnitude of its basal infusion proportionally to the number of demand boluses made. The CIPCEA algorithm adjusts the background infusion to 5, 10 or 15 mH if the patient required one, two or three demand boluses respectively in the last hour and decreases the background infusion by increments of 5mH if there were no bolus demands in the preceding hour. The algorithm is designed to respond to the patient’s analgesic requirement to improve analgesic efficacy whilst minimising increases in local anaesthetic use-associated background infusions. From several studies by Sia et al, Lim et al, Sng et al, the CIPCEA programme reduces the incidence of breakthrough pain during maintenance of labour epidural analgesia and increases the maternal satisfaction. There was no increased local anaesthetic consumption or side effects. The CIPCEA group had a higher basal infusion rate during the second stage of labour, compared with PCEA with moderate fixed basal infusion. This may support an increased epidural local anaesthetic requirement as labour progresses.

The basis of automated mandatory boluses and intermittent boluses originate from an experimental model that a bolus injection, administered at greater injection pressures, allows drugs to exit from all holes of a multi-orifice catheter, whereas a slow continuous infusion, given at lower injection pressures, causing drugs to exit almost exclusively from the most proximal hole. Administering background intermittent bolus during epidural analgesia in labour resulted in longer duration of analgesia after CSE, report lower pain scores and achieved a higher sensory block than using continuous epidural infusion. By incorporating background intermittent bolus injections with PCEA, several investigators have shown that automated mandatory bolus technique may have some advantages. Studies using 2 pump system conducted by Wong et al showed that the bolus group had less bupivacaine consumption, similar analgesic efficacy and higher patient satisfaction to those in the infusion group, whilst Capogna et al showed that when bolus technique was compared with a continuous infusion, this resulted in a lower incidence of maternal motor block and instrumental vaginal delivery. Using a 1 pump system combining backgroud automated mandatory bolus with PCEA, Sia et al showed that automated bolus group had a reduced overall consumption of ropivacaine, 2014 American Society of Regional Anesthesia and Pain Medicine.
longer duration of analgesia before the first PCEA self-bolus as well as a smaller proportion of patients who self-administered PCEA boluses compared to the infusion group. No difference in the need for clinician interventions was found between the 2 groups.

George and Habib et al performed a systematic review and meta-analysis comparing bolus technique with the use of basal infusion during maintenance of epidural analgesia for labour pain. The review did not find any statistical difference in the rate of caesarean delivery, duration of labour or the need for epidural supplementation. However, automated intermittent boluses did result in a small but statistically significant reduction in local anaesthetic consumption and increased maternal satisfaction.

As labour pain intensifies with progressive cervical dilatation and analgesic needs may escalate as labour progresses or as augmentation regimens are started. Hence, a variable frequency of background automated boluses that is responsive may provide more efficacious analgesia. Recently, Sia et al reported a novel software that enables a PCEA pump to determine the patient’s analgesic usage over the past hour and deliver 5 ml machine of ropivacaine, mean hourly pain scores or sensory levels, maternal side effects, mode of delivery or neonatal outcomes.

The ability of technology to provide individualization of therapy is imperative in the provision of efficacious labour analgesia. Recent advances in clinical research can aid clinicians in administering seamless epidural analgesia during labour and delivery.

**ESRA1-0699 Symposium: Modern Blocks**

**PECs I+II: INDICATIONS AND LIMITATIONS**

Blanco R. Anaesthesia, Corniche Hospital, Abu Dhabi, United Arab Emirates.

Regional anaesthesia has been during the last decade most probably in its golden era due to the introduction of ultrasound as a tool to target more or less accurately nerves of different sizes and patterns. Many of us believed that with the introduction of ultrasound the success of our blocks would improve and the so-called “failed blocks” would be part of history. At the same time with more dense and precise blocks the need of sedation throughout the surgical procedure was expected to be less, but is this so?

The reality about the need of sedation is more complex than to cover a block in medical school so they have to start again from scratch. The nerves and dense and precise blocks the need of sedation throughout the surgical procedure was expected to be less, but is this so?

The reason why PECS blocks are being used to treat the population of breast cancer patients and patients undergoing breast cancer surgery cannot be easily explained. The use of ultrasound to design these blocks had also in mind to use sono landmarks. In this way anybody with any machine regarding how basic it is should be able to perform the blocks. We know for a long time that bone can be easily identified but very difficult to work with as it creates blind spots all around them, making very difficult to needle through the windows they leave.

Nerves are also very difficult to identify sometimes unless a very good knowledge of anatomy has been achieved, and this can take years. Cross section and 3D anatomy it is not the way doctors learn their basic sciences in medical school so they have to start again from scratch. The nerves and

ESRA1-0698

**Refresher Course: Sedation for regional anaesthesia: needed?**

Blanco R. Anaesthesia, Corniche Hospital, Abu Dhabi, United Arab Emirates.

Regional anaesthesia has been during the last decade most probably in its golden era due to the introduction of ultrasound as a tool to target more or less accurately nerves of different sizes and patterns. Many of us believed that with the introduction of ultrasound the success of our blocks would improve and the so-called “failed blocks” would be part of history. At the same time with more dense and precise blocks the need of sedation throughout the surgical procedure was expected to be less, but is this so?

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ESRA Abstracts

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particularly when the injection is related to a high Regional Anesthesia and Pain Medicine

ESRA1-0701
Refresher Course: Regional anaesthesia and nerve injury: risks and their minimization

REGIONAL ANAESTHESIA AND NERVE INJURY: RISKS AND THEIR MINIMIZATION
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Regional anaesthesia and nerve injuries: risks and their minimization
Permanent nerve injuries as a complication of peripheral regional anaesthesia are uncommon.1 However, transient neurological symptoms and deficits occur more frequent.1 Even with application of ultrasound and electrical nerve stimulation for needle placement, the occurrence of nerve injury persists.2 Correspondingly the question arises, whether there are risks as potential triggers for nerve injury and whether physicians could minimize the risk of nerve injury by selecting safer techniques and methods for the application of peripheral nerve blocks. Different aspects within the procedure of peripheral nerve blocks are considered as potential triggers for nerve injury. Next to the technique for nerve localization which could be electrical nerve stimulation or ultrasound, the injections pressure during administration of local anaesthetics, paraesthesia, current thresholds, the needle type and size, local anaesthetic toxicity, volume and patient factors are considered as relevant. Additionally, it could be relevant which nerve block/ anatomical nerve structure is selected for regional anaesthesia. 

Retrospective studies and register data indicate that the incidence for irreversible neurological deficits is rather low with 1-3:10000 cases.1 In contrast, the occurrence of transient complications - which can last between days and months- is shown to be 100-fold more frequent with a rate of 1-5%.1, 3 However, smaller prospective studies describe higher incidences of neurological deficits. 4-5) Borget et al. described an incidence of 1-14% for nerve injury within the first 6 months following surgery.5 Widmer et al. found an incidence of approx. 2% for nerve injury lasting more than 6 months following knee arthroplasty.6 Ares et al. described permanent injuries with an incidence of 3% following upper limb surgery.7 Regarding this data, triggers and risks for complications are not to determine. Hence, experimental studies try to investigate which part of block procedures could be relevant provoking complications like nerve injury. Our research group observed histological changes in pigs following needle-nerve penetration or needle-nerve contact with different needles.8-10) Accordingly, large sized needles (18G) may induce a severe nerve trauma compared to small sized needles (24G).6 Moreover, we found that even a needle-nerve contact could induce a distinctive aspetic nerve inflammation.11 In case of needle advancement during needle-nerve contact (0.15 N) myelin destruction may occur.8 Kapur and Hadzic et al. observed in dogs that high injection pressures during intraneural injection of local anaesthetics may lead to clinical and histological nerve injury.9,10) Whitlock et al. found that local anaesthetics like ropivacaine injected within peripheral nerves could trigger axonal damage in rats.11 Kitagawa and colleagues found nerve injury related to the concentration of local anaesthetics when nerve tissue is exposed to local anaesthetics.12

Needle-nerve puncturing and needle-nerve contact without subsequent injection may induce histological nerve injury. Particularly when large sized needles (i.e. catheter placement) are used, nerve injury is likely. The injection of local anaesthetics could cause histological impairment and neurologic deficits – particularly when the injection is related to a high injection pressure. Moreover, local anaesthetics comprise neurotoxic properties. This corresponding neurotoxicity is likely related to the selected concentration. Considering the present studies it can be recommended, that needle-nerve contact, nerve puncturing and the injection of local anaesthetics within peripheral nerves should be avoided - particularly when high injection pressure occurs. Even though, there is no clear evidence that sonography prevents nerve injury, it is obvious that ultrasound could reduce the risk of nerve injury by permanent visualization of the needle tip and the target nerve. In the case of difficult conditions (deep blocks, obesity) it seems to be useful to combine ultrasound with other techniques like electrical nerve stimulation. Threshold currents >0.5 mA, low injection pressures and the consideration of paraesthesia during needle advancement may help to avoid needle-nerve trauma.

References

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ESRA1-0702
Panel Discussion: Technical development for patient safety in regional anaesthesia

COST-BENEFIT COMPARED STIMULATING TO NON-STIMULATING CATHETERS

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Stimulating catheters may be able to improve postoperative analgesia by providing feed-back regarding the location of the catheter tip in relation to the target nerve or plexus structure. Thereby, it is supposed, that stimulating catheters could reduce the risk of analgesia-failure. Due to their inner technique, the production of stimulating catheters is very costly when compared to non-stimulating catheters. Hence it can be assumed that the price of a stimulating catheter is more or less the double of a conventional catheter. This fact is important since economical considerations got more relevant for health care over the last years. Accordingly, a physician has to justify such higher costs for medical devices to the hospital administration. The avoidance of complications/risks and their associated costs - as a kind of reimbursement - could be the crucial argument to introduce a more expensive device.

Therefore a stimulating catheter should be superior to a non-stimulating catheter regarding the procedural time for placement, analgesia quality or failure rate or a combination of these factors.

To date there are 13 randomized controlled trials comparing stimulating versus non-stimulating catheters. Five studies were performed in patients scheduled for continuous femoral nerve block, 6 for popfleical sciatic nerve block. One trial was applied for interscalene plexus block and another study was performed for continuous infraclavicular nerve block. A total of 720 patients were enrolled. In two studies ultrasound was used in combination with nerve stimulation or alone (61 patients). According to the hypothesis as mentioned above, we compared failure rates, quality of postoperative analgesia, consumption of rescue medication, and procedural times for catheter placement.

A total of 349 patients with stimulating and 361 patients with non-stimulating catheters was investigated. Only one study reported secondary catheter dislocation (4 patients). No significant differences can be reported regarding postoperative analgesia. In one study lower pain scores were noted (32 patients). Some studies (297 patients) observed a lower consumption of rescue medication and local anaesthetics (130 patients). Procedural times were significantly shorter when ultrasound was used in combination with non-stimulating catheters.

In conclusion, there is no evidence that stimulating catheters could reimburse their higher price by higher effectiveness during catheter placement due to shorter procedural times or within the postoperative phase due to a reduction of local anaesthetics or rescue medication.

References

ESRA1-0703
Refresher Course:

CHRONIC POSTOPERATIVE PAIN FOLLOWING CARDIAC SURGERY

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More than one decade ago, around 2000, William Macrae, one of the pioneers in acute and chronic pain management & leader of Pain Services in Ninewells Hospital in Dundee, was among the first authors internationally, who brought up to light the topic of chronic pain after surgery and who discussed extensively its existence. However, the same author some years after his first reports related to the subject, in a review published in BJA, in 2008, disappointingly concluded that chronic pain represents one of the most common and serious long term problems after surgery, with its percentages still being highly alarming.

Percentages of chronic pain after surgery vary depending on the site of operation. Chronic Post – Surgical Pain is a well – known and common clinical entity with a reported incidence between 5 and 90% of patients after various types of operations. Not all studies are consistent about its incidence, with wide variations between different surgical procedures, probably due to the lack of clarity in its description and the absence of a universally agreed definition.

According to classical literature, it involves pain that develops after a surgical intervention and has a duration of at least two months after surgery, excluding pain due to other causes (malignancy, infection), or pre – existing pain problems continuing post – surgery. Yet, Chronic Post – Surgical Pain has received increased interest during the past 10 – 15 years and can be characterized as one of the commonest and most serious postoperative complications, also posing a significant economic and health – care burden, since millions of patients undergo surgery at the European or International level annually.

References regarding chronic postoperative pain after cardiac surgery usually focus on post–sternotomy neuralgia/pain or dysaesthesia. Chronic Pain after Sternotomy Pain (CSPS) frequency, according to some authors, climbs up to above 50%, whereas, according to others, fluctuates around 30%. The incidence of severe incapacitating CSPS is quite consistently about 3–5%, with at least 1/3 of these patients reporting that chronic pain disturbs their daily activities, impacts quality of everyday life and interferes with sleep. Recently, it has been estimated that nearly 1/3 of patients undergoing cardiac surgery, experience moderate to severe CSPS. Many of these patients do not seek medical attention to manage their pain, which they often describe as burning, shooting or constant aching, thus implying potential participation of neuropathic components. Despite great interest in chronic post-surgical pain in general, due to various reasons, CSPS has been neglected topic during the previous years and, indeed, may still be under–recognized and undertreated, according to multiple researchers’ conclusions. From the cardiac surgeons’ point of view, CSPS is usually not an issue, since most of investigators are usually focused on other outcome parameters, such as strokes prevalence, mortality rates and angina recurrence or heart-related chest pain. Although surgeons do not usually see it as an issue, patients may suffer from CSPS (often called chronic or post-operative sternalgia).

Terminology is complex with multiple variations among studies. However, Chronic Pain after Cardiac Surgery is usually neuralgic and can involve either the area of sternotomy or the upper and lower limb from where arteries or veins have been harvested, or both. One can find the following terminology: Chronic Post – Surgical Chest Pain, Non – Cardiac Thoracic Pain after Sternotomy, Post – CABG Pain Syndrome, Post – Sternotomy Neuralgia / Dysaesthesia, Postoperative Sternalgia, or/and Chronic Postoperative Leg / Arm Pain after CABG.

For the first time CSPS was described by the group of Mailis in 1989, through a reference originating from Toronto Western Hospital Pain Clinic. 11 patients who underwent CABG with IMA harvesting were followed up for 4 months – 5 years postoperatively and described chest wall pain probably due to injury to anterior branches of intercostal nerves at the site of IMA harvesting. Similarly, the same year, the group of Defalque published an article in which they also mentioned the term poststernotomy neuralgia in 54 pts, at a 6 months follow up following cardiac surgery. The possible mechanism was scar entrapped neuromas of small terminal rami of anterior branches of upper intercostal nerves, due to section / damage of nerve rami by sternal wires and needles inserted at sternal margin of interchondral spaces, or marked scar reaction by sternal wires themselves.

In 2001, in Acta Anaesthesiologica Scandinavica, E Kalsbo published their results on chronic post sternotomy pain, after a 2-3 years follow up of 625 cardiac surgery patients. According to their findings, CSPS reached an incidence of 28%, with 38% of patients experiencing moderate to severe pain and 1/3 of them referring sleep disturbances. Chronic sternalgia was not attributed to IMA harvesting as it was believed in the past, but a correlation of severity of acute postoperative pain with chronic pain development was found.

Since these first references on chronic pain following cardiac surgery, several papers have appeared in literature regarding pain after operations involving sternotomy, and to their credit, chronic pain is often the major area of study. Unfortunately these papers are often anecdotal, a series of case studies or at best
Poststenotomy dysesthesia is a common long term postoperative complication and in reference to its pathophysiology, severe acute perioperative pain can signal abnormally severe tissue trauma, due to a complication (haematoma, fracture, infection) or nerve entrapment, which then will develop to chronic pain. It is also possible that the endogenous pain control systems are weaker in these patients. The correlation between acute pain and development of chronic pain has previously been suggested, potentially indicating a neuroplastic element that is usually unrelieved by conventional opioid analgesia. Patients who need more analgesics during the immediate postoperative period are more likely to develop CPSP after cardiac surgery.

Reduction of painful stimuli in the perioperative period potentially might reduce central sensitization at the dorsal horns and may attenuate the development of chronic pain. Local anaesthetics, when given epidurally, have the ability to block noxious input to the spinal cord and offer a different mechanism than opiates for modulating the development of chronic pain. However in two papers auditing HTEA role in CPSP reduction or prevention, HTEA did not contribute to a difference in CPSP intensity and/or frequency, compared with patients receiving traditional opioid-based analgesia. Local anaesthetics or opioids may not provide total C-afferent blockade during surgery, and inflammation (secondary phase of injury) can extend well into postoperative period and may continue to cause central sensitization, once analgesics are withdrawn. On the contrary, high doses of opioids, especially remifentanil, may trigger or exacerbate CPSP due to their hyperalgesic properties. Ketamine and General Anesthesia have found no clinical benefit in CPSP development. Hence, the term "protective analgesia" has been used to describe techniques that may limit the development of pathologic chronic pain by altering neuronal plasticity and sensitization. At present, there is extremely limited evidence to support any protective analgesic regimen in cardiac surgery that requires sternotomy. Gabapentin was studied in a small trial of 40 patients, and no benefit was shown. Thoracic epidural also has shown limited benefit in preventing chronic sternotomy pain.

Both gabapentin and diclofenac appear to be effective in treating chronic sternotomy pain once it has developed; however, gabapentin provides superior analgesia with a more sustained effect after discontinuation. Other medications, such as pregabalin, tricyclic antidepressants, serotonin-norepinephrine reuptake inhibitors, lidocaine patches, and tramadol, also might be effective because they generally are used in the treatment of neuropathic pain syndromes. High-quality evidence does not exist for the use of chronic opioids in non - cancer pain. One prominent pain society’s recent comprehensive review of the literature found very limited weak evidence for chronic opioid use, urging practitioners to use these medications with “great restraint and caution”. When medical therapy does not confer pain relief; minimally invasive interventional techniques, such as intercostal nerve blocks and pulsed radiofrequency of the dorsal root ganglion may be attempted. Epidural injections also may be helpful in alleviating certain types of thoracic pain; however, there are no studies that assess their role in the treatment of chronic poststenotomy pain. Spinal cord and peripheral nerve stimulation are alternative minimally invasive options that may be attempted in refractory cases.

Cardiac surgery most commonly is performed via median sternotomy, which results in significant postoperative pain in an acute and chronic basis. Effective pain management after surgery leads to improved patient satisfaction and, possibly, improved clinical outcomes. The pathophysiology of chronic sternotomy pain is poorly understood, but risk factors for its development include poorly controlled postoperative pain and mammary artery graft harvesting. CPSP may be treated with medications used in other chronic pain syndromes and with interventional pain procedures, but the evidence for these practices is still limited. Future research is needed to elucidate whether chronic sternotomy pain can be prevented by specific interventional anesthetic techniques and to discover more effective treatments if it occurs.

CPSP pathogenetic mechanisms still need to be resolved. CPSP is a common and frustrating postoperative complication, and future, prospective, randomized studies addressing the issue are recommended. It is interesting and primarily important to try to elucidate causes and risk factors, since in this...
way we will be allowed to look at strategies for prevention, always taking into account that CPSP is still hard to be treated effectively.

References

ESRA1-0704 Refresher Course: Cardiovascular Patients: Regional Anesthesia revisited

CARDIOVASCULAR PATIENTS: REGIONAL ANESTHESIA REVISITED

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Introduction
The role of Regional Anesthesia (RA) techniques in the anaesthetic management of cardiovascular patients still remains a subject of discussion and continuous debate, despite the fact that multiple related references have appeared in literature the last 20–25 years, however, with inconclusive or even contradictory results. Nevertheless, as opposed to General Anaesthesia (GA) alone, many clinicians continue to apply RA as well, for intraoperative anesthesia/analgiesia and postoperative pain management, in combination with a general anaesthesth, sufficient to produce unconsciousness, amnesia, and tolerance of the endotracheal tube.

Currently, RA advantages are claimed to be improved postoperative pulmonary function, with shorter time to extubation, possibly a reduction in pulmonary infections, and superior postoperative pain control over systemic opioid – based analgesic regimens, with a significant reduction in postoperative pain, still representing a worthwhile outcome. Additionally, RA results in a reduced incidence of deep venous thrombosis and pulmonary embolism, as well as a reduction in postoperative gastrointestinal ileus. Among the physiological effects of RA, primarily of Central Nervous Blocks (CNBs), but also of Peripheral Nerve Blocks (PNBs) a possible decrease in the postoperative stress response, a decrease in postoperative hypercoagulability, a possible increase in myocardial oxygen delivery, and decrease in oxygen consumption could potentially have beneficial effects on cardiac morbidity. Based on the above, recent developments in technical aspects of RA have the potential to provide significant advantages for many categories of cardiovascular patients in all age groups, with the majority of studies focusing on specific outcomes and potential RA benefits, when used for surgery and postoperative analgesia.

One of the biggest challenges for anaesthetists is the safe conduct of anaesthesia for patients who might be elderly, have pre – existing cardiovascular diseases and are scheduled to undergo not only cardiovascular, but also minor or major non – cardiac surgery. During the previous decades, numerous studies have attempted to determine whether RA offers convincing benefits over GA, often with really promising results. Nowadays, there is a tendency to interpret literature reports and meta – analyses more carefully, and it still remains unclear whether RA is finally beneficial when applied to the group of cardiovascular patients. Anaesthesiologists have debated for many years whether RA is better or worse than GA especially when compared to GA in elderly patients. According to literature research, many studies in this area are weak in experimental design and therefore have not produced any definite answers. Due to the rarity of some situations like valvular disease, especially in subpopulations of patients (eg obstetrics, paediatrics), the literature offers many anecdotal cases or case series, but not enough controlled studies; as such, guidelines are still needed to sum up best evidence for these challenging situations. Until then, we must rely more on the understanding of the pathophysiology of cardiovascular diseases, of surgical needs and of the effects of the anaesthetic technique in every different situation.

RA & Ischaemic Heart Disease – CNBs (High TEA) Cardioprotective Effects

RA continues to enjoy enthusiasm among clinicians. The successful application of High Thoracic Epidural Analgesia (High TEA), for the treatment of angina – Ischaemic Heart Disease and the achievement of improved analgesia after thoracotomy, have both prompted its use during cardiac surgery. In several animal studies, it has been shown that High TEA may redistribute myocardial blood flow in favor of subendocardial layers at risk of ischemic events and may reduce the size of experimentally induced myocardial infarction.

TEA has also been shown to decrease adverse perioperative cardiac events. Better pain relief with concomitant reduction in the postoperative stress response and systemic sympathetic activity may contribute to this effect. Regional sympathetic block including the cardiac sympathetic nerves reduces not only ischaemic pain but preserves coronary perfusion during cold pressor testing. This effect was most pronounced in stenotic vessels. These data further support findings of perioperative anti – ischaemic effects of High TEA, in cardiac as well as non – cardiac surgery. TEA improved diastolic as well as systolic function in patients with coronary artery disease undergoing operative revascularization. Diastolic dysfunction has been reported to be an early sign of cardiac ischaemia. Tropinin release and long – term survival after coronary artery bypass grafting further underline the cardioprotective potential of high TEA, especially at the experimental level. Clinical data on myocardial ischaemia and mortality are still inconclusive, in reference to complications rate, survival and general outcome.

High TEA for coronary artery bypass graft (CABG) surgery promotes perioperative analgesia and attenuates the stress response to surgery; it provides effective pain relief for patients with unstable angina and myocardial infarction. The beneficial effects of local anaesthesia administration through a high TEA catheter in patients with severe angina who are not candidates for surgical revascularization have also been documented. Surgery of the coronary arteries in patients with co – morbidities is fraught with difficulties. Minimally invasive direct CABG surgery and conscious off – pump CABG surgery (COP – CAB) has been performed in conscious patients with acceptable results, initially engaged with much enthusiasm by many skillful clinicians for obvious reasons. At this point, one must never underestimate that, although GA is considered a safe anesthetic, it is not without complications, especially in high risk cardiovascular surgical patients. A protective effect of TEA against arthromegnosis has been seen in animal, as well as in human studies (CABG patients), in an effort to evaluate and assess the postoperative impact of high TEA on cardiac function, using a combination

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Additionally, High TEA, up to now, was thought to provide cardioprotective effects in patients undergoing non-cardiac surgery as well. Nevertheless, the results of two previous recent meta-analysis showed controversial conclusions regarding its impact on perioperative survival, cardiac morbidity or mortality, on the basis of currently available randomized controlled trials. In a meta-analysis published last year, nine studies with a total of 2,768 patients were included. According to authors’ conclusions and results, High TEA did not reduce perioperative mortality, although patients receiving it demonstrated a tendency to a lower rate of perioperative myocardial infarction, that did not however reach statistical significance. As such, one may assume that positive influence of High TEA on perioperative in-hospital mortality in patients undergoing non-cardiac surgery. Furthermore, it remains questionable if it also has the potential to reduce the rate of perioperative myocardial infarction.

RA and Valve Diseases

Patients with significant aortic stenosis (AS) who present for non-cardiac surgery also offer a unique challenge to the anaesthesiologist. It is the only valvular lesion identified as a significant risk factor for non-cardiac surgery. Specific haemodynamic goals must be maintained to avoid serious, even fatal, complications. Traditionally, neuraxial blockade has been considered contraindicated in these patients because the sudden and potentially profound decrease in systemic vascular resistance may precipitate a life-threatening compromise in coronary perfusion. However, certain neuraxial techniques, such as continuous spinal and epidural anaesthesia, can be tailored to minimize this effect.

No randomized or prospective clinical trials are available in the literature to support the traditional view that spinal and epidural anaesthesia are contraindicated in patients with AS. Two retrospective series, evaluating the risk of non-cardiac surgery in patients with AS were found. In 1 series of 48 patients, 22 received GA, 25 LA, and 1 had a neuraxial blockade (spinal anaesthetic); significant hypotension without major sequelae occurred in 1 patient. Another series reported a successful use of RA in 10 patients with AS from 1993 to 2003, including 1 case report of an aortic valve replacement under epidural anaesthesia in a lightly sedated, spontaneously ventilating patient. The current evidence in the literature lacks the scientific validity provided by randomized clinical trials. The best information available is a few anecdotal observations that neuraxial anaesthesia may be administered successfully in patients with significant AS. No contradictory evidence was found (i.e., adverse outcomes with neuraxial blockade in the same patient population). Any conclusions can only be based in observation and in clinical understanding of the pathophysics of AS and the physiologic perturbations of neuraxial anaesthesia.

A precipitous and marked decrease in afterload can result in profound hypotension and myocardial ischaemia in patients with severe aortic insufficiency. Cardiovascular collapse and death has been described in a woman with aortic regurgitation and pre-eclampsia who received a single bolus of 18 ml of epidural bupivacaine.

There is little data in literature to guide the anaesthetic management of patients with severe pulmonary valve disease. Epidural anaesthesia, using incremental injections of bupivacaine 0.5%, has been successfully used for Caesarean Delivery in a woman with Watson’s syndrome, who was suffering from pulmonary stenosis. Analgesia for labour and delivery has been provided with an intrathecal sufentanil infusion, and a bolus of lidocaine 1% (15 mg) for vacuum extraction was given, in another parturient with isolated severe pulmonary stenosis. Various case reports referring to rheumatic mitral stenosis (MS) in pregnant women are found in the literature. The ideal labour analgesia and caesarean anaesthesia for this population, based on patient expectation, severity of disease, safety, and morbidity outcomes remains controversial. A carefully and gradually titrated lumbar epidural analgesia or CSEA, with consideration to optimize preload, afterload, heart rate, and rhythm, can be used for analgesia and anaesthesia in nearly all patients with MS. However, when contraindications to RA are present, GA can be safely administered as well for caesarean delivery, but care should be used to avoid the significant increases in heart rate, SVR, and PVR, commonly associated with induction and emergence. With either RA or GA techniques, invasive monitoring should be reserved for patients with severe disease.

As one may realize, patients with valvular disease presenting for non-cardiac surgery are either elderly or pregnant women that present for labour or caesarean delivery. Pregnancy results in dramatic changes in the cardiovascular system. Maternal heart disease complicates 0.2%–3% of pregnancies.

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of bupivacaine 0.5% and clonidine epidurally. Among other findings, according to studies results, a reduction of supraventricular arrhythmias has been indicated, with lower catecholamine levels and slower heart rates after CABG in High TEA treated patients also being reported in previous literature references.

In addition, High TEA effects on myocardial ischaemia or infarction ECG/ Biochemical markers are not clear yet. In a randomized trial for elective CABG surgery Barrington et al found that High TEA had no effect on the release of troponin I, whereas it improved time to tracheal extubation and analgesia. In this study according to authors, infusion of ropivacaine 0.2% did not maintain a dense sympathetic block, when compared with bupivacaine 0.75% in another study by Loick et al, who reported reduced troponin T release with High TEA. However, the same results were noted by Priestley et al, who used ropivacaine 1% and also found no effect on troponin levels with High TEA. Despite the theoretical advantages of High TEA, factors such as technical difficulty in grafting and myocardial protection during the ischaemic period may have a more significant effect than High TEA on troponin release.

The potential and well known advantage of RA over GA should be an asset in cardiac patients. RA disadvantages include hypotension from uncontrolled sympathetic blockade and need for volume loading, which eventually may result in ischaemia. Larger doses of local anaesthetics can cause myocardial toxicity and myocardial depression, highlighting the necessity of a slow, careful and incremental administration of the total dose, always accompanied by haemodynamic monitoring. Activating the sympathetic nervous system may result in myocardial ischaemia and infarction as well. In this context, countering the potential High TEA cardioprotective effects, one should keep in mind the potential risk of hypotension secondary to bradycardia and reduced sympathetic tone. Several studies in CABG patients have shown larger intraoperative vasopressor requirements in High TEA – treated patients compared with controls, posing the impact of hypotension on the incidence of myocardial ischaemia, especially in patients with critical coronary stenosis and compromised myocardial O2 supply, to be ignored with difficulty.

One, however, may wonder: Are all cardiac operations equal? Most studies have focused on coronary artery graft surgery with or without cardiological anaesthesia by hypotension or even the uncommon but interesting “awake cardiac surgery” performed under HTEA alone. Supplemental analgesia may be required for saphenous vein versus radial artery harvest, especially when highly lipophilic epidural opiates are used in conjunction with local anaesthetics (e.g., fentanyl vs. morphine). There is no evidence, however, of increased risk of High TEA – related complications with valve surgery versus coronary artery bypass graft surgery. The bias toward investigating coronary artery bypass graft surgery may reflect the greater patient and operative homogeneity compared with valve and other complex cardiac surgeries. So how do these studies influence our clinical decision on whether to use High TEA for cardiac surgery? If the sole purpose for High TEA use is to substantially reduce postoperative morbidity and mortality, then there is insufficient evidence to recommend that practice. If the primary purpose, however, is to provide optimal pain relief and perhaps improve overall quality of care outcomes, then do not put down your Tuohy needles just yet.

As such, this aspect of the application of High TEA in CABG patients still requires further consideration. The anaesthesiologist and surgeon should collaborate and plan the best peroperative strategy to provide optimal care and ensure a rapid and complete recovery of patients. The use of High TEA and fast track anaesthesia also offers particular benefits in beating heart surgery. The excellent analgesia, the ability to reduce myocardial oxygen consumption, and the good haemodynamic stability suggest it might be an interesting technique. New scenarios and in clinical understanding of the pathophysiology of AS and the physiologic perturbations of neuraxial anaesthesia.

A precipitous and marked decrease in afterload can result in profound hypotension and myocardial ischaemia in patients with severe aortic insufficiency. Cardiovascular collapse and death has been described in a woman with aortic regurgitation and pre-eclampsia who received a single bolus of 18 ml of epidural bupivacaine.

There is little data in literature to guide the anaesthetic management of patients with severe pulmonary valve disease. Epidural anaesthesia, using incremental injections of bupivacaine 0.5%, has been successfully used for Caesarean Delivery in a woman with Watson’s syndrome, who was suffering from pulmonary stenosis. Analgesia for labour and delivery has been provided with an intrathecal sufentanil infusion, and a bolus of lidocaine 1% (15 mg) for vacuum extraction was given, in another parturient with isolated severe pulmonary stenosis. Various case reports referring to rheumatic mitral stenosis (MS) in pregnant women are found in the literature. The ideal labour analgesia and caesarean anaesthesia for this population, based on patient expectation, severity of disease, safety, and morbidity outcomes remains controversial. A carefully and gradually titrated lumbar epidural analgesia or CSEA, with consideration to optimize preload, afterload, heart rate, and rhythm, can be used for analgesia and anaesthesia in nearly all patients with MS. However, when contraindications to RA are present, GA can be safely administered as well for caesarean delivery, but care should be used to avoid the significant increases in heart rate, SVR, and PVR, commonly associated with induction and emergence. With either RA or GA techniques, invasive monitoring should be reserved for patients with severe disease.

As one may realize, patients with valvular disease presenting for non-cardiac surgery are either elderly or pregnant women that present for labour or caesarean delivery. Pregnancy results in dramatic changes in the cardiovascular system. Maternal heart disease complicates 0.2%–3% of pregnancies.

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Valvular heart disease in women of reproductive age is most commonly due to rheumatic heart disease, endocarditis, or congenital abnormalities. In general, regurgitant lesions are well tolerated during pregnancy because the increased plasma volume and lowered systemic vascular resistance result in increased cardiac output. In contrast, stenotic valvular disease is poorly tolerated with an increased incidence of maternal death due to the increased plasma volume preload. The choice of anesthesia depends on the lesion and its severity. Usually, RA provides the least amount of alteration in hemodynamics, although GA for caesarean section can be equally safe, when the abrupt changes associated with laryngoscopy, intubation, and extubation are blunted by the appropriate choice of pharmacological agents and anaesthetic modalities.

A careful preview history of disease and thorough physical examination of patients having valvular heart disease using modern instrumental investigation methods are important in assessing preoperative risk. Important factor in the preoperative decision process and the risk assessment is the nature of surgical procedure also. Prevention of cardiovascular system complications is another factor having impact on operations results for patients with heart valvular pathology during non – cardiac surgery. Efforts should be joint, to avoid these complications, involving surgeon, cardiologist, anesthesiologist and general practitioner. Survey of available literature provides variable pathophysiological features of cardiac lesions, which are of paramount importance while choosing methods of anaesthesiological management during non – cardiac operations and use of anaesthetics and vasoactive drugs, as well for patients with aortic and mitral valve diseases.

RA and Hypertrophic Obstructive Cardiomyopathy (HOCM): It is a relatively rare disease of intraventricular septum (IVS) that places patients at significant risk of sudden cardiac death. The enlarged septum can result in left ventricular outflow obstruction leading to angina pectoris, syncope, tachydysrhythmias, and congestive heart failure. Though morbidity and mortality during normal activity is low, HOCM patients have a higher incidence of congestive heart failure and other cardiac events, when placed under surgical stress. Data describing the successful anesthesia management of HOCM in non-cardiac surgery is limited. Anesthetic goals for the HOCM patient have typically been directed towards depressed myocardial contractility, normal or increased systemic vascular resistance (SVR), and increased left ventricular volume. Compared to GA, RA techniques can provide superior postoperative analgesia, decreased surgical stress response and a reduction in postoperative nausea and vomiting, which can benefit HOCM patients.

RA and Cardiac Surgery: Vascular surgical patients are a diverse group of patients who tend to be elderly, with multiple comorbidities, while vascular procedures may involve significant blood loss and ischaemia of tissues beyond the arterial obstruction. RA techniques may offer benefits to patients undergoing vascular surgery because of their cardiorespiratory comorbidities. However, this group of patients is commonly receiving multiple medications, including anticoagulants, so regional techniques are not without risks.

During lecture presentation three fundamental revascularization procedures, carotid, abdominal aortic aneurysm repair, and infraglacial surgery, will be analyzed, discussing the clinical applications of regional techniques relevant to each key area.

RA and Cardiac Outcome: Neuraxial anesthesia results from injection of local anesthetics into the subarachnoid space and/or into the epidural space. There is an ongoing debate about whether neuraxial blockade can reduce perioperative mortality. Recent large high – quality trials have focused on this important question. Some areas of interest, such as orthopedic and cancer surgery, suggest some evidence of reducing perioperative mortality due to neuraxial anesthesia; others such as cardiac and vascular surgery are still in debate.

In this context, there is still a going discussion on the effects of RA on perioperative outcome. In a meta-analysis of eleven randomized controlled trials of 1173 patients RA was associated with lower incidence of myocardial infarction (p=0.04) but lumbar epidural analgesia had no effect. Another meta-analysis of the effect of neuraxial blockade, epidural or spinal on postoperative morbidity, assessed 141 trial of 9559 patients and concluded that the overall 30 day mortality was decreased significantly (30%) by neuraxial blockade. They reported evidence of an improvement not only in major morbidity but even on mortality. There has been a lot of scrutiny on the results of the above mentioned study concluding that RA only improved mortality in patients undergoing orthopedic surgery and that use of general anesthesia negated the beneficial effect on mortality of RA alone. Although thoracic epidural and spinal analgesia significantly improved mortality, lumbar epidural analgesia was ineffective.

Another meta-analysis comparing GA versus RA for hip fracture surgery examining 15 trials of 2162 patients showed decreased mortality in the RA group 6.4% RA, versus 9.4% in the GA group. The result not surprisingly was not sustained after 3, 6 and 12 months.

Recent randomized controlled trials failed to show any major advantage in outcome of combined RA versus GA. This might reflect the recent improvements in GA which have been sufficient to catch up to the standards set for RA in the 1980s and early 1990s.

The principals of an epidural technique designed to improve pulmonary and cardiac outcome were not fulfilled in these studies. It is not clear if the patients had a complete sensory block throughout surgery; if the concentration of the inhaled anesthetic was larger of 0.5 MAC and there was a frequent use of opioids during surgery, the study is not comparing an epidural technique with general anesthesia but two general anesthesia techniques.

The activation of the neuroendocrine response results in high levels of nor-epinephrine that stimulates coronary endothelial production of nitric oxide resulting in paradoxic vasoconstriction (vasospasm) in patients with AHFS. Thus for a patient to derive a cardioprotective effect from a perioperative epidural technique, the catheter must be inserted in the high thoracic region. Moreover, a local anesthetic must be administered both during and after surgery in a continuous fashion, and for at least 72 hours, conditions not clearly met in the above mentioned studies.

Conclusions: In conclusion, cardiac disease does not preclude regional anesthesia, but the anesthetic management must be based on individual assessment of cardiac function and reserve, and an anticipation of the impact of selected anesthetic technique (general or regional) on cardiac performance.

The information submitted in this lecture – review remains only an overview of the data, which will continue changing from time to time, depending upon the evidence procured over a period of time. Also the techniques will normally be tailored, varying from patient to patient, surgical needs and the facilities available. To confirm all these findings, future trials should explore this enduring question of potentially positive outcome with adequate power, ideally in the setting of high – quality multicenter randomized trials. Regional techniques based on the philosophy of improved outcome of cardiovascular patients can lead the patient or parturients through surgery and postoperative course successfully.

A reduced morbidity and an accelerated convalescence can be obtained if a multimodal approach is applied, in which the patient is adequately informed and prepared, where an appropriate RA technique is used, not only to provide intraoperative pain relief, but also to relief pain in the postoperative period, thus attenuating perioperative stress and inducing fast track and enhanced recovery.

It is hard to believe that regional anesthesia is beneficial in every patient and in every surgical intervention. However, common sense makes us to believe that some surgical procedures are best performed under RA. Surgical outcome, however, is not only determined by anesthesia alone. Postoperative care dependent on many other factors. RA is not a cure for – existing morbidity that may contribute to postoperative complications. One cannot reduce death from severe coronary artery disease with a short – term intervention. And although it may be difficult to prove that RA has major advantages on all aspects over GA, currently there is no study where GA has proven meaningful outcome improvements over RA.

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Panel Discussion: Regional anaesthesia in special patients

RA IN OPIOID TOLERANT PATIENTS

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Introduction: Noticeable shifts in pain pharmacotherapy and physicians attitude have occurred during the previous years, in reference to opioids use for the treatment of benign and malignancy-related pain, with pain specialists prescribing opioids to a greater number of patients and in doses appropriately titrated towards individualized needs. The percentage of patients to whom opiates for chronic pain are prescribed has increased dramatically in recent years. Interestingly, 47% of these patients are treated with strong opioids, such as morphine, oxycodone and methadone, whereas long-term opioid use and dose escalation has been noted in one third of patients with chronic non-cancer pain. A variety of opioid analgesics and delivery systems have been introduced, that have increased patient satisfaction, physician acceptance, and overall use.

Concomitant with improvements in pain relief and quality of life improvement, an increasing number of patients are affected by issues related to opioid tolerance and physical dependence. Only few published reviews address the treatment of acute pain in patients with substance abuse disorders, and even fewer have focused specifically on perioperative pain management in opioid-tolerant or opioid-dependent patients, incorporating Regional Anaesthesia (RA) techniques. Multiple factors are responsible for opioid tolerance, physical dependence and/or addiction, making pain management even more difficult in this specialized subset of patients.

Many patients who present for surgery and anesthesia may be opioid-dependent or at least moderately tolerant to the therapeutic effects of opioid analgesics. Causal factors underlying tolerance and dependence include substance use disorder and, more commonly, legitimate use of opioid analgesics for treatment of chronic benign or malignancy–associated pain. Opioid-dependent/tolerant patients, particularly substance abusers, may present with organ damage, infectious diseases such as human immunodeficiency virus, tuberculosis, hepatitis, associated psychological disorders, and drug–specific adaptations such as tolerance, physical dependence, and withdrawal. These variables alone or in combination may diminish opioid analgesic effectiveness in the perioperative setting. Perioperative management of opioid-tolerant/dependent patients and RA application pose a special challenge to primary care-givers, anaesthesiologists and pain specialists alike, with the problem usually emanating from the often conflicting needs to balance the rights of the patient on one hand and concerns regarding safety, diversion, and abuse on the other, thus raising important ethical issues.

Basic Concepts of Opioid Use Disorders: Terminology–Criteria–Key Issues: Prior to presentation of RA role in opioid tolerant patients, the following issues should be considered to provide a comprehensive perioperative pain management strategy: (1) key concepts and definitions, such as substance abuse, physical versus psychological dependence, and tolerance development; (2) clinical differentiation of opioid dependence; (3) preoperative assessment issues and (4) perioperative-specific management issues.

Substance use disorders have been classified according to clinical manifestations of psychological dependence, with/without physical dependence or tolerance and/or both. Specific definitions have already been consolidated in current literature. Distinctive boundaries of definitions might not be always
clear (especially for terms such as addiction, dependence, abuse and substance abuse), partly due to terminology evolution over time in varying historical and sociocultural contexts, also reflecting conflicts regarding appropriate terminology for the complex medical and psychosocial issues, that underlie chronic and compulsive substance-using behaviour.

Opioid Physical Dependence – Withdrawal Syndrome: It describes alterations in physiologic response that result from opioid binding and receptor-mediated activity. Abrupt discontinuation of oral or parenterally administered opioids leads to opioid withdrawal or abstinence syndrome (hypertension, tachycardia, diaphoresis, abdominal cramping, and diarrhea, as well as physiologic and behavioral responses). These symptoms, although very unpleasant are rarely life threatening; however, they can often confuse clinical diagnosis and care. The time course of withdrawal (onset, peak intensity) is variable, depending on the opioid used.

Opioid Tolerance – Definition: Opioid tolerance is a predictable pharmacologic adaptation. Continued opioid exposure results in a rightward shift in the dose–response curve, and patients require increasing amounts of drug to maintain the same pharmacologic effects. The phenomenon of tolerance develops to analgesia, euphoric, sedative, respiratory depressant, and nausea inducing effects of opioids, but not to their effects on miosis and bowel motility. The degree or gradation of opioid tolerance is generally related to duration of exposure, daily dose requirement, and receptor association/dissociation kinetics. Opioid agonists binding to the same receptor may show asymmetric cross-tolerance on their intrinsic efficacy. For example, patients treated with sufentanil, an agonist having high intrinsic efficacy and requiring low receptor occupancy for a given analgesic effect, develop tolerance more slowly than to opioids having low intrinsic efficacy, such as morphine.

Tolerance is observed in patients to whom opioids are legitimately prescribed for pain management, as well as in those abusing this class of drug. In general, the higher the daily dose requirement, the greater is the degree of tolerance development, thus reflecting harmful addiction rather than a normal adaptation to this class of analgesics.

Types of Opioid Tolerance – Molecular and Cellular Mechanisms: Several types of opioid tolerance, including (1) innate (have been defined. Innate tolerance refers to preexisting insensitivity, which is genetically determined and hence is present before drug exposure. True Tolerance is acquired after multiple exposures. This can be of three types: Pharmacokinetic Tolerance, Learned Tolerance, and Pharmacodynamic Tolerance. Pharmacokinetic tolerance refers to changes in distribution or metabolism of the drug, usually by enzyme induction and subsequent acceleration in metabolism. There is also adequate evidence that drug metabolism by genetically variable P–450 can also influence the development of tolerance and dependence. Learned tolerance, refers to a reduction in the effects of a drug due to compensatory mechanisms that are learned. For example, an opioid abuser learns to behave normally despite intoxication. Learned tolerance is also observed in methadone maintenance programs, where abusers mask the effects of methadone, so that a higher dose will be prescribed.

Perhaps the most important form of tolerance relevant to opioids is pharmacodynamic tolerance. Pharmacodynamic tolerance has been related to neuro-adaptive changes that take place after long-term exposure to the drug. These include changes in receptor density and alterations in receptor coupling to G proteins and signal transduction pathways. Basic research has provided a better understanding of the cellular and molecular mechanisms mediating pharmacodynamic opioid tolerance. These mechanisms possibly occur at two distinct levels. The first occurs at the level of the opioid receptor and involves (a) receptor desensitization on long-term or repeated exposure to opioids, (b) subsequent decreases in the absolute number of opioid receptors (down-regulation), (c) receptor trafficking from cell surface to the interior of the cells (internalization), and (d) secondary uncoupling of opioid receptors from underlying G proteins.

Another mechanism proposed to explain pharmacodynamic tolerance involves up-regulation of the cyclic adenosine monophosphate (cAMP). Acutely, opiates inhibit the functional activity of the cAMP pathway, although with long-term opiate exposure, the cAMP pathway gradually recovers, and tolerance develops. Increased synthesis of cAMP may be responsible for physical dependence and physiologic changes associated with withdrawal. Up-regulation of cAMP has been most clearly demonstrated in brain, but up-regulation within the dorsal horn of the spinal cord seems to be responsible for tolerance to opioid – induced analgesia.

Long term–tolerance may represent a persistent neural adaptation. This phenomenon may be observed in patients who discontinued prescribed or illicit opioid use many months or years previously, but continue to exhibit opioid insensitivity. Long–term adaptations at the molecular and cellular level include (1) induction of transcription factors, which regulate the function of several genes in a stable fashion, thus initiating neuronal plasticity; (2) activation of the central glutamnergic system; and (3) increased synthesis of spinal dynorphin, with strong evidence of glutamate and NMDA receptors playing a role in the development of opioid tolerance and increased pain sensitivity. Prolonged exposure to morphine indirectly activates NMDA receptors via second–messenger mechanisms and also down–regulates spinal glutamate transporters. The resultant high synaptic concentration of glutamate and NMDA activation contributes to opioid tolerance and abnormal pain sensitivity, by various mechanisms (Ca++ influx, PKC activation, NO production and neuronal apoptosis). Spinal dynorphin also seems to play an important role in the development of opioid tolerance and hyperalgesia. Concentrations of this endogenous opioid peptide increase after continuous exposure to μ-opioid receptor agonists.

Differentiation – Diagnosis – Categorization of Various Clinical Pictures: Anesthesiologists are likely to deal with a variety of opioid–dependent/tolerant patients. Their majority includes those with chronic pain conditions, who have been taking opioid analgesics for a prolonged period (months to years). The increase in dose requirement may be indicative of tolerance development, progression of disease, or both factors. A second group, exhibiting tolerance, includes opioid abusers (opiates addicts, usually to heroin). The problematics are generally in terms of assessment and management, with exact prevalence of opioid addicted patients presenting for surgery currently being unknown and possibly varying.

A unique subset includes opioid–tolerant patients (neither abusers, nor opioid–prescribed for chronic pain). They are former addicts enrolled in long–term methadone maintenance programs. Many of these individuals have not been users for many years, but are exposed to relatively large doses of methadone, and, as might be expected, exhibit high–grade tolerance to the antinoceptive effects of opioids. There are no published research data on how to best address the concerns of this particular subclass. Patients may be reassured that despite a previous history of opioid dependency, effective pain control is an achievable goal, and that the risk of relapse can be minimized, by developing a perioperative management plan, excluding excessive opioid doses that might lead to recurrence of addictive disorder.

A final subset of opioid– dependent patients is those who have well document chronic pain and who, superficially, resemble opioid abusers by virtue of their often obsessive drug–seeking behavior. These patients are usually found to have visited numerous physicians and have filled multiple prescriptions for opioids. In actuality, these individuals are not addicted but undermedicated and are only seeking adequate pain relief (pseudoaddiction). Pseudoaddictive behavior generally reflects patients’ attempts to compensate for development of tolerance, progression of metastatic disease, or worsening of pain in settings, where patients have become more functional. In general, pseudoaddictive patients can be differentiated from true drug abusers because increasing doses of opioids and improvement in pain control usually eliminate the drug–seeking behaviour.

Additionally, methadone– maintained and other opioid– tolerant patients are relatively pain intolerant and demonstrate significantly increased sensitivity during cold pressor and thermal testing. It has been hypothesized that continuous opioid receptor occupation produces hyperalgesia during less painful states; thus, these patients are unable to cope with sudden acute pain. Therefore, after surgery or other settings of acute pain, caregivers should not restrict medicating opioid–dependent patients, but rather treat the pain aggressively, while being aware of the altered pharmacokinetic/pharmacodynamic and behavioral issues involved. This necessitates a good assessment strategy and formulation of a perioperative management plan to provide adequate comfort to this particularly pain– sensitive population.

Differentiation of Patients Subsets – Importance of Diagnosis and Assessment Steps: The management of acute postoperative – perioperative pain in the opioid tolerant patient is a common challenge for anesthesiologists worldwide. For patients presenting for surgery on high doses of opioids, perioperative pain management requires a carefully balanced multi – modal approach, with regional anesthetic/analgiesic techniques (e.g., central neuraxial and peripheral nerve blocks – CNBs and PNBs) representing valuable tools, with an important role throughout the whole perioperative period. Apart from treatment plan formulation, patient assessment is of paramount importance.

There are several general principles that help to guide the anesthesiologist and pain specialist with perioperative pain management. First and foremost is to uncover the fact that the patient is an opioid user or an abuser and to recognize that issues related to physical and psychological dependence and opioid

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Neuraxial Analgesia for Postoperative Pain: Neuraxial administration of opioids offers a more effective method of providing postsurgical analgesia than parenteral or oral opioids. Intrathecal and epidural doses of morphine are roughly 100 times and 10 times more efficacious, respectively, than the same doses of intravenous opioids. Therefore, significantly higher levels of analgesia can be delivered to those patients recovering from more extensive procedures, where postsurgical parenteral opioid doses would be expected to be very high.

There have been few evaluations of neuraxial analgesia in opioid-dependent patients. In contrast to local anesthetic blockade, neuraxial opioid analgesia is influenced by down-regulation of spinal opioid receptors, and epidural and intrathecal dose requirements are increased proportionally. Indirect scientific support for this results from the notice that patients with terminal pelvic cancer, also being dependent on high doses of parenteral morphine (5–20 mg every 2h) required relatively large amounts of intrathecal morphine (1 mg as often as every 4 h) to achieve effective pain relief. This dose of intrathecal morphine, although 2–3 times higher than the usual amounts used for postoperative analgesia in opioid-naive patients, did not result in excessive sedation, nausea, vomiting, or delayed respiratory depression.

The opioid dose is generally a small fraction of the patient’s baseline opioid requirement with intrathecal administration. Despite the fact that patients experience effective pain relief, plasma concentrations and supraspinal receptor binding may decline to the point that acute withdrawal is precipitated, unless supplemental opioids are given. For this reason, it is important to maintain baseline opioid requirements, either orally or by intrathecal PCA. Monitoring for complications such as excessive sedation and respiratory depression is mandatory when administering opioids in higher dose and via different routes of administration. Caregivers on postsurgical units should be instructed about the high opioid dose requirements of highly tolerant patients, as well as the potential for overdose when parenteral and neuraxial opioids are administered concomitantly.

Increasing the concentration of epidurally administered opioids may compromise the spinal receptor down-regulation. An epidural opioid loading dose, greater than that used in naive patients, followed by a more concentrated infusion, may improve pain control in highly tolerant patients. Patient-controlled epidural boluses (PCEA) may be added to complement the basal epidural infusion. Local anaesthetics such as 0.1% bupivacaine, 0.1% levobupivacaine, or 0.2% ropivacaine may be added to the epidural infusate to provide selective neural blockade and augment opioid-mediated analgesia. Rescue doses of peripheral and possibly oral opioids should be administered to gain supraspinal analgesic effects and to prevent withdrawal symptoms. In patients ordered to take nothing by mouth, epidural analgesia is used for postsurgical pain, while baseline requirements are maintained with intravenous PCA, intravenous boluses of opioids, or “sip and swallow” doses of methadone.

Switching to an opioid that has high intrinsic potency has been previously advocated, especially in patients with high-grade opioid tolerance, recovering from major surgery, also experiencing ineffective pain control, despite treatment with relatively high doses of epidural morphine (30 mg/h). Switching to sufentanil (50 μg), generally, reduces pain substantially. In addition, an epidural infusion containing 2 μg/ml sufentanil and 0.1% bupivacaine can maintain excellent pain control, for up to 10 days postoperatively. After this time, sufentanil concentration can be changed even to oral methadone. Although switching to a more potent opioid agonist might be beneficial, it is conceivable that improved pain control can also have been achieved by increasing the dose of epidural morphine.

A final method that may be used to improve neuraxial analgesic efficacy is to administer opioids directly into the subarachnoid space. Subarachnoid dosing
markedly increases the concentration of molecules available to bind spinal opioid receptors. Placement of subarachnoid catheters and administration of intrathecal opioids, although rarely used for acute pain management in opioid-naive patients, may provide effective analgesia in opioid-dependent patients, although no scientific literature is available.

Peripheral Nerve Blocks and Perineural Catheters: The optimal infusate and duration of perineural infusion have not yet been established. While the ideal perineural local anesthetic infusion in the periproperative period maximizes analgesia and minimizes motor block, there is no single local anesthetic on the market that guarantee both at present. Both ropivacaine and bupivacaine are commonly used, with ropivacaine possibly preserving motor function and demonstrating faster recovery to baseline motor function compared to bupivacaine, with different results originating from various clinical studies. To date, no additives to local anesthetics for perineural infusion have been shown to improve analgesia, except maybe dexmethylamine, so plain local anesthetic solutions are recommended.

Studies evaluating basal–only, basal–bolus, and bolus–only perineural local anesthetic infusion regimens, show that the basal–bolus combination results in the optimal balance of infusion duration, analgesic efficacy, and patient satisfaction. Comparing different concentrations of ropivacaine infusions administered in equal drug mass, the incidence of numbness and efficacy of analgesia differ at various catheter insertion sites. Therefore, the results of any study evaluating a single perineural catheter site cannot be extrapolated to all anatomic sites.

The optimal duration of perineural infusion for acute postoperative pain management is unknown, with effective median infusion duration of 56 hours (range from 2 – 7 days), according to multicenter trials. However, randomized controlled trials comparing local anesthetic infusions to saline infusions demonstrate a return to equivalent pain scores in the treatment subjects once catheters are removed. Perhaps longer – term perineural infusions are warranted for patients with opioid tolerance, but evidence to support this notion is currently lacking. Although the risk of infection becomes a concern for any indwelling catheter the longer in remains in place, the rate of catheter infection in a military case series was only 1.9%, and the 7 cases identified had superficial infections localized to the catheter insertion site which resolved without sequelae following catheter removal.

Future Directions: The acute pain management of opioid-tolerant patients cannot be accomplished by regional anesthetic techniques alone. Several newer agents have been shown to enhance postoperative analgesia or chronic pain control and may serve as useful analogs adjuncts in opioid-dependent patients. These include the μ2-adrenergic receptor agonist dexametomidine, the NMDA receptor antagonist dextramethorphan, gabapentin, antidepressants and the second-generation parenteral cyclooxygenase inhibitors etoricoxib and parecoxib, since they might all be characterized by postoperative opioid-sparing effect, independently of the administration route (spinally or systemically). They can all be combined with opioids.

Gabapentin and pregabalin has been shown to reduce postoperative morphine requirements and to enhance morphine analgesia in healthy volunteers, although no published reports strong evidence of efficacy of these drug in opioid-dependent patient groups are available. However, it may complement standard measures outlined above.

Another promising line of research and potential therapy concerns the development of agents targeted to reduce opioid tolerance and increase intrinsic efficacy, thus obviating the need for dose escalation. Production of nitric oxide, possibly influenced by NMDA receptor activation, has been implicated in tolerance development, however, its exact role remains unclear. Inhibition of nitric oxide synthase has been shown to reduce morphine tolerance. Dextromethorphan has been shown in animal studies to attenuate the cationization of morphine. It may be combined with opioids.

Conclusion: Opioid-dependent patients have special needs in the perioperative period. There is lack of scientifically rigorous studies in this important area, and most of the information must be derived from anecdotal reports and personal experience of anesthesiologists working in this field, thus highlighting the need to conduct such studies in the future.

The anesthesiologist plays the key role in maintaining baseline opioid requirements, administering supplemental intratrophic and postoperative opioids, and providing nonopioid analgesics and neural blockade. To prevent undermedication, the anesthesiologist and pain specialist may be required to titrate doses of opioid that would clearly result in overdose in opioid-naive patients. Nevertheless, undermedicating these patients must be avoided. The dependent patient experiencing opioid overdosage is rare. Awareness and administration of appropriate doses of analgesics as well as continuous clinical monitoring remain the keys to successful perioperative pain management in this special group of patients.

RA techniques can offer many benefits for the opioid tolerant patient in the acute postoperative setting as part of a multimodal analgesic regimen. Many techniques have been described for CNBs, perineural catheter placement and infusion management, incorporating multiple categories of medications and dosage schemes, allowing practitioners to individualize perioperative pain treatment/management in this challenging population.

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Symposium: Evidence of regional anaesthesia

EVIDENCE OF IMPACT OF RA ON FUNCTIONAL OUTCOME
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Optimizing Functional Outcome for Lower Extremity Orthopedic Surgery: Continuous peripheral nerve blocks (CPNB) for lower limb orthopedic surgery in a multimodal analgesia regimen consistently provide better analgesia and optimized postoperative rehabilitation when compared to traditional systemic opioid-based analgesia. Actual literature demonstrated that regional anaesthesia and specifically CPNB prolong site-specific local anesthetic delivery in the inpatient or outpatient settings, allow optimal analgesia, minimal side effects, and avoidance of premature regression of an analgesic block. Furthermore, and more importantly, an improvement in patients’ health-related quality of life or functional outcome benefits has been demonstrated. It appears that CPNB is generally superior to intra-articular LA infusion for immediate postoperative pain but new data report that inpatient of a multimodal analgesia regimen, peri- and intraarticular application of local anesthetics can improve early postoperative analgesia and functional outcome.

Introduction Outcome is defined as “a change in a patient’s health status that can be attributed to antecedent healthcare”. Improved patient outcome after surgery is one of the main ultimate goals of any anesthetic technique. A lot of studies have been carried out over the last 20 years to investigate whether epidural or peripheral nerve blocks improve the quality of postoperative analgesia, postoperative rehabilitation and decrease adverse events compared with systemic opioids, and whether it influences the outcome from surgery after lower limb orthopedic surgery. Some benefits, such as the quality of postoperative analgesia, the decrease in hospital stay or in hospital costs are easy to demonstrate but the proofs that regional anaesthesia improves the functional outcome from surgery are more sparse. Patient’s satisfaction, quality of life, and quality of postoperative rehabilitation, have become really prominent parameters. These new endpoints become more important in the light of the decreasing anesthetic-related morbidity and mortality.

The pain in orthopedics Postoperative pain is a major concern after orthopedic lower limb surgery. One of the characteristics of this pain is its dynamic component. Indeed, pain is exacerbated with motion, particularly after knee surgery. From moderate at rest, pain becomes most severe during mobilization. The reason for this is that major joint operations entail massive nociceptive input from the richly innervated joint tissues that produce continuous deep somatic pain and bouts of severe reflex spasm of muscles supplied by the same and adjacent spinal segments supplying the site of surgery. Moreover, periarticular structures exhibit not only C-afferents but also A-alpha and A-delta afferents, the latter being poorly blocked by opioids. Adequate control of pain is crucial in modern orthopedics because early rehabilitation is necessary for success after major lower limb orthopedic surgery.

The concept of early mobilization (rehabilitation) Throughout the years, rest and motion have been the most commonly prescribed forms of non-operative management for disorders and injuries of the musculoskeletal system. Among orthopedic surgeons there always have been the “resters” and the “movers.” Until recently, the “resters” have far out-numbered the “movers”. A Danish surgeon, Von Kiemke, stated already in 1926 that “All joint affections should be moved. Movement should begin on the first day, should be very slow, and as much as possible it should be continuous”. Salter1, the father of the concept of continuous passive motion showed in 1960 that immobilization of a rabbit knee joint under continuous compression resulted in pressure necrosis of the cartilage. A few years later the same group demonstrated deleterious effects of immobilization on the articular cartilage of rabbit knee joints. The compilation of the scientific works on this topic for the last 30 years has shown that continuous passive motion (CPM) has a significant stimulating effect on the healing of articular tissues, including cartilage, tendons and ligaments. CPM prevents adhesions, joint stiffness and does not interfere with the healing of incisions over the moving joint and, indeed, enhances such healing. Moreover, regeneration of articular cartilage through neochondrogenesis is possible under the influence of CPM. Indeed, all scientific investigations to date are in agreement that prolonged immobilization of joints and that exercise, or continuous motion, is better for joints and their articular cartilage than its immobilization. This new concept has greatly influenced our way to provide analgesia since pain, which becomes very severe during motion in orthopedics, was the main reason to prevent the application of this concept in daily clinical practice. Since then anesthesiologists were asked by orthopedic surgeons to provide prolonged and efficient analgesia. This was one of the major reasons for the explosion of the continuous perineural catheter technique.

What kind of functional outcome
Early rehabilitation: It is well-known that early rehabilitation properly applied during the first postoperative days acts to pump blood and edema fluid away from the joint and periarticular tissues. This allows maintenance of normal periarticular soft tissue compliance. Continuous motion is thus effective in preventing the development of stiffness if full motion is applied immediately following surgery and continued until swelling that limits the full motion of the joint no longer develops. Capdevila et al compared the impact on early mobilization of three different analgesic regimens after major knee surgery. Patients were randomized to either epidural analgesia, continuous femoral block or PCA morphine during 72h. The authors found that the epidural and continuous femoral groups had significantly lower pain scores at rest and with motion. On postoperative day 7 maximum knee flexion was 90° in the epidural and femoral groups versus 80° in the PCA-morphine group. The duration of complete rehabilitation was significantly shorter in the epidural (37 days) and femoral (40 days) groups than in the morphine group (50 days). Another group undertook a quite similar study using the same analgesic regimens and type of surgery. The authors found, as Capdevila, that epidural and continuous femoral block provided better pain control, faster ambulation and shorter hospital stay than PCA-morphine group. Significantly better knee flexion was noted in the epidural and femoral groups until 6 weeks after surgery. Recent randomized double-blinded, placebo-controlled trials provided data involving patients discharged at home with CPNB.9,10 These studies included patients scheduled for painful orthopedic procedures who had femoral, or posterior sciatic popliteal perineural catheters. Patients receiving perineural local anesthetic infusions achieved clinically lower resting and breakthrough pain scores while requiring fewer oral analgesics. Patients who received perineural local anesthetic experienced additional benefits related to improved analgesia. Zero to 30% of patients with perineural ropivacaine reported insomnia due to pain, compared with 60-70% of patients using only oral opioids. Patients receiving perineural ropivacaine infusion awoke from sleep because of breakthrough pain episodes an average of 0 times on the first postoperative night, compared with 2 times for patients receiving perineural saline. Obviously lower opioid consumption in patients receiving perineural local anesthetic resulted in fewer opioid-related side effects. Whether these benefits result in an improvement in patients’ health-related quality of life or functional outcome benefits is only partially studied. Illfeld and colleagues compared an oral versus continuous femoral nerve block (cFNB) to a 4-day bolus cFNB with ropivacaine 0.2%. The CPNB technique did not increase the ambulation distance the afternoon after surgery but significantly decreased the time until three specific readiness-for-discharge criteria (adequate analgesia, independence from intravenous analgesics, and ambulation of at least 30 m) are met after total knee arthroplasty in 50 patients. Catheters were removed on...
postoperative day 4. Patients given 4 days of perineural ropivacaine attained all three discharge criteria in 25 (21-47) h, compared with 71 (46-89) h for those of the control group receiving saline. After hip arthroplasty compared to an overnight continuous lumbar plexus block, a 4-day ambulatory cLPB decreases the time to reach the three predefined discharge criteria by an estimated 38% but did not increase ambulation distance to a statistically significant degree. Capdevila et al compared a CPNB infusion of ropivacaine 0.2% to patient controlled intravenous morphine in 83 patients scheduled for ambulatory orthopedic surgery for functional recovery and postoperative analgesia. Basal–bolus ropivacaine infusion decreased the time to a 10 minutes’ walk, optimized all daily activities After ambulatory orthopedic surgery, 0.2% ropivacaine delivered as a perineural infusion optimizes functional recovery and pain relief. Finally, in a recent study, 80 patients undergoing total knee arthroplasty under spinal anesthesia were randomized to receive continuous femoral nerve block or peri-and intra-articular infiltration and injection. More patients in the group intra-articular than in the Femoral block group could walk > 30 m on the first postoperative day. They also had significantly lower pain scores during activity and lower consumption of opioids on the first postoperative day. No differences between groups were reported regarding side effects or length of stay. It appears that impart of a multimodal analgesia regimen, peri- and intraarticular application of local anesthetics can improve early postoperative analgesia and mobilization for patients undergoing TKA. However, the debate is still open concerning the definite interest of a short period of CPNB on functional outcome after orthopedic surgery. Recently Raimer and colleagues didn’t noted differences in functional outcome between the continuous psoas and sciatic blocks, epidural analgesia or intravenous opioid analgesia after knee arthroplasty.

Literature clearly shows that regional anesthetic/analgesic techniques improve early functional outcome for lower limb orthopedic surgery. These benefits are clinically evident for about 3 months.

Prolonged hospital stay/unplanned admission: The introduction of regional techniques has significantly shortened hospital stay and reduced unplanned admission. These effects are mainly explained by the lower opioid consumption and reduced incidence of opioid side-effects.

Quality of recovery: Quality of care has been defined as the degree to which health services increase the likelihood of desired health outcome consistent with current professional knowledge. Patient satisfaction is an important measure of quality of care that can contribute to a balanced evaluation of the structure, process and outcome of services. Many factors contribute to patient satisfaction, including accessibility and convenience of services, institutional structure, interpersonal relationships, competence of health professionals and patient’s own expectations and preferences. Patient satisfaction was investigated in 10,811 patients interviewed on the first day after operation. A strong relation between patient dissatisfaction and intraoperative awareness, moderate or severe postoperative pain and severe nausea and vomiting were found. Quality of health is multifaceted. Since morbidity and mortality have been greatly reduced in the last two decades, further emphasis should now be placed on other feature of postoperative recovery. Quality of recovery and patient satisfaction are two such indices. Ifelid and colleagues found no evidence that extending an overnight continuous femoral or lumbar plexus blocks to 4 days improves subsequent health-related quality of life between 7 days and 12 mo after TKA or THA. In this context regional anesthesia/analgesia techniques can be a major step to improve quality of health care but further studies are needed.

References
The oldest evidence of a regional procedure performed in children was found in the mastaba (tomb) of Ankhmahor, a famous doctor of the 6th Dynasty of Ancient Egypt (2350-2000 BC), in Saqqarah, the necropolis of the ancient Egyptian city of Memphis. This tomb displays a bas-relief depicting a scene of circumcision on a young adolescent. With the help of an assistant (left part of the bas-relief), the boy is standing before a squating man who is massaging his penis with a non-identifiable object. According to the phylactery (speech bubble) located above, the child says “Rub well what will be (operated on)”. The right part of the bas-relief shows the “surgeon” cutting the foreskin while saying to the child “I will do my best to make it not unpleasant”.

Later on, no further mention of regional anesthetic techniques specifically used in children either for medical or religious procedures can be found and even Hippocrates in his aphorisms 16, 24 and 25 devoted to pediatric diseases does not mention such procedures. In the modern era, the first documented performance of regional procedure in a child is that by August Bier in 1899 who reported a spinal anesthesia with cocaine in an 11 years old child undergoing surgical removal of a tumor of his thigh (1). Thereafter, spinal anesthesia gained some popularity for surgeries in children (2, 3) and new techniques were reported by individuals such as caudal anesthesia by Meredith Campbell in 1933 (4) but these never gained worldwide acceptance. In the first textbook of pediatric anesthesia, published in 1923 (5) Christopher Langton Hewer expressed mitigating feelings about regional anesthesia which he clearly detailed in a letter to the editor in the British Medical Journal in 1922 (6). Conversely, twenty six years later, the second textbook of pediatric anesthesia (often erroneously quoted as the first one) edited by Morton Digby Leigh and Kathleen Belton (7) described no less than 13 techniques of regional anesthesia, and spinal anesthesia was deemed essential.

Up until 1950, pediatric anesthesia was not identified as a specific subspecialty and was mostly practised by nurses under the control of surgeons who considered it just as a mean (a nuisance?) to achieve surgery while keeping the patient alive. World War 2 forced a complete disruption in regard to the traditional management of surgical patients. Due to massive body damage to large populations of young and healthy people occurring almost simultaneously, surgical care ceased to be an individual art of a limited number of experts to become a production line work involving concomitantly several participants each one acting in a specific domain, in synchrony but also in full responsibility.

Tracheal intubation and use of muscle relaxants became common practice on battlefield whereas there were not yet used in “normal” hospitals, still even less in pediatric patients.

Ups and downs of pediatric regional anesthesia during the second half of the XXth century:

In the post-war years, two major changes happened in most European countries: 1) the recognition of anesthesia as a specific entity, distinct from surgery and requiring specifically trained doctors with a strong background in respiratory and hemodynamic physiology but, unfortunately, with little teaching in anesthesia which he clearly detailed in a letter to the editor in the British Medical Journal in 1922 (6). Conversely, twenty six years later, the second textbook of pediatric anesthesia (often erroneously quoted as the first one) edited by Morton Digby Leigh and Kathleen Belton (7) described no less than 13 techniques of regional anesthesia, and spinal anesthesia was deemed essential.

These children were prone to develop major intra- and postoperative complications at a time when monitoring and specialized devices and equipment were rather limited. Regional anesthesia, especially central block procedures, could represent an option, at a time when they were strictly forbidden and considered malpractice by all institutional/national scientific societies with the consideration of pain relief was, at last, formally identified not only as an improvement of comfort but as a way to reduce postoperative morbidity. Whether the administration of narcotics proved to be very helpful intra-operatively, it became apparent too that it elicited significant, occasionally lethal, adverse reactions postoperatively. Consequently, regional anesthetic techniques were considered again either to be used instead of general anesthesia, especially in obstetrics, or to avoid narcotics particularly during the postoperative period.

In pediatric however, it was not before the last twenty years of the century that regional anesthesia was considered again as a suitable procedure, particularly after the publication of three major, even revolutionary, publications. The first one by Meignier et al. (8) reported 6 pediatric patients with severe respiratory condition, aged 6 months to 7 years and weighing less than 15 kg, who were operated on for esophageal reflux (Nissen fundoplication in 5 patients) and coloplasty in 1. At the end of the surgery, an epidural catheter was placed for postoperative pain management during the first 48 h and extubation of the trachea was performed at the end of the procedure: all patients underwent favorable evolution with no significant adverse effect and none required either immediate or secondary respiration assistance. The second key publication was that of Abajian et al (9) reporting the very low morbidity rate of surgeries performed on infants when spinal anesthesia was used instead of general anesthesia. The third major publication that restored complete respectability to regional anesthesia in pediatric patient was that by Wellborn et al. (10) reporting a significant risk of postoperative apnea in infants undergoing surgery under general anesthesia whereas those operated on under spinal anesthesia did not experience such a possibly lethal complication.

The report of Meignier et al (8) was of tremendous importance because it opened new doors allowing safer management of a previously non-existent group of pediatric patients, the “survivors”. These patients whose life expectancy was considered very limited were denied aggressive therapeutic intervention. However, due to better management by devoted caregivers as allowed by medical progress and nutritional assistance, they did not pass away and their physical condition deteriorated considerably. Skeletal deformities such as hip luxation and major scoliosis, esophageal and respiratory disorders due to gastro-esophageal reflux resulting from permanent dorsal decubitus, bedsores and pressure point lesions could not be ignored anymore the more so as the amount of pain endured by these patients was considerable and no longer ethically acceptable.

These children were prone to develop major intra- and postoperative complications at a time when monitoring and specialized devices and equipment were rather limited. Regional anesthesia, especially central block procedures, could represent an option, at a time when they were strictly forbidden and considered malpractice by all institutional/national scientific societies with the improving a medical condition was commonly accepted in the general population as well as in the medical community.

Around the 1970s, pediatric patients undergoing anesthesia belonged to two clearly opposite populations: on one hand was the vast majority of infants and children basically in good health requiring rather minor surgical procedures and on the other hand a minority of very sick patients often suffering from severe malformations or major co-morbidities and requiring life-threatening and rather hazardous procedures at a time when pediatric intensive care units were virtually non-existent. The intra- and post-operative mortality rate in the second population was quite high when they were operated on under general anesthesia even more so because no adequate equipment and devices specifically designed for pediatric use were available. Such a high mortality rate was no more socially acceptable due to the rapid changes in mentalities resulting from the general improvement of well-being in western countries: any form of hazard was progressively considered unacceptable. Two major developments of medicine reinforced this tendency: 1) progress in physiological knowledge of nociception and analgesia which demonstrated that pain was no longer an unavoidable fate, not only in a context of surgery but in all aspects of life, including childbirth pain; 2) availability of contraceptive drugs which completely changed the condition of human reproduction in countries where such agents were available: in educated people, pregnancy was no longer out of control but, on the contrary, the result of a deliberate project of life with great expectations. The hypothesis that this closely programmed child might die became totally unacceptable and all resuscitation efforts had to be undertaken in order to save his/her life, whatever the consequences. Furthermore, this baby should look like the dream baby his parents once fancying and any physical non-normality, even the almost non-noticeable ones, became unacceptable and was expected to be surgically mended as soon as possible.

In such a context of great expectations whatever the physical condition of the child, the limitations of general anesthesia rapidly became apparent. Loss of consciousness proved to be insufficient to allow safe surgery and the importance of pain relief was, at last, formally identified not only as an improvement of comfort but as a way to reduce postoperative morbidity. Whether the administration of narcotics proved to be very helpful intra-operatively, it became apparent too that it elicited significant, occasionally lethal, adverse reactions postoperatively. Consequently, regional anesthetic techniques were considered again either to be used instead of general anesthesia, especially in obstetrics, or to avoid narcotics particularly during the postoperative period.
noticeable exception of ESRA and its founder, Albert Van Steenberge. Our young colleagues should keep in mind that many of the senior anaesthesiologists in this assistance who attempted to develop regional anesthesia were severely despised and criticized by their peers and would not have been able to pursue their work and establish the now well-acknowledged importance of regional anesthesia if ESRA had not been there to support them and allow them to publish their results. This is particularly the case of pediatric anaesthesiologists, including myself.

At the repeated requests of parents deeply hurt from the terrible fate of their disabled children, some pioneers to whom I feel proud to have belonged, explored the possibilities of regional techniques, especially central block procedures, to offer accessibility to major surgical care for these children “who did not want to die”. The objectives were not to obtain complete healing of all disorders but to improve the well-being of these children, reduce their pain and make their sanitary conditions better. Incidentally, one might notice that these objectives are now those of palliative medicine: even though it is not usually acknowledged, the founding principles that lead to the rebirth of regional anesthesia in disabled pediatric patients consistently changed the mentalities again and, finally, lead to the modern concept of palliative medicine.

Spinal deformities represented the most difficult challenge because the nutritional condition of these patients who almost constantly suffered from severe respiratory disorders due to gastro-intestinal reflux was poor. General anesthetics such as thiopentone was not a suitable option in those with major deformities but iterative low-dose spinal anesthesia at different levels of the spine, including cervical levels, allowed partial correction of the deformities. Repetition of these partial corrections finally resulted in complete correction of the scoliosis without compromising, at any time, the frail respiratory condition of these patients (11).

The high success rate of central block procedures and their low morbidity even in patients at great risk of severe complications rapidly increased the popularity of regional anesthesia in pediatrics and extended its indications to more usual surgical procedures in children. The first textbook of pediatric regional anesthesia (12) which I had the pleasure of publishing in 1990 was rapidly followed by a second one the same year (13). Within a decade, caudal anesthesia became routinely practised in infants and children for urologic and lower abdominal procedures. Epidural anesthesia gained some popularity too but peripheral nerve blocks remained little used due to fear of nerve damage and masking compartment syndromes.

In 1996 we published the first multinational prospective study on the practice of pediatric regional anesthesia including 24 409 regional blocks collected from May 1, 1993 to April 30, 1994 (14). This study definitively established that regional anesthesia was quite safe, with a very low morbidity rate. The only pending issue of this study was that dealing with the potential hazards of masking the development of compartment syndrome; this issue was fixed by the national pediatric epidural audit published in 2007 (15), showing that in each of the four incidents of compartment syndrome that were reported the presence of epidural anesthesia did not mask the condition.

The promise of pediatric regional anesthesia for the XXIst century:

By the end of the XXth century, regional anesthesia had regained complete acceptability in pediatric anesthesia, the more so as the development of ultrasound techniques made visible the progression of block needles, the nerve trunks and all surrounding anatomical structures, improving considerably both the ease and safety of the techniques. However, very few medical centers had the required resources to train residents in this field and acquisition of abilities as well as adequate knowledge in indications of the different techniques remained casual the more so as they were not required by any program of residency in anesthesiology. Additionally, new developments in pharmacology, especially new modalities of administering general anesthetics, they offer the best perspectives of safe anesthetic management of pediatric patients and certainly do represent the best promise for anesthesia care in the next decades.

References

SUPRACLAVICULAR APPROACH SHOULD REPLACE INTERSCLANELE

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Interscalene block is still a standard for shoulder analgesia. However, this approach has several drawbacks. Therefore, intensive research is going on alternatives, which are safer but have similar effectiveness to interscalene block. This lecture aims to present latest studies on this subject and the author’s own experience.

Literature reveals several case reports of total spinal anaesthesia and permanent damage to the spinal cord after interscalene block[1-3]. ASA closed claim project [4] revealed that this approach has a higher incidence of neurological complications (42%) of all peripheral blocks. ASRA’s Practice Advisory on Neurologic Complications [5] recommended not to perform this block on anaesthetized or heavily sedated patients. What is less known is the high rate of postoperative neuropraxias and/or nerve conduction abnormalities after shoulder fractures and/or shoulder surgery performed under general anaesthesia[6-8]. Nerve conduction studies in patients with postoperative neurological complications usually cannot localize the precise site of the injury. Therefore, minimizing the risks of nerve damage is highly desirable.

Another problem faced by the anaesthesiologists is a hemidiaphragmatic paresis in 100% of patients having interscalene block [9]. In otherwise healthy patients it is mostly asymptomatic. However, in patients with co-existing pulmonary pathology it may cause respiratory failure. Reduction of the dose of local anaesthetic (LA) and/or injection at the level of C7 may reduce, but not eliminate the risk of hemidiaphragmatic paresis without affecting the quality of analgesia [10,11]. However, even as little as 3 ml of LA may cause respiratory failure [12].

Shoulder joint is innervated mostly by the suprascapular and the axillary nerves with minor contributions from the musculocutaneous and the subscapular nerves. All these nerves are blocked using the supraclavicular approach. However, care must be taken to identify the suprascapular nerve behind the omohyoid muscle and make sure that it is still within the plexus. Ultrasound-guided suprascapular block using lower volume of LA injected more laterally, at the level of plexus trunks/divisions, may avoid diaphragmatic paresis [13] and has much lower (4%) incidence of neurological complications [4]. It is very effective for shoulder surgery [14]. This approach also allows blocking of the suprascapular nerves from the superficial cervical plexus using the same needle and puncture site. In author’s practice 10 ml of LA injected between the divisions with additional 5 ml injected subcutaneously just cranial to the middle part of the clavicle provides sufficient analgesia for shoulder surgery without affecting the diaphragm.

References


ESRA-0713
Symposium: Prospect and ESRA - Linked for the Future

PROSPECT - WHAT WE DO, WHY WE DO IT AND HOW WE DO IT

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More than 2500 articles dedicated to postoperative pain management are published each year. However, meta-analysis of these articles document a great heterogeneity precluding definite conclusions (1). One of the reasons is mixing up of different types of surgery in the same analysis. On the contrary, assessing postoperative pain treatment should combine surgical procedures with close postoperative pain levels. The comparison of dental pain that is used to assess many analgesic treatments, with other surgical procedures, should especially be avoided. Indeed, the site of pain, its intensity and duration vary according to the surgical procedure. Efficacy of analgesics is consequently different according to different postoperative settings. Other flaws are pointed out by literature analysis: wide difference in analgesic protocols management for the same procedure, difference between the design of analgesic protocols and daily clinical practice, and the fact that studies are focused on the assessment of analgesic agents while multimodal approach using various co-analgesics is used in daily practice. In addition, series of patients are limited, controversial results are commonly reported for the same analgesic, quantification of the analgesic effect is rarely performed and side effects are underestimated. In view of these issues, the PROSPECT group has developed a surgical procedure-based systematic analysis of the literature in order to define an evidence-based approach of the analgesic protocols administered to postoperative patients. This approach is based on a consensus established by anaesthesiologists and surgeons of the group. According to Sackett et al, the aim is to “integrate individual clinical experience with the best available external clinical evidence from systematic research”. It is the most objective way to determine and maintain high standards in medical practice. In addition, this process can help speeding up the process of transferring clinical research findings into practice, it has the potential to significantly reduce health-care costs, and it can help prevent exposure to ineffective or even dangerous treatments.

The successive steps of the process consist in identifying surgical procedures, conducting systematic review and analysis of the literature, grading the evidence according to the quality of the articles retrieved, supplementing the material by transferable evidences from other comparable surgical procedures, establishing a consensus using the Delphi method and producing appropriate recommendations. Thus, the PROSPECT group
publishes on its website qualitative information on the value of different interventions (i.e., did it work in this study?), meta-analyses, which are of particular importance in an area where many trials are small-scale, more detailed information on additional properties, such as effects on nausea, discharge times etc., and a foundation for decision support development. Ten commonly performed surgical procedures are now listed on the website while the site is continuously upgraded.


ESRAI-0714
Symposium: Anesthesia for Cesarean section

SPINAL ANESTHESIA REVISITED: DOSE, DRUGS, FLUIDS, VASOPRESSORS

Sahin S. Turkey.

Spinal anesthesia is the most common mode of anesthesia for cesarean section and there are several reasons for preferring spinal anesthesia for cesarean section such as rapid onset, a dense neural block, little risk of local anesthetic toxicity and minimal transfer of drug to the fetus. However, maternal hypotension is an undesirable consequence of spinal anesthesia for cesarean delivery and should be aggressively managed in the first 5-10 minutes. Methods aimed at countering effects of aortocaval compression do not reliably prevent hypotension. Hyperbaric bupivacaine remains the most common local anesthetic drug for spinal anesthesia. Reducing the dose of bupivacaine and combining with opioids may be of some help. A recent meta-analysis showed combination of low-dose bupivacaine and opioids provided satisfactory analgesia with less intraoperative hypotension when compared with high-dose (>10 mg) or low-dose (<10 mg) spinal anesthesia in cesarean section.

Maternal hypotension induced by spinal anesthesia is caused mainly by peripheral vasodilation and is not usually associated with a decrease in the cardiac output. Hypotension becomes intensified by a deficit of intravascular volume adding to sympathetic blockade during spinal anesthesia. Although the intravenous administration of fluids helps to increase cardiac output, it does not always prevent maternal hypotension. Intravenous crystalloid preload has poor efficacy, and focus has changed toward cohydration and use of colloids. Three strategies of fluid administrations are equivalent for the prevention of maternal hypotension and a reduced need for vasopressors: 1. colloid preload; 2. colloid coload; and 3. crystalloid coload. Crystalloid preload is not as effective as any of those three strategies, however, colloids are more expensive and have higher potential risk of allergic reactions. Recent studies have shown that combined use of vasopressor is recommended regardless of the type of fluids administered.

Maternal hypotension causes detrimental maternal and fetal effects and the best strategy is to maximize the use of vasoconstrictors to maintain blood pressure at baseline. Ephedrine has been the drug of choice for prophylaxis and treatment of hypotension. Recent clinical trials have shown that alpha-agonists such as phenylephrine and metaraminol produce better fetal acid-base status than ephedrine. Unlike phenylephrine, ephedrine can cause fetal acidosis. It has been shown that all three vasopressors were equally effective in maintaining blood pressure when administered before the onset of hypotension. The recommended dose for IV ephedrine infusion is between 0.5 mg/min to 5 mg/min. Larger doses of ephedrine are associated with maternal symptoms like tachycardia, nausea and vomiting. Saravanan et al. found a dose ratio of 1:80 between phenylephrine and ephedrine for prevention of hypotension in women undergoing cesarean section. If phenylephrine infusion is used, it is prudent to start with lower doses (25-50 mcg/min) because they were as effective as higher doses and were associated with less reactive hypertension. Recent research supports decreased use of crystalloid preload and ephedrine and increased use of cohydration, colloids, smaller spinal doses and phenylephrine.

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ESRAI-0715
Symposium: ASRA/ESRA Joint Session:

ASRA: CONTINUOUS REGIONAL ANAESTHESIA FOR AMBULATORY SURGERY

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*Outpatient Periurethral Catheters: Who, When, and How?

Technique overview:

In the past decade, there has been an increasing interest in providing “continuous peripheral nerve blocks”—also called “perineural local anesthetic infusions”—on an ambulatory basis. This technique involves the percutaneous insertion of a catheter directly adjacent to the peripheral nerve(s) supplying an affected surgical site (as opposed to a “wound” catheter placed directly at a surgical site). Local anesthetic is then infused via the catheter providing potent, site-specific analgesia. Combining a perineural catheter with a portable infusion pump, outpatients may experience the same level of analgesia previously afforded only to those remaining hospitalized.

Avoiding Complications: Indications and Selection Criteria:

Because there are inherent risks with an outpatient infusion, the majority of published series limit this technique to patients expected to have moderate postoperative pain of a duration greater than 24 h that is not easily managed with oral opioids.12 However, outpatient infusion may be used following mildly painful procedures—defined here as usually well managed with oral opioids—to decrease opioid requirements and opioid-related side effects.14 Because not all patients desire, or are capable of accepting, the extra responsibility that comes with the catheter and pump system, appropriate patient selection is crucial for safe ambulatory local anesthetic infusion. Since some degree of postoperative cognitive dysfunction is common following surgery,5 investigators often require patients to have a “caretaker” at least through the first postoperative night.15–19 Whether a caretaker for one night or for the entire duration of infusion is necessary remains unresolved.13 If caretaker removal at home is expected, then a caretaker willing to perform this procedure must be available at the infusion conclusion if the patient is unwilling or unable to do this themselves (e.g. psoas compartment catheter).

Complications that could be managed routinely within the hospital may take longer to identify or be more difficult to manage in medically supervised patients at home. Related to this, investigators often exclude patients with known hepatic or renal insufficiency, in an effort to avoid local anesthetic toxicity.14 For infusions that may effect the phrenic nerve and ipsilateral diaphragm function (e.g. interscalene or cervical paravertebral catheters), patients with heart or lung disease are often excluded since continuous interscalene local anesthetic infusions have been shown to cause frequent ipsilateral diaphragm paralysis.16–19 Although the effect on overall pulmonary function may be minimal for relatively healthy patients,19 conservative application of this technique is warranted until additional investigation of hospitalized, medically supervised, patients documents its safety.17,18

Infusion pump selection:

An infusion pump that malfunctions within the hospital environment may be easily identified and replaced by nursing staff. However, for outpatients, the choice of a simple, yet reliable infusion pump is critical. Simplicity is relatively easy for practitioners to judge. However, evaluating reliability is far more difficult, as there are few studies involving this topic. Some practitioners have supported the use of elastomeric devices, suggesting that electronic pumps are prone to malfunction and alarm.19 However, newer devices are far superior to their older cousins, and pump manufacturers have built-in safe-guards into their newer models. In general, an electronic infusion pump will identify when a new dose for IV ephedrine infusion is between 0.5 mg/min to 5 mg/min. Avoiding Complications: Indications and Selection Criteria:
then contact their healthcare provider. Elastomeric pumps do not provide such warnings. How often these complications occur is unknown. However, a recent study of 430 elastomeric devices used in a hospital setting found that 27% of one brand of pump failed to deflate while only 6% of a second brand malfunctioned. There is no warning when elastomeric pumps malfunction, and in accidents, elastomeric devices fail to deflate. And, when analgesia is inadequate, it is unknown if the cause is a malfunctioning pump, or simply the normal (and expected) waxing and waning of postoperative pain.

In addition, the infusion accuracy of elastomeric infusion pumps is far more variable compared with electronic pumps. In general, electronic pumps infuse at ±5% of their programmed basal infusion rate, while elastomeric devices infuse ±10-25% of their programmed basal infusion rate. Over-infusion may result in an insensate extremity, which is considered a risk factor for permanent nerve injury (if a patient can’t feel an extremity, it’s difficult to protect that extremity). In addition, over-infusion may result in muscle weakness, increasing the risk of falls for lower extremity infusions. Under-infusion may result in inadequate analgesia. In this regard, electronic infusion pumps are certainly superior to elastomeric devices. However, to what degree these theoretical considerations affect clinical care remains undetermined, as multiple investigators have reported high success rates using both types of pumps.

What is critical for decreasing the risk of complications is using an infusion pump—elastomeric or electronic—that allows for an adjustable basal rate (able to control bolus doses). This will allow patients to titrate their infusion to specific requirements, which will vary depending on the postoperative day and activity level. While most electronic infusion pumps will allow reprogramming, this can be very challenging for many patients at home being given instructions by a healthcare provider via the telephone (or instruction form). And while elastomeric devices are far easier to adjust, only one elastomeric device is currently marketed in the United States with an adjustable basal rate.

Multiple factors must be taken into account to determine the optimal device for a given clinical application. Such factors include—but are not limited to—the acceptable infusion rate accuracy, patient-controlled bolus capability, and total local anesthetic volume requirement. These will exclude those for which performance data is available from independent sources.

Accuracy, Consistency, Reliability: For our purposes, accuracy is defined as infusing at the set/expected rate, while consistency is infusing at the same rate for the majority of the infusion. In general, electronic infusion pumps provide highly accurate (90–100% expected) and consistent (±5% baseline) basal rates over the entire infusion duration. Elastomeric devices provide a higher-than-expected basal rate initially (110–150% expected), returning to their expected rate within 2–12 h, and again increasing to a higher rate prior to reservoir exhaustion. Similarly, spring-powered pumps initially provide a higher-than-expected basal rate (115–135% expected) which steadily decreases to a lower-than-expected rate (70–75% expected) by reservoir exhaustion. Currently, there is insufficient published data to determine the clinical situations in which the typical basal rate variation of nonelectronic pumps would be clinically relevant. Although investigators have utilized elastomeric pumps for multiple catheter locations and surgical procedures, it remains unknown if providing a less variable basal rate would have affected outcomes. Additionally, there is little published data regarding the failure rates—or “reliability”—of the various pump models.

Of note, the Microjet PCEA pump has been noted to have a high rate of false alarm activation. However, redesigned models are replacing both the Microjet PCA and PCEA. There are electronic pumps that have been noted to infuse without an erroneous alarm for over 10,000 cumulative hours of clinical use. And while the nonelectronic pumps cannot trigger alarms which are an irritant to both patients and health-care providers, there is also no warning if a catheter occlusion or pump malfunction occurs.

Bolus-Dose Capability: Various pumps allow for both patient-controlled local anesthetic boluses and a basal infusion, while others allow for only one of these. Without the option for a bolus dose, higher doses of oral opiates are often required for break-through pain. Patient-controlled local anesthetic administration, also called patient-controlled regional analgesia (PCRA), provides equivalent or superior analgesia with lower local anesthetic consumption compared to continuous infusions alone with a variety of peri neural techniques. PCRA is often important for ambulatory patients as the infusion may not be tailored to provide a minimum basal rate allowing maximum infusion duration and minimal motor block (and therefore the risk of falls), yet allow bolus dosing for break-through pain and prior to physical therapy.

Lastly, for patients with difficulty applying force to a bolus button (e.g. patients with arthritis), electronic pumps offer easily-depressed buttons compared with the “manual” bolus injection systems of nonelectronic units. Some investigators have utilized elastomeric pumps that provide “bolus-only” dosing when the patient releases a clamp on the tubing connecting the pump and catheter. The patient is instructed to re-clamp the tubing after a specified period of time. If a patient forgets to re-clamp the tubing it is possible for the entire contents of the local anesthetic reservoir to be administered in under an hour.

Anticoagulants: The use of low molecular weight heparin and other new anticoagulants for deep vein thrombosis prophylaxis may obviate the epidural option because of the unacceptably high risk of epidural hematoma. There are case reports of patients with a continuous lumbar plexus nerve block receiving low molecular weight heparin developing a retroperitoneal hematoma. These reports have led some health-care providers to manage patients with a psoas compartment catheter in a similar way as those having neuroaxial block when thromboprophylaxis is ordered, although this practice has been questioned by others. The American Society of Regional Anesthesia consensus statement on neuraxial anesthesia and anticoagulation notes that, “conservatively, the [recommendations]… may be applied to plexus and peripheral techniques. However, this may be more restrictive than necessary,” and, “additional information is needed to make definitive recommendations.” Practitioners should be cognizant of this issue prior to discharging patients home who are taking anticoagulants with a perineural catheter and infusion. The risk/benefit ratio must be considered and discussed with patients.

Infusions: Currently, there is insufficient information to determine if there is an optimal local anesthetic for CPBN. The majority of peri neural infusion publications have involved bupivacaine (0.1% – 0.25%) or ropivacaine (0.1% – 0.4%), although levobupivacaine and shorter acting agents have been reported. The main determinant of CPBN effects—local anesthetic concentration and volume or simply total drug dose—remains unknown; although there is evidence that for continuous posterior lumbar plexus blocks, local anesthetic concentration and volume do not influence nerve block characteristics, suggesting that local anesthetic dose (mass) is the primary determinant of peri neural infusion effects. There are no adjuncts added to local anesthetics that have been demonstrated to provide peri neural benefits during the continuous period. Adjuncts include antibiotics, which have been added to local anesthetic infusions, but there are currently insufficient published data to draw any conclusions regarding the safety of the former or the efficacy of the latter.

Many variables probably affect the optimal regimen, including the surgical procedure, catheter location, physical therapy regimen, and the specific local anesthetic infused. For procedures resulting in at least moderate postoperative pain, a basal infusion optimizes benefits such as analgesia and sleep quality. Providing patients with the ability to self-administer local anesthetic doses increases perioperative benefits such as improving analgesia, minimizing supplemental opioids, and allowing a decreased basal infusion rate which minimizes the risk of limb weakness and maximizes the infusion duration for ambulatory patients with a finite local anesthetic infusion pump reservoir volume. Unfortunately, insufficient information is available to base recommendations on the optimal basal rate, bolus volume, or lockout period accounting for many variables that may effect these values (e.g. catheter type, location, surgical procedure). Until recommendations based on prospectively-collected data are published, practitioners should be aware that investigators have reported successful analgesia using the following with long-acting local anesthetics: basal rate of 4 – 8 mL/h, bolus volume of 2 – 5 mL, and lockout duration of 20 – 60 min.

The dosing issue has particular importance for lower extremity CPBN. Although inhibition of pain fibers is the primary goal for postoperative CPBN, currently available local anesthetics approved for clinical use decrease other afferent (e.g., non-pain-related sensory and proprioception) and efferent (e.g., motor) nerve fibers as well, resulting in undesirable side effects such as muscular weakness. There is growing evidence that lower extremity CPBN may increase the risk of patient falls, although to what degree the perineural local anesthetic infused. For procedures resulting in at least moderate postoperative pain, a basal infusion optimizes benefits such as analgesia and sleep quality. Providing patients with the ability to self-administer local anesthetic doses increases perioperative benefits such as improving analgesia, minimizing supplemental opioids, and allowing a decreased basal infusion rate which minimizes the risk of limb weakness and maximizes the infusion duration for ambulatory patients with a finite local anesthetic infusion pump reservoir volume. Unfortunately, insufficient information is available to base recommendations on the optimal basal rate, bolus volume, or lockout period accounting for many variables that may effect these values (e.g. catheter type, location, surgical procedure). Until recommendations based on prospectively-collected data are published, practitioners should be aware that investigators have reported successful analgesia using the following with long-acting local anesthetics: basal rate of 4 – 8 mL/h, bolus volume of 2 – 5 mL, and lockout duration of 20 – 60 min.

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as well, and none of the patients who received a placebo block and infusion reported a fall. The relationship between perineural infusion and balance/proprioception/strength deserves further investigation. Until these issues are resolved, it is worth considering very conservative treatment for ambulatory subjects with lower extremity perineural infusions. Minimizing the basal infusion rate will minimize dose/mass of local anesthetic; providing patients with a small-volume patient-controlled bolus dose and 30-minute lock-out period will allow them to titrate their block, as needed. It is certainly safe to assume that decreasing the mass of local anesthetic will decrease the block and risk of falls, so decreasing the local anesthetic concentration should theoretically be beneficial. However, if the volume of local anesthetic is increased to counter the decreased concentration’s effect on anaesthesia, it cannot be assumed that there will be a decrease in sensory/motor block. The interaction between local anesthetic concentration and volume is thus complex and varies among catheter locations.44;56–59 Until additional data are available, practitioners may want to consider steps that may minimize the risk of falls, including minimizing the dose/mass of local anesthetic,60 providing limited-volume patient-controlled bolus doses which allow for a decreased basal dose without compromising analgesia in some cases.61;62 although not all,63 utilizing a knee immobilizer and walker/braces during ambulation,64 and educating physical therapists, nurses, and surgeons of possible CPNB-induced muscle weakness and necessary fall precautions.

Discharge and Home-Care:

Patient Education. Because most patients have some degree of postoperative cognitive dysfunction, most investigators educate both the patient and his/her caretaker at the same time prior to discharge. Although currently uninvestigated, there is consensus among practitioners that both verbal and written instructions should be provided, along with contact numbers for health-care providers who are available throughout the infusion duration.65;66;67 Along with standard postoperative outpatient instructions, topics reviewed usually include infusion pump instructions, expectations regarding surgical block resolution, breakthrough pain treatment, specific instruction not to drive or operate machinery, catheter site care (sponge bath instead of shower), limb protection, what to do if local anesthetic leaks from under the protective dressing, signs and symptoms of possible catheter-related complications, and catheter removal plan. If the initial surgical block has not resolved prior to home discharge, postoperative analgesic requirements cannot be assessed. While perineural infusions of local anesthetic usually decrease postoperative pain dramatically, many patients still require oral analgesics. The percentage of patients who will use supplemental oral opioids is dependent upon a multitude of factors, including the type of surgery, other analgesic adjuvants such as cryotherapy, the local anesthetic used for infusion, and the infusion dosing regimen provided. Furthermore, the possibility of catheter misplacement during initial insertion or subsequent dislodgement will usually require the use of oral analgesics. However, it is currently impossible to accurately predict which patients will require oral opioids. Therefore, a prescription for oral analgesics should be provided to all patients, and the importance of filling the prescription immediately after leaving the surgical center should be emphasized. A period of inadequate analgesia may result if patients wait to fill the prescription until after they have determined if oral analgesics are required.

Dislodgement: The most common complication during ambulatory perineural infusion is simply inadvertent catheter dislodgement.68;69 The reported incidence of dislodgement varies greatly between 0 and 30%, and is most likely related to the anatomical location, equipment type, and technique used to secure the catheter.70;71;72;73 Every effort to optimally secure the catheter must be made to maximize patient benefits. Measures have included the use of sterile liquid adhesive (e.g. benzoin), sterile tape (e.g. Statlock), subcutaneous tunneling of the catheter,60;61;62 and the use of 2-0ytical cyanoacrylate glue.64 Using a combination of these maneuvers,74;75;76 investigators have reported a catheter retention rate of 95-100% for 6–9 days of ambulatory infusion.70;71

Patient contact and catheter removal: Although not systematically investigated, practitioners may want to consider documenting each patient contact, as catheter migration include investigators. The optimal frequency of contact with ambulatory patients is currently unknown, and probably is dependent upon multiple factors such as patient comorbidities and surgical procedure. Multiple investigators have suggested that patients be contacted daily by telephone,60;65;67;77 while others have provided twice-daily home nursing visits in addition to telephone calls.72;77 Issues deserving attention consist of signs and symptoms of potential complications including, but not limited to, site infection,73 nerve injury,74 pulmonary compromise,75;76 and local anesthetic toxicity.77 While there are case reports of initially misplaced catheters,77;78 migration following a documented correct placement has been described in only one case.75 Possible complications of an unidentified initially misplaced catheter or of a catheter migration include intravascular or interpleural placement/migration resulting in local anesthetic toxicity, intramuscular placement/migration resulting in myonecrosis, and epidural/intrathoracic placement/migration when using interscalene, ISCM, paravertebral, or psosas compartment catheters.

Investigators have reported catheter removal by various techniques: some discharge patients with written instructions,60 others have insisted on a health-care provider performing this procedure,63 while others have patients’ caretakers (or occasionally the patients themselves) remove the catheters with instructions given by a provider over the telephone.8;72 While there are no data documenting the superiority of any one technique, one survey revealed that with instructions given by phone, 98% of patients felt comfortable removing their catheter at home.8 Of note, only 4% would have preferred to return for a health-care provider to remove the catheter, and 43% responded that they would have felt comfortable with exclusively written instructions.63 Practitioners may consider providing nonsterile gloves for patients having their catheters removed at home.8 The presence of a blue/silver catheter tip identified by the person removing the catheter confirms complete removal (depending on catheter design), and should be documented in the medical record.

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Panel Discussion: Cancer pain

NEUROPATHIC CANCER PAIN AFTER CHEMOTHERAPY: WHAT IS THE EVIDENCE

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Neuropathic pain (NP) is commonly encountered in cancer patients and is considered a well-established entity for more than 20 years. Approximately, 1/3 of cancer patients experience NP, usually mixed with nociceptive components, but also, as a single, autonomous entity. It can be disease related or related to the acute or chronic effects of cancer treatment. For example, chemotherapy-induced peripheral neuropathy (CIPN) occurs in 90% of patients receiving neurotoxic chemotherapy. An increasing range of oncological therapies are available, including radiotherapy, chemotherapy, hormonal therapy, or one of the evolving approaches (e.g. immune therapies).

Cancer treatments have become more effective; patients are living longer with cancer and there are more cancer survivors. However, side-effects (particularly neuropathy) have become more problematic. The key to management of cancer-related neuropathy is a considered assessment, remembering not to miss the opportunity of reversing the cause of the pain with appropriate oncological management. According to the literature, 25%-60% of women treated for breast cancer, regardless of the stage, experience pain. Taxanes used in adjuvant therapy for breast cancer are neurotoxic, and thereby being a potential risk factor for persistent pain after breast cancer treatment (PPBCT) and sensory disturbances. Doxetaxel as adjuvant treatment for breast cancer does not increase the risk of PPBCT, sensory disturbances in the surgical area or functional impairment, but increase the risk for peripheral sensory disturbances. Pain and other concomitant symptoms and side effects should be assessed with validated and reliable scales and questionnaires.

Specific guidelines on pharmacological treatment of NP have been suggested by the European Federation of Neurological Societies (EFNS) Task Force. This Task Force concluded that there is a level A of evidence for the efficacy of gabapentin (one study), a level B for TCAs and tramadol and inefficacy of valproate.

In the following pages, non-opioid and opioid drugs that are recommended by the WHO for cancer pain therapy, as well as various classes of adjuvant analgesic drugs for NCP and CIPN treatment will be presented.

Non-Opioid Analgesic Drugs:

Non-opioids, such as NSAIDs, acetaminophen and COX-2 inhibitors, have limited usefulness in the management of NCP. However, some patients do report relief, so a trial may be indicated. Many patients have concomitant neuropathic and nociceptive pain, which may respond to non-opioids.

Opioid Analgesics:

The role of opioids has been re-evaluated during NCP therapy. Controlled-release oxycodone has been applied, because it is safe, well-tolerated and effective, although it is unlikely that opioids will replace antidepresants and antiepileptic drugs for NCP therapy. However, co-administration of oxycodone and paracetamol resulted in a low-dose synergic combination in different pain types. It has been reported that such a combination can be useful in cancer-related pain, including those situations that are complicated by a neuropathic component.

Morphine combined with gabapentin achieved better analgesia, at lower doses of each drug, than either as a single agent, with constipation, sedation and dry mouth as the most frequent adverse effects.

Clinically, opioids provide effective relief of cancer pain, although occasionally high doses must be administered, to suppress “breakthrough” pain or pain from nerve involvement. The most common adverse effects of opioids are constipation, sedation, drowsiness and nausea.

Methadone, according to a systematic review of 35 years, conducted by WHO (2005), due to its favourable analgesic properties and low cost, has been recognized as an important player in the treatment of both nociceptive and neuropathic pain and has been characterized as an essential analgesic in cancer neuropathic pain management.

Tramadol Hydrochloride:

Tramadol is a norepinephrine and serotonin uptake inhibitor (SNRI), centrally-acting analgesic, which has direct, but weak opioid action (metabolite with major opioid agonist effect) and indirect monoaminergic action (like TCAs). It is also devoid of immunosuppressive activity. RCTs have yielded positive results from tramadol and tramadol/acetaminophen combination in PDN, PHN and various NP states. In all trials, tramadol, titrated to a maximum dosage of 400 mg/day significantly relieved pain, compared with placebo. Its beneficial effects on allodynia and quality of life are also reported.

The most frequent side-effects of tramadol include dizziness, nausea, constipation, somnolence and orthostatic hypotension.

Adjuvant Analgesic Drugs:

The widely-used adjuvants represent a major aspect in our NCP and CIPN armamentarium. These include gabapentinoids (gabapentin, pregabalin), anti-depressants (TCAs, duloxetine, venlafaxine), corticosteroids, capsaicin 8% patch, biphosphonates, NMDA-antagonists, cannabinoids and other substances.

An adjuvant analgesic is an agent, whose primary indication is other than pain, exerting analgesic effects in certain painful conditions. Not only are adjuvants important per se, but they also hold opioid-sparing effects.

Tricyclic Antidepressants (TCAs):

TCAs inhibit norepinephrine and serotonin reuptake, followed by augmentation of bogenic amines’ activity. Their action includes sodium channels’ modulation in the periphery and NMDA antagonism. As a result, TCAs enhance dorsal root inhibition and reduce peripheral sensitization.

TCAs are started with a low bedtime dose (10–25 mg), which is gradually increased or titrated weekly, every 3–7 days (by 10–25 mg/day), usually up to 150 mg. Further dose increase is forbidden due to adverse effects. Although TCAs analgesic properties probably occur at lower dosages than those for an antidepresant effect, no systematic evidence supporting this assumption exists.
Some data suggest a possible dose-response relationship. Topical Amitriptylin, Ketamine and Lidocaine is a safe intervention to use with minimal toxicity and good compliance. It significantly reduces several measures of neuropathic pain associated with radiation dermatitis. A larger-scale study would require recruitment from multiple centers.

Clinical side-effects of TCAs are sedation, anticholinergic consequences (dry mouth, constipation, postural hypotension and weight gain). In one large-scale study, TCAs long term administration was associated with a 2.2-fold greater relative risk of myocardial infarction and a 1.7-fold increase in overall mortality, compared with placebo.

Other Antidepressants SSRI, SNRIs (Venlafaxine, Duloxetine), Selective Serotonin Reuptake Inhibitors (SSRIs) produce less side-effects and are better tolerated than TCAs. At present, in NCP and CIPN treatment there is insufficient evidence to support the use of SSRIs.

Venlafaxine, with a different chemical structure compared to TCAs and SSRIs, inhibits norepinephrine and serotonin reuptake (SNRI) at a dose ≥ 150 mg/day. In a randomized, 3-period, crossover trial of venlafaxine and imipramine administered in patients with painful polyneuropathy, both antidepressants resulted in superior pain relief, compared with placebo, with no differences between them: in a placebo-controlled, crossover trial of 13 patients with chronic NCP following breast cancer therapy (surgery, chemotherapy, radiotherapy) the investigators did not find significant benefits of venlafaxine (150 mg/day) vs placebo, regardless of pain daily ratings, although venlafaxine was associated with better results related with two secondary pain end-points (maximum intensity of every day pain at rest and in movement). They also reported similar percentages of adverse effects vs placebo.

Duloxetine, a newer dual uptake inhibitor, belongs to SNRIs, is FDA approved for PDN treatment, with early evidence of being efficacious. It has minimal or no effect on blood pressure and body weight, with few sexual adverse effects in studies published up to now. Duloxetine doses range between 60 and 120 mg/day, without any significant differences between the two doses, but with better effect versus placebo. Improvement should be noted in 1 to 2 weeks at all increasing the dose, which should be considered prior to further dose elevation. Frequent adverse events observed were nausea, somnolence, dry mouth, constipation, diarrhoea, hyperhidrosis and dizziness, while discontinuation rates were 15-20% Duloxetine induces little or no cardiovascular side effects, but rare cases of hepatotoxicity have been published.

The advantage of venlafaxine and duloxetine application in NCP treatment is that, apart from pain relief, they can serve a useful therapeutic role for clinical depression. Evidence to support venlafaxine and duloxetine for the treatment of CIPN from oxaliplatin- or paclitaxel-based regimens is promising. Unfortunately, direct comparisons between venlafaxine and duloxetine do not exist, so definitive conclusions about which agent is preferred cannot be made. However, the data with duloxetine showed that it may be prudent to consider duloxetine first when choosing a SNRI for CIPN treatment. More robust trials are needed to establish their optimal place in therapy with regard to patient population, timing of therapy, dosing, and treatment duration. On the basis of the paucity of high-quality, consistent evidence, there are no agents recommended for the prevention of CIPN. With regard to the treatment of existing CIPN, the best available data support a moderate recommendation for treatment with duloxetine.

Calcium and magnesium infusions and venlafaxine are effective in preventing CIPN but are not routinely used because of concerns related to decreased chemotherapy efficacy. Adjunct treatment options for CIPN include a topical analgesic, a tricyclic antidepressant, an anticonvulsant, or an SNRI. Duloxetine is more effective than placebo in treating oxaliplatin- or paclitaxel-induced CIPN, is well tolerated, and should be considered to be a first-line treatment option for CIPN.

Antiepileptic Drugs (AEDs) – Gabapentinoids:

Gabapentin is an AED, holding the broadest evidence for efficacy in NP treatment, due to central sensitization reduction. Loss of inhibitory regulation of spinal and supraspinal antinociceptive mechanisms, through complex mechanisms. Levels of gamma-aminobutyric acid (GABA, a dorsal horn inhibitory transmitter) are reduced, and GABA receptors in dorsal horn neurons are down regulated. Gabapentin, an anticonvulsant structurally related to GABA and not acting on GABA receptors, is efficacious for the treatment of various etiologies.

It has an FDA-approved indication for PHN in the United States and is licensed for the treatment of NP in the UK. Eight, at least, published double-blind, placebo-controlled, RCTs of gabapentin for chronic NP therapy exist in literature. These studies examined patients with PHN, PDN, mixed NP syndromes, phantom limb pain, Guillain-Barre syndrome and acute or chronic pain from spinal cord injury. Gabapentin at dosages up to 3600 mg/day significantly reduced pain versus placebo; improvement in sleep, mood, and quality of life were also reported in some Confirmation from basic experimental studies, employing animal cancer pain models, as well as from clinical ones, concluded that gabapentin is effective in treating CIPN. In a study investigating the combination of gabapentin and safety: gabapentin monotherapy in the management of CIPN, Gabapentin has also been studied in a multi-centre, randomized, double-blind, placebo-controlled trial, including 121 cancer patients with CIPN. Patients had ineffective analgesia with opioids and they were started on gabapentin at a dose of 600–1800 mg/day. The authors concluded that gabapentin is effective in improving analgesia in CIPN patients, already treated with opioids. Side effects of gabapentin include somnolence, dizziness and less commonly gastrointestinal symptoms and mild peripheral oedema. All these effects require close monitoring and dosage adjustment, but usually not drug discontinuation.

Pregabalin has been FDA approved for PHN and PDN and its action is similar to that of gabapentin, with a significantly greater affinity for the α2-δ subunit of voltage-gated calcium channels versus gabapentin. Pain improvement is noted by the second day. It is not liver metabolized and as a result, important pharmacokinetic drug-drug interactions do not occur, but the dosage must be adjusted for patients with renal dysfunction. Its side effects are mild to moderate (dizziness, somnolence, headache, dry mouth and peripheral oedema). During the first 3 days 150 mg daily are prescribed, followed by 300 mg daily for the remaining of the second week. The second week are usually prescribed to patients, whose creatinine clearance is more than 60 ml/min (max dose 300 mg twice a day) Pregabalin discontinuation rates range from 0 (150 mg/day) to 20% (600 mg/day). As far as the therapeutic role of pregabalin in CIPN we published a paper last year. We examined the results of the addition of pregabalin, in cancer patients whom pain had a NP component. In this prospective, open label, study, we included 102 cancer patients with definite CIPN, resistant to a combination of paracetamol, codeine, NSAIDs and methylprednisolone. Patients were randomly divided into two groups (pregabalin versus opioids). In the first group pregabalin was added and titrated up to 600 mg/day, until significant pain relief or poor tolerability where observed (which ever occurred first). In the second group, TTS fentanyl 25mcg/h was added and the dose was escalated by 25 mcg/h every 72 hours, up to a maximum dose of 125 mcg/h, until significant pain relief or problematic tolerability. We concluded that pregabalin prescription in CIPN patients provided significant pain alleviation and minimized the need for rescue opioids, thus reducing opioid-induced adverse effects and tolerance. However, in another recent publication on the treatment of CIPN the authors concluded that, unfortunately, even when effective in other types of NP anticonvulsants have not yet proven effective for treating CIPN symptoms.

Topical Antineuralgics: 5% Lidocaine Patch, 5% Lidocaine Gel:

Topical lidocaine is available as a 5% patch or gel. The efficacy of lidocaine patch has been demonstrated only in patients with PHN and focal NP syndromes, expressed with alldynia, without controlled studies being conducted for other pain conditions. Anecdotal evidence of a beneficial effect in patients who have NCP has been published. In our department, we have used the 5% lidocaine patch in 36 patients in an open, observational study, for the treatment of NP of diverse origin. The therapy had a 2-month to 4-year duration, resulting in good and very good analgesia in 50% of patients.

Lidocaine patches have been used in NCP where allodynia (sensitivity to light touch) exists. It has also been used for central NP in a patient with metastatic epidural spinal cord compression, with promising results, offering new treatment options.

Topical Antineuralgics: Capsaicin 8% Patch:

Capsaicin is the active component of chili peppers, which are plants belonging to the genus Capsicum. Capsaicin is an agonist for the transient receptor potential vanilloid 1 receptor (TRPV1), which is an ion channel-receptor complex expressed on nociceptive nerve fibers in the skin. Topical administration of capsaicin causes an initial enhanced stimulation of the TRPV1-expressing cutaneous nociceptors that may be associated with painful sensations. This is followed by pain relief thought to be mediated by a reduction in TRPV1 expressing nociceptive nerve endings.

A high concentration capsaicin patch (8%), applied to the skin for 60 min in 402 patients, was found to be more effective in treating NP versus a placebo. The concentration patch Adverse effects were primarily attributable to local capsaicin-related reactions at the application site. The patch has also been used for the treatment of painful HIV neuropathy. In our department, we have used the Capsaicin 8% patch in patients with CIPN in an open, observational study with good, un published yet, results.
NMDA Antagonists: Ketamine, Dextromethorphan, Amantadine.

The N-Methyl-D-Aspartate (NMDA) receptors within the spinal cord play a significant role in the pathophysiology of chronic NP. NMDA receptor antagonists have been used in an attempt to abolish wind-up at the spinal cord level. The role of excitatory amino acids in hyperalgesia and the development of tolerance to opioids were early recognized. Ketamine and dextromethorphan are NMDA receptor antagonists, being explored for relieving NP. Ketamine is a potent analgesic at subanesthetic doses, by reducing hypersensitivity in the dorsal horn. Recently, it has been suggested that ketamine and amantadine reduce opioids resistant NCP.

Conclusions: In conclusion, NCP and CIPN is a complex pain problem that is often refractory to treatment. Its pathophysiology may involve diverse aetiologies, which can vary with the evolution and progression of the disease. Present therapeutic strategies rely heavily upon pharmacotherapy. Combination of drugs, with completely different mechanisms of action is the optimal approach.

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Ultrasound-guided Cervical Spine Injections:

Ultrasound-guided Cervical Nerve Root Injections

**Limitations of the fluoroscopy-guided technique:**

Cervical transforaminal injections have been traditionally performed with the use of fluoroscopy or CT. However, there have been few reports of fatal neurorological complications as a result of vertebral artery injury or infarction of the spinal cord and the brain stem. The mechanism of injury was hypothesized to be either vasospasm or unintentional arterial injection of particulate steroid with embolus formation.2-8

Currently the guidelines for cervical transforaminal injection technique involve introducing the needle under fluoroscopic guidance into the posterior aspect of the intervertebral foramen just anterior to the superior articular process in the oblique view to minimize the risk of injury to the vertebral artery or the nerve root.12 Despite strict adherence to these guidelines adverse outcomes have been reported. A potential shortcoming of the described fluoroscopic-guided procedure is that the needle may puncture a critical contributing vessel to the anterior spinal artery in the posterior aspect of the intervertebral foramen.3,9

Here the ultrasoundography may come to play, as it allows for visualization of soft tissues, nerves and vessels, and the spread of the injectate around the nerve thus it may be potentially advantageous to fluoroscopy. US allows real-time identification of the vessels before needle puncture and this is the most distinct advantage over fluoroscopic guidance, wherein this complication can be recognized only after aberrant vascular uptake is noted with contrast agent injection. In other words, ultrasound can “detect” intravascular penetration, while contrast fluoroscopy can “detect” intravascular injection after the fact.14

**Advantages of ultrasound guided cervical nerve root block:**

Extraforaminal “periradicular” versus transforaminal spread:

It is very important to identify the target in the US-guided technique. The target is the nerve root, or more specifically the ventral rami, in the transverse process groove between the anterior and posterior tubercle. Thus with US, the procedure is an extraforaminal selective nerve root block. This is contrary to fluoroscopy-guided technique where the procedure is a transforaminal epidural injection.

As we described before; with ultrasound approach, the needle is intentionally placed extraforaminal to avoid the vascularity within the foramen and accordingly it is not feasible to monitor the spread of the injectate through the foramen into the epidural space because of the bony artifact of the transverse process. We therefore refer to this approach as a “cervical selective nerve root” block rather than cervical transforaminal epidural injection.15

- Yamauchi et al. monitored the efficacy and the spread of injectate in ultrasound-guided cervical nerve root block in a clinical study as well as a cadaveric study. All target nerve roots in the 12 patients and 10 cadavers were correctly identified by ultrasound. This study suggested that there is no difference in the analgesic effects after ultrasound-guided injections, although the injectate spread tends to be mainly extraforaminal compared with conventional transforaminal fluoroscopic technique.16

- Lee et al. compared the technical differences and clinical outcomes between US-guided cervical periradicular steroid injection (US-CPSI) and conventional fluoroscopy-guided transforaminal epidural injection for treatment of cervical radicular pain. Their data suggested that US-CPSI can provide an adequate local spread pattern, tissue penetration for treatment of cervical radicular pain.17

Identification of small critical vessels (Table 1–2):

- Narouze et al. reported a pilot study of 10 patients who received cervical nerve root injections using ultrasound as the primary imaging tool with fluoroscopy as the control.15 In 4 patients they were able to identify vessels at the anterior aspect of the foramen, while 2 patients had critical vessels at the posterior aspect of the foramen and in one patient this artery continued medially into the foramen most likely forming or joining a segmental feeder artery. In these 2 cases such vessels could have been injured easily in the pathway of a correctly placed needle with fluoroscopy.

- Jee et al. evaluated the efficacy and safety of US-guided cervical nerve root block in comparison to fluoroscopy guided injection in a prospective randomized blinded, clinical trial (RCT). A total of 120 patients were randomly assigned to either fluoroscopy or ultrasound. The treatment effects and functional improvement after the nerve root block were compared at 2 and 12 weeks. There was no statistical difference between the 2 groups. The authors in this study reproduced the findings by Narouze et al., but in a larger cohort of patients. In 21 patients in the ultrasound group, vessels were identified at the anterior aspect of the foramen. Eleven patients had a critical vessel at the posterior aspect of the foramen and five patients had on artery continue medially into the foramen. On the other hand, 5 cases of intravascular injections were observed in the fluoroscopy group.

- Obernauer et al. also evaluated the accuracy, time saving, radiation doses, safety, and pain relief after US-guided versus CT-guided cervical nerve root injections in a prospective randomized clinical trial (RCT). The accuracy of US-guided injections was 100%. The mean time to final needle placement in the US group was 2:21 ± 1:43 min versus 10:33 ± 2:30 min in the CT group. Both groups showed the same significant improvement in visual analog scale.18

**TABLE 1. Incidence of vascular injections with fluoroscopy-guided cervical transforaminal injections**

<table>
<thead>
<tr>
<th>Study</th>
<th># injections</th>
<th>% vascular injection with DSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smuck et al18</td>
<td>121</td>
<td>32.8% -</td>
</tr>
<tr>
<td>Fuman et al17</td>
<td>504</td>
<td>19.4% -</td>
</tr>
<tr>
<td>Nahm et al20</td>
<td>136</td>
<td>20.6% -</td>
</tr>
<tr>
<td>Kim et al19</td>
<td>71</td>
<td>63.4% -</td>
</tr>
<tr>
<td>McLean et al22</td>
<td>134</td>
<td>17.9% 32.8%</td>
</tr>
</tbody>
</table>

**TABLE 2. Incidence of vascular injections with US-guided cervical nerve root injections**

<table>
<thead>
<tr>
<th>Study</th>
<th># injections</th>
<th>% vascular injection with ultrasound</th>
<th>% vascular injection with fluoroscopy control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narouze et al15</td>
<td>10</td>
<td>0% 20%</td>
<td></td>
</tr>
<tr>
<td>Jee et al19</td>
<td>60</td>
<td>0% 9%</td>
<td></td>
</tr>
<tr>
<td>Obernauer et al18</td>
<td>20</td>
<td>0% NA</td>
<td></td>
</tr>
</tbody>
</table>

Ultrasound-guided cervical facet injections:

Galano et al.23 reported the feasibility of ultrasound guided cervical facet joint intra-articular injections in cadavers using a lateral approach. The facet joints from C2-3 to C6-7 were accurately identified in 36 of 40 cases. Computed Tomography (CT) confirmed needle tip placement inside the joint space.

More recently, Obernauer et al.24 conducted a prospective randomized clinical trial comparing US to CT-Guided facet joint injections in the middle and lower cervical spine in forty patients. US-guided intra-articular injections resulted in a significant reduction of procedure duration without any exposure to radiation, while maintaining the same therapeutic effect as CT-Guided intra-articular injections.

**Ultrasound guided TON and cervical facet nerve (medial branch) block:**

Eichenberger et al.25 reported ultrasound guided third occipital nerve blockade in volunteers. The third occipital nerve was visualized in all volunteers and showed a median diameter of 2.0 mm. The C2-C3 facet joint was identified correctly by ultrasound in 27 of 28 cases. They reported accuracy of needle position as confirmed by fluoroscopy in 82% of insertions and a 90% success of nerve blockade.

The technique and the feasibility of ultrasound guided cervical medial branch block was reported by Siegenthaler et al.26 Unlike fluoroscopy, ultrasound may allow visualization of the target cervical medial nerves, thereby potentially improving both the diagnostic accuracy of the nerve block and the therapeutic efficacy of the radiofrequency procedure. In a prospective report of 15 patients with cervical facet joint pain, radiofrequency denervation according to a shortened protocol based on ultrasound localization of the nerves reached the benchmark of the standard technique.27

Ultrasound-guided cervical medial branch block was successfully performed in 30 of 34 cervical medial branches in five cadavers. The accuracy of neurotomy was confirmed by pathological examination of the cervical medial branches obtained through cadaver dissection.28

Fifty patients with chronic neck pain were studied in an exploratory sonoanatomy study. Successful visualization of the nerves varied from 96% for TON to 84% for C medial branch (8%). The great exception was C7 medial branch, which was only visualized in 32%. The bony targets could be identified in all patients, with exception of C7, which was identified in 92%.29

Siegenthaler et al.30 compared 180 ultrasound guided cervical medial branch blocks with fluoroscopy in 60 volunteers. After ultrasound-guided needle placement and application of 0.2 ml contrast dye, fluoroscopic imaging was
performed and evaluated by a blinded pain physician. Accuracy was very high at all cervical levels except for the C7 medial branch.

Finlayson et al. described a short axis in-plane approach targeting the middle of the bony contour of the articular pillar. Fifty patients underwent 163 blocks with ultrasound guidance and each of the targeted levels was injected with a needle placed at 1.1 cm lateral and 1 cm inferior to the transverse processes. The needle was advanced until bone was reached and then withdrawn a few millimeters. The injectate may be deposited in the substance or anterior tubercle. The needle is advanced until bone is reached and then withdrawn a few millimeters. The injectate may be deposited in the substance or anterior tubercle.

The vertebral artery runs anteriorly at the C7 level before it enters the foramen transversarium in 7% of subjects at C6 level. However, all 10 needle tips, placed in one cadaver, were able to clearly visualize the facet joints in 42 of 50 anatomical levels with 0.3 mL of a 1:1 mixture of local anesthetic and contrast agent. All needle tips were positioned on the articular pillars with >80% were located in the middle of the articular pillar. The contrast covered the appropriate level in 94.5% of cases, and no complications were reported.

More recently, Finlayson et al. conducted a randomized comparison between ultrasound- and fluoroscopy-guided third occipital nerve block in forty patients. Ultrasound guidance was associated with a significantly shorter performance time (212.8 vs 396.5 seconds) and fewer needle passes (2 vs 6), while maintaining a similar high success rates (95%–100%). C2-C3 intra-articular spread of radiographic contrast and vascular breach were noted in 15% and 10% of patients in the fluoroscopy group, whereas none was observed with ultrasound guidance.

Ultrasound guided Stellate Ganglion Block:
Safety and Efficacy of Ultrasound-guided SGB:
Identification of the correct fascial plane:
The target with the fluoroscopy-guided approach is the C6 transverse process or anterior tubercle. The needle is advanced until bone is reached and then withdrawn a few millimeters. The injectate may be deposited into the substance of the longus colli muscle resulting in a possible block failure. This can be avoided using an US-guided approach as the tip of the needle is placed in the fascial plane where the sympathetic chain runs, deep to the prevertebral fascia contributing the posterior fascial layer of the carotid sheath, and superficial to the fascia investing the longus colli muscle. Few reports showed that injections made deep to the prevertebral fascia tend to have more caudal spread and hence improved efficacy.

On the other hand, if the injectate is deposited anterior to the prevertebral fascia, it tends to spread around the carotid sheath. Hence, the risk of hoarseness is greater due to blockade of the vagus nerve within the carotid sheath or the RLN adjacent to the carotid sheath.

SGB is usually performed to help diagnosing sympathetically mediated pain syndromes. Accordingly, to insure an effective block, it’s very critical that the procedure be selective to the sympathetic chain. The author believes that identifying the correct fascial plane is the single most important advantage that ultrasound can provide to help making the procedure more “specific” to the sympathetic chain and avoid blocking the vagus nerve (parasympathetic) or the cervical nerve roots (somatic).

The esophagus:
Ultrasound imaging can also identify the esophagus, especially on the left side and accordingly can prevent esophageal puncture or injury. The esophagus is deviated to the left of the trachea in approximately 50-70% of the population, as shown by different imaging modalities.

The esophagus usually appears as an outpouring behind the trachea and can be better identified by the change in shape and shadowing during swallowing. Mediastinitis can result from esophageal injury, particularly if the patient has an unrecognized diverticulism.

The vertebral artery:
The vertebral artery runs anteriorly at the C7 level before it enters the foramen of the C6 transverse process in about 90% of cases. It enters at C5 or higher in the remaining cases. Accordingly; the vertebral artery may be more vulnerable to injury during cervical sympathetic block at C7. However, vertebral artery injury is still a possibility at higher levels, whenever that artery is exposed in between the cervical transverse processes. The vertebral artery can be easily identified and avoided with ultrasound imaging.

Recently, two observational studies reported the estimated risk of esophageal and vascular puncture after conventional stellate ganglion block. The European study showed that the esophagus, on the left, was located along the needle path in 22 and 39 of 60 cases at the C6 and C7 levels, respectively. The vertebral artery was located in the needle path in 8 of 60 cases. Other arteries were located in the needle path in 17 of 60 cases. The Canadian study showed that the esophagus was found to be variable but lateral to the airway in 50% and 74% of the subjects at C6 and C7, respectively. With the anterior approach, a vessel was observed in up to 29% and 43% of patients at the C6 and C7 levels, respectively and the vertebral artery was outside the foramen transversarium in 7% of subjects at C6 level.

The inferior thyroid vessels:
The inferior thyroid vessels run a tortuous and variable course. These vessels may be a major source of retropharyngeal hematoma after SGB. The inferior thyroid artery originates from the thyrocervical trunk of the subclavian artery and ascends anteriorly to the vertebral artery and the longus colli muscle and then curves medially behind the carotid sheath to enter the inferior part of the thyroid lobe. It is vulnerable to injury during SGB when it crosses behind the carotid artery from lateral to medial, at C6-C7 level, as it terminates into the thyroid gland. Injury of the inferior thyroid artery can be prevented by using an ultrasound-guided technique.

The course of the inferior thyroid artery needs to be identified first with ultrasound pre-scanning and accordingly one should plan on a safe needle trajectory.

Small volume of injectate:
Ultrasound allows using a small volume of injectate while maintaining the same efficacy. Using ultrasound guidance, the needle can be placed closer to the target in the correct fascial plane (as described before) which will minimize the amount of local anesthetic needed and hence will improve patient safety.

Greher et al. described the ultrasound guided approach for lumbar facet joint injections. They initially performed fluoroscopy guided medial branch blocks in 20 patients. Subsequently 1 month later the same patients received another lumbar medial branch blocks with ultrasound guidance and the needle tip position was confirmed with fluoroscopy. They were able to place the needles in correct position under US guidance 95% of the time. However the major limitation to this study was that the mean weight and body mass index (BMI) of the patients in this study were only 51 kg and 22.8 kg/m² respectively.

Ultrasound guided lumbar spine injections:
Ultrasound guided lumbar facet medial branch block:
Galgano et al. reported the feasibility of US guided facet joint injections in cadavers with a correlation of 0.86 between US and CT derived measurements. They were able to clearly visualize the facet joints in 42 of 50 attempts in 5 cadavers. However all 10 needle tips, placed in one cadaver, were located inside the joint space as verified by CT. This encouraged the same group to conduct the first prospective randomized controlled trial (RCT) comparing US guided versus CT guided lumbar facet injections.
This study involved a small sample size of 40 patients and the facet joints could not be visualized in 2 patients with BMI of 28.3 and 32.9. They reported the success rate of 94% (17/18 patients with visualized joints). The mean time for single joint injection was 14.3 ± 6.6 min which is much longer than the widely used fluoroscopy guided technique. To date there is no RCT comparing ultrasound with fluoroscopy in lumbar facet injections.

Ultrasound guided lumbar nerve root injections:

Contrary to the cervical area, lumbar nerve roots are usually not well seen with ultrasonography because of the depth (compared to cervical) and the presence of bony structures of different contour in the lumbar spine obscure or prevent the visualization of the target structures in the neural foramen. The technique was described before as percutaneous intercostal injections. Recently, Gofeld et al. reported a cadaveric preclinical feasibility study reproducing the results of the above mentioned study. Of the 50 planned injections, 46 procedures were performed. L5/S1 foraminal access was impossible in 4 cases (8%). Fluoroscopy confirmed the correct foraminal placement in all 46 injections (100%). The contrast-spread pattern was intraforaminal in 42 cases (91.3%) and extraforaminal (nerve root) in 4 cases (8.7%). In 3 cases, intravascular injection was detected (6.5%).

**Conclusion:** Ultrasound is a welcome addition to other imaging techniques in interventional pain management. It is a valuable tool for imaging soft tissue structures and bony surfaces, guiding needle advancement and confirming the spread of injectate around the target, without exposing healthcare providers and patients to the risks of radiation. There is a rapidly growing interest in USPM as evidenced by the surging number of publications in the last few years. However most of these publications are small observational feasibility studies. There are 2 RCTs reporting on the advantages of US-guided cervical nerve root block over the traditional fluoroscopy-guided and CT-guided approaches (2 RCTs, level Ib) and a weak evidence that ultrasound is superior to CT in lumbar facet intra-articular injections (one small RCT, level Ib).

Although we do have few reports and observational studies showing that ultrasound guided SGB has definite advantages over the traditional fluoroscopy guided technique, we don’t have RCT driven data to support this. Pain practitioners followed the common sense and sound judgment approach despite lacking strong scientific evidence when they transitioned from performing SGB with the blind approach to the routinely used fluoroscopic guided approach. Now with the introduction of ultrasound guidance in pain management, pain practitioners are following the same path. Ultrasound is definitely, more appealing in SGB with the presence of multiple vulnerable soft tissue structures compacted in a tight vascular space around the sympathetic chain.

**References**


Catheter misconnection and leakage should be ruled out in patients with severe PDPH symptoms; misconnection and leakage can be diagnosed by failure to aspirate CSF from the pump port or collection of CSF around the pump. Percatheter CSF leakage can be managed conservatively with increased fluid intake, simple analgesics, bed rest, caffeine, etc. Severe symptoms may require epidural blood patch, surgical closure of dural tear, repositioning of catheter, and pars-plugging sutures over the dura around the catheter. In severe leakage, a hygroma may develop, which is an accumulation of CSF subcutaneously near the dural incision. Aspiration of this fluid should be avoided due to the risk of infection. A large leak draining from the incision may require surgical intervention.

The first step in the diagnosis of cephalalgia, in a chronic pain patient, is to identify it among the various types of headaches that constitute specific disease entities (primary headaches) as opposed to those that are symptoms of other diseases (secondary headaches)\textsuperscript{12}. Headache associated with intracranial liquor hypotension syndrome is characterized by decreased cerebrospinal fluid (CSF) pressure and orthostatic cephalalgia\textsuperscript{12}. The most characteristic symptom is headache that begins in the occipital region and spreads toward the frontal-temporal regions. Headache is triggered or exacerbated by sitting up or standing, whereas it is relieved by lying down. In the most severe cases, headaches are associated with stiffness of the neck, nausea, vomiting, dizziness, and tinnitus\textsuperscript{11}.

First-line treatment for patients with this condition is conservative therapy or large-volume lumbar epidural blood patch. Further treatment, however, including targeted epidural blood patches, fibrin glue injections, and open surgical repairs may be necessary.\textsuperscript{11} However, if no diagnostic results are obtained and symptoms persist, there are no guidelines in the literature as to how to proceed. At this stage, a diagnostic algorithm (Table 1) was drawn following the latest recommendations in the recent work by the Headache Study Group of the Spanish Society of Neurology\textsuperscript{13}.

**Conclusions:** We conclude that understanding of the relationship between leakage of CSF and the CSF hypotension and decision algorithm to confirm the diagnosis of suspected intracranial liquor hypotension due to microleakage of CSF are very important to apply in the management of patients with IID implanted systems.

**References**

Panel Discussion: Spinal anesthesia & Spine sonography: pearls and pitfalls

INTERACTIVE VIRTUAL MODEL OF THE LUMBAR SPINE AND ITS CONTENTS USING 3D-PDF TECHNOLOGY

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The demand of 3D reconstructions in computed tomography and magnetic resonance imaging (MRI) has significantly increased during the last years, but in spite of their enormous potential in clinical diagnosis, they are not widely used in anesthesiology. Three-dimensional MRI reconstructions could provide an undoubtedly useful complementary support tool as it may facilitate the visualization of structures relevant in regional anesthesia.

Actually, 3D models obtained from cross-sectional images can be embedded in Portable Document Format (PDF) files, becoming a powerful tool for clinical, educational and research purposes (1). In this context, a variety of human 3D resources based on crossections of the Visible Human Project (2) are available (3). Furthermore, 3D-PDF resources from the Korean visible body, based on higher resolution images of sections of a whole male cadaver, are now also freely available (4). In this presentation, we review the anatomy of the lumbar spine and related structures relevant to neuraxial blockade (5-7) by using a 3D-PDF supported model developed by our group based on human MR images (8).

The PDF document with the 3D model and the corresponding instruction file can be accessed from the University of Barcelona public repository (http://oldpoub.unizar.es/espac/public/237/16789/). Those files are distributed under an international Creative Commons Attribution-Share Alike license, which requires attribution to the authors, but allows derivative works without commercial use, provided that is shared like the present license. Those files have been sent to different scientific Anesthesiology Societies to facilitate its distribution through their web sites, and translated to several languages including Spanish, German, Japanese, Russian, Italian, Portuguese and Polish.

The model includes reconstructions of the lower lumbar vertebrae (L3, L4 and L5), intervertebral disks (L3-L4, L4-L5), ligaments (flavum, supraspinous and interspinous), epidural fat (dorsal, ventral and foraminal fat), dural sac and sleeves, sensory and motor cauda equina roots, as well as needles simulating common neuraxial approaches (epidural medial, spinal paramedial and radicular path). Furthermore, it includes axial, sagittal and coronal MRI planes. The interface of the document is divided in 3 main functional areas: 1) a central screen 3D working area, were the different anatomical models and MRI slices are visualized; 2) a control area, at the left, containing buttons, checkboxes, radio buttons and a drop-down list, which allows the selection of the anatomical models to change their properties (visibility, transparency, MRI slice orientation and position); the selection of predefined views (axial, coronal and sagittal) and the activation of clipping functions; and 3) a group of numbered buttons, at the bottom, to reproduce a presentation with predetermined custom views.

The model allows a dynamic rotation of 360 degrees with the right mouse button. Partial transparency effects and selective visualization of each structure are possible, as well as clipping of the entire model in the three axes. Different axial, sagittal, and coronal MRI slices may be visualized either independently or in combination. Predefined views are provided, that can be displayed sequentially to facilitate an educational presentation, showing the progressive appearance of the spine, ligaments, epidural fat, and dural sac and sleeves containing sensory and motor cauda equina roots to demonstrate, for example, the path followed by the needle in an epidural medial approach.

In comparison to other anatomical commercial software, the advantages of the present tool are the free availability and the anatomical detail based on human MR images, focused on lumbar anesthetic approaches. It is a 3D model embedded in standard PDF file format that runs under Acrobat Reader XI. The PDF format greatly simplifies its use, portability, compatibility and storage as the file size can be compressed and transferred across multiple platforms. The program is intuitive and doesn’t need any special informatics knowledge of the user, which may be familiarized with the interface in a few minutes.

This model could be of interest in educational programs, allowing teaching neuraxial anatomy and regional anesthesia, as well as visual aid in the development of new approaches in regional anesthetic techniques and surgical procedures. Finally, it is a simple and convenient tool to attach to patient information. It can also be a support in research programs, with review of real data and image inspection techniques of complications in regional anesthesia.

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ESRA1-0723
Panel Discussion: Regional anaesthesia in special patients

RA IN PATIENTS WITH COGNITIVE IMPAIRMENT

Argyra E.
Greece.

Preoperative cognitive impairment: a look into the problem: Cognitive decline, including memory dysfunction, is a leading cause of functional impairment worldwide. The risk of cognitive decline increases with age and is further enhanced after hospitalization for critical illness and surgery, resulting in significant long-term morbidity and an overall reduced quality of life.[i] Recent advances in technology and anesthetic care have enabled increasingly older and sicker patients to be viable candidates for elective surgery. Of particular concern are surgical patients with preexisting neurodegenerative conditions in whom a precipitous decline in cognitive function may occur postoperatively.[ii]

Definition-Diagnosis: Cognitive functions such as perception, language processing, attention and memory functions, and abstract thinking are crucial for daily life activities, varying from everyday tasks to complex social interaction. One speaks of cognitive dysfunction (impairment) when these processes are disturbed. Patients often describe their dysfunction as memory loss, lack of concentration, or slowness in executive and abstract functions.

The presence of preoperative cognitive impairment (PreCI) short of dementia has been recognized with several different labels. The term mild cognitive impairment (MCI) is generally used to portray a transitional zone between normal cognitive function and clinically probable Alzheimer’s disease (AD) and has been described in a comprehensive consensus statement of an international working group.[iii] Petersen et al.[iv] provided a formal assessment procedure for detection of amnesic MCI (aMCI) that combines clinical assessment with the systematic use of neuropsychological test data to reliably define the presence of MCI.

Cognitive impairment after anesthesia and surgery (postoperative cognitive dysfunction [POCD]) is a persistent deterioration of cognitive performance after surgery and anesthesia, defined by preoperative and postoperative cognitive testing.[v] It is a well described complication after both cardiac- and major non-cardiac surgery, [vi] characterized by a subtle impairment of memory, concentration and information processing, distinct from delirium and dementia. Surprisingly less studied is preexisting cognitive impairment although recently it has become increasingly apparent that preoperative cognitive function may be an important determinant of postoperative cognitive dysfunction (POCD).[vii][viii] [ix] Undiagnosed preoperative cognitive dysfunction may render patients more susceptible to the subsequent development of especially debilitating forms of POCD.

Cognitive Testing: Studies of perioperative cognitive impairment are complicated because the criteria used to establish impairment differ and comparisons between studies are frequently difficult due to the heterogeneity of the tests and the interpretation of the results.[x] Preoperative cognitive impairment (PreCI) is most commonly used in anesthetic studies and is defined as two or more psychometric test results that are greater than or equal to two SDs below the population mean.

Mild cognitive impairment (MCI) is most often used in the psycho geriatric literature and uses somewhat less strict objective evidence (1.5 SD below controls in psychometric memory testing) in patients with otherwise-normal or minimally affected activities of daily living. MCI is usually combined with a subjective complaint of recent memory loss from either the patient or an informant (known as ‘amnestic’ MCI (aMCI)).[xi] [xii] Evered et al.[xiii] prospectively assessed cognition in 152 patients older than 60 yr who were scheduled for elective total hip replacement. Asked subjects and informants structured questions about memory and tested immediate and delayed recall on a widely accepted test of auditory verbal memory. Their results are striking. Approximately one in five patients had either PreCI or aMCI, and prevalence increased with age, with PreCI identified in 55% of those in their 80s. [xiii] It should be emphasized though that identification of patients with preoperative cognitive dysfunction is methodology-dependent and it is not clear which domains of cognition are most important. Moreover PreCI and aMCI did not consistently identify similar patients, different classifications (i.e. composites) for cognitive dysfunction resulted in different predictors of cognitive dysfunction,[xiv] while the optimal approach to subsequently identify patients who may be at greatest risk of progressive cognitive deterioration remains to be determined.

Is preexisting cognitive impairment a risk factor for POCD: Data are equivocal but some causal relationship between preexisting cognitive disability and postoperative cognitive morbidity makes sense i.e., the prevalence of PreCI or aMCI is approximately 20% and the incidence of POCD is 10–15%.[xv] POCD is more likely in patients suffering from preoperative MCI[xvi] or depression.[xvii] Among the patient-related risk factors for POCD are increasing age, genetic disposition and pre-existing cognitive impairment. This may be related to cognitive reserve, i.e. the ability of the brain to cope with stress or an insult. Identifying individuals with MCI (or even mild but previously undiagnosed dementia) before surgery might help us anticipate perioperative cognitive problems, predict long-term cognitive outcome, and plan for the appropriate perioperative care.

Implications: The implication is that we are anesthetizing and operating on a large percentage of elderly patients with compromised brain. To identify cognitive impairment in patients before they come to the operating room is a challenge as it requires cognitive assessment to become a routine part of the preoperative screening of elderly patients. Developing and validating a cognitive evaluation tool that is practical, reproducible, and robust will not be easy, and will require focused research because the brain is a complex organ and cognitive assessment is a complicated task.

Cognitive impairment and anesthesia: Research into POCD has put forward several mechanisms to be involved in the development of cognitive impairments after surgery, including changes in cerebral blood flow, sleep disturbances, effects of anesthetics, and inflammation. Some evidence has been found in animal studies, and in vitro experiments, that volatile anesthetics contribute to POCD through enhancement of the oligomerization and cytotoxicity of Alzheimer disease-associated peptides.[xviii] However, there are no clinical studies supporting these in vivo findings so far. [xix]

Regional Anaesthesia in cognitively impaired patients: Up to now there is no evidence that regional anaesthesia (mainly neuraxial) alters per se the course of postoperative cognitive decline, and the incidence of POCD after regional anaesthesia or general anaesthesia is similar.[xx][xxi] Although in these studies patients operated under regional anaesthesia frequently received sedatives, usually low-dose benzodiazepines or propofol. There are no randomized studies comparing the effect of PNb or continuous PNb versus GA on POCD. Only a few reports are available demonstrating a positive effect of continuous PNb on POCD. Nielsen et al.[xxii] reported that cognitive function was stable after major ambulatory shoulder surgery in patients receiving a continuous interscalene brachial plexus blockade for 72 hours.

Nonetheless, a wide variety of other patient-related measurements showed confirmable improvement when regional anaesthesia/analgiesia is used. RA may provide excellent and prolonged postoperative analgesia that decreases opioid requirements, improves sleep patterns, facilitates patient mobility, participation in physical therapy and return to normal activities. These characteristics result in a faster recovery and improvement in perioperative outcomes. Studies have reported that multimodal analgesia improves postoperative analgesia leading to a faster recovery and enhanced functional outcome. RA techniques may play an important role in facilitating earlier discharge to the home setting and result in fewer unplanned hospital admissions.[xxiii]

Thus decision to perform RA in cognitively impaired patients should be guided by the general criteria of consent and cooperation which might be compromised in the cognitively impaired, fitness to the surgical requirements and a plan for postoperative analgesia tailored to the needs of the patient and the operation.[xxiv]

References

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LEARNING REGIONAL ANESTHESIA BY SIMULATION: POSSIBLE?
Deblos A. 1France.
The application of ultrasound to perform peripheral nerve blocks (PNBs) is a common practice in regional anesthesia. However, learning this new technology poses a challenge. There are 2 aspects to learning how to perform an ultrasound-guided PNB: (1) interpretation of sonoanatomy, which involves identification of anatomic structures as seen on the ultrasound images, and (2) needling technique, which involves learning to manipulate the ultrasound transducer and needle to direct the needle to the target under direct vision.

Simulation-based training is becoming an accepted tool for educating physicians before direct patient care. As ultrasound-guided regional anesthesia (UGRA) becomes a popular method for performing regional blocks, there is a need for learning the technical skills associated with the technique.

1- Technical simulation:
Learning ultrasound-guided regional anesthesia (UGRA), a clinical setting has ethical and safety concerns and is limited by time constraints. Simulation models address these concerns in addition to possibly lowering the learning curve of technical skills.

1-1 : Phantom:
Although simulator models do exist for learning UGRA, they either contain food and are therefore perishable or are not anatomically based. Sites et al (2) attempted to place a needle into any area of an olive buried inside a turkey breast. In this study, anesthesiologists, with little or no ultrasound experience, can rapidly learn and improve their speed and accuracy in performing a simulated interventional ultrasound procedure. This phantom model had disadvantages of containing potentially infective material, requires refrigeration, cannot be used after multiple needle punctures, and is associated with more failures during simulated UGRA.

Several newer USGRA models are available and are fairly inexpensive. Liu (3) showed that training on inexpensive synthetic simulation models with no perishable products enable novices to learn UGRA skills.

Direct visualization of the target in the transparent model allows the trainee to focus on needle insertion skills, but an opaque model may be more realistic for learning target identification skills required when UGRA is performed on real patients in the operating room.

1-2 Simulation model:
Nizzi (4) evaluated whether simulator training aids success of novice operators in ultrasound-guided PNB. All residents assigned to the simulation group received an hour-long teaching session on a low-fidelity simulation model, in addition to conventional training. The conventional training group had 51.3% successful blocks, and the simulation group had 64%; P = 0.016. In the conventional training group, 4 out of 10 residents achieved proficiency, and in the simulation training group, 8 out of 10 residents achieved proficiency (80% vs 40%; P = 0.0849).

It is also important that educational tools actually “simulate” real anatomy so that sonoanatomy and appropriate tactile feedback occur for proper learning. It is to this end that, in this study, the authors designed simulation models where simulators are developed to anatomically mimic both surface anatomy and the sonoanatomy present on ultrasound visualization.

2- Computer based simulators:
Web sites(1) and DVD’s are also beneficial in learning RA. Software is interesting because everybody own a computer. It is easily transportable to be used anywhere and thither more, it is not as expansive as a complex simulation model.
Recently, Woodworth (6) demonstrated the efficacy of computer-based video and simulation in ultrasound-guided regional anesthesia training. The teaching video with interactive simulation significantly improved knowledge of US anatomy (P < 0.001), but failed to improve hands-on performance of US scanning to localize the nerve.

In an integrated DVD(7), the authors introduce a medical simulator for the training for RA with neurostimulation or UGRA. It is based on desktop virtual reality, realistic 3-D rendering and interactive techniques with a conventional mouse and keyboard. It simulates the various biological phenomena which can occur during a regional anesthesia procedure. The interest of this software is to simulate a real 3D virtual body.

3- Nontechnical simulation:
Simulation can refine technical skills, but also expands the teaching paradigm to include management of rare complications.

Severe local anesthetic systemic toxicity (LAST) is a rare event, the management of which might best be learned using high-fidelity simulation(8). Use of the ASRA Checklist(9) significantly improved the trainees’ medical management and nontechnical performance during a simulated episode of severe LAST.

4- Robot assistance:
During the insertion of the needle that is realized with one hand, the anesthesiologist has to maintain the needle visibility by orienting, with the other hand, the ultrasound probe. Therefore, he has to perform a complex hand coordination to maintain both the needle and nerve visible in the US image plane and delivering the anesthetic solution.

Robot assistance is an ambitious project (10) that faces many scientific and technical challenges namely US image analysis and interpretation, probe and needle localization, visual servoing, needle path planning, ergonomy approach for the mechanical design, real time processing, and human interaction in a medical environment.

Hence, the objectives are to:

a) Develop an ergonomic approach for global and efficient anesthesiologist/patient/robot/environment interactions.
b) Implement an automatic detection (11) of the regions of interest (ROI e.g. nerves, needle) within US images, and provide the anesthesiologists with an US image based servo-control to maintain the ROI in the US plane.
c) Provide an interactive path planning for the needle insertion to target a given area.
d) Design a collaborative robotic platform including a haptic teleoperated needle-holder robot and the US probe-holder, to assist the anesthesiologists during the entire RA act.
e) Perform technical and clinical validations to ensure the accuracy, robustness and safety of the platform.

In an other study, Morse (12) compared the success rates, learning curves, and inter-subject performance variability of robot-assisted and manual ultrasound-guided nerve block needle guidance in simulation. All blocks performed on a nerve phantom were successful. There were significant differences between anesthesiologists in performance times to perform the manual blocks but no statistical difference was noted for the robot-assisted blocks. Linear regression indicated that the average decrease in time between consecutive trials for robot-assisted blocks was significantly greater than the decrease for manual blocks. Robot assistance of nerve blocks allows for faster learning of needle guidance and inter-subject performance variability of robot-assisted and manual ultrasound-guided nerve block needle guidance in simulation. British journal of anaesthesia 2014;112:1092–7.


ESRA1-0725
B. Braun Lecture
THE EVOLUTION OF TRAINING AND EDUCATION IN REGIONAL ANESTHESIA AND PAIN MEDICINE
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Training residents and post-graduates in regional anesthesia has improved remarkably over the past, but challenges remain as hospital structures, technology and health care needs of society, develop faster than methods of education. Quality training in regional anesthesia is necessary to promote not only clinical competence but also practitioner confidence in the ability to perform the skill proficiently and safely. The paradigm in anesthesia medical education has evolved from an apprenticeship model to a competency-based training model, having to develop procedure-specific tools for evaluating technical ability. Otherwise innovation is important for the development and advancement of any medical specialty. Regional anaesthesia is one of the fundamental skills of the practicing anaesthetist. Changes in learning opportunities for trainees over the last decade mandates a change in the way practical skills are taught and assessed1. In order to optimise the way the practical skill of regional anaesthesia is acquired by trainee anaesthetists, it will be necessary to combine technology (ultrasound, monitors, electrical stimulation,…) newer educational methods (e.g. simulation, structured feedback and assessment with older techniques (e.g didactic learning, clinical demonstration). The use of proven concepts from disciplines outside medicine should also be considered.

One aspect, which to me is of paramount importance, is the need to recall knowledge of anatomy and apply them during administration of anesthesia. However, as anatomy is traditionally presented to students early in the


curriculum, it is not always easy for the student to recall and apply this knowledge. Thus, it can be useful to have a review of the anatomy of the concerned part before the demonstration of anesthetic techniques.

Several methods for completing this transition between didactic knowledge and clinical care have been reported. Practicing anesthetic techniques on anatomic specimens before administering nerve blocks in patients involves an effective method of training. These techniques might be performed without any visualization of the deeper anatomical structures. Through the use of anatomical models, in combination with virtual 3D models, the practitioner can identify the point of needle penetration in the skin and observe its final position in the anatomical space. This makes the technique more easily understandable. It became clear that we associated the images of models with the images of the technique being done in patients, the student could more easily relate the tissue surface with the deeper levels and so understand the technique in its essence.

Human (cadaveric) anatomical preparations have always been an excellent way for trainees to learn the correct anatomic landmarks and relationships for performing various nerve blocks. As nerve architecture varies from nerve to nerve, and within the same nerve at different locations, an understanding of what constitutes needle placement categories as intraneural (within the nerve) versus perineural (adjacent to the nerve) is important for understanding the efficacy and safety of PNBs. The epineurium, perineurium, and endoneurium serve different functions with regard to nerve impulse propagation in axons, protection against infection, toxins and mechanical trauma. They are relevant to the performance of nerve blocks and to the occasional complications that develop. Knowledge of the anatomical distribution of nerves and their relationship to neighbouring structures is important for successful practice and teaching of anesthesia-related peripheral nerve block (PNB) techniques. However, much less attention has been paid on the histological aspects of the nerve structure, the organization of axons and the tissues surrounding them. Knowledge of these relationships will allow better understanding of the tissue layers that local anesthetics must traverse, and more accurate estimates of the risk for intrafascicular injection.

The study of the ultrastructure of the subarachnoid space and more specifically of the arachnoid and its different layers could shed some light on the clinical practice of neuralaxial blocks and their related morbidity. Our studies suggest that the subarachnoid sac is a compartmentalized space and we postulate that the presence of these micro compartments may promote uneven distribution of local anesthetics within the dural sac. In those areas where the local anesthetic solution would not mix (distill) adequately with CSF, neurotoxic concentrations could be reached leading to nerve root damage. Anatomical factors may, in this way, help explain the pathogenesis of neurological syndromes like Transient Neurological Syndrome and Cauda Equina Syndrome.

The specialty of Anaesthesia has been among the first to embrace simulations and computer screens as a training and assessment tool in medicine. A 1999 world wide survey of the use of simulators in anaesthetic practice found that in excess of 70% of medical schools used some kind of simulator for teaching anaesthesia skills. Simulation offers the unique opportunity to acquire and practice technical skills without exposing patients to any risk. It also offers the possibility of presenting the learner with rare but critical scenarios which might not ordinarily be encountered in routine practice. In theory it is an ideal bridge between textbook and reality. However the evidence supporting the use of simulators in procedural training has been questioned, based in the lack of evidence of better outcomes in clinical practice. Nevertheless, there are a number of reasons for their popularity in being used for training in anaesthesia:
1. They simulate a high degree of reality.
2. No risk for a real patient.
3. Predictable, programmable, standardisable, reproducible scenarios presented.
4. Repeated assessments at present times possible.
5. Allows for practice on clinically rare scenarios.
6. Videotaping allows for review.
7. Simulation can be stopped or restarted for teaching.

The success of the use of the simulator has resulted in a broadening of the simulator use in anesthesia. Many centers are using the simulator for medical student and resident teaching. In the context of teaching medical students, the full scale simulator has been used to demonstrate basic anesthetic skills, principles of cardiopulmonary physiology and to provide an experiential introduction to the practice of anesthesia, as well as aspects of critical care. For anesthesia residents, the simulator has been used to familiarise new residents to the operating environment, learn the basic principles of giving a general anesthetic and to learn to deal with common and rare intraoperative problems. In addition, high fidelity simulators have been used to study human error and to teach the non-technical skills in anesthesia, as developed by Fletcher et al, such as task management, team working, situation awareness and decision making. Issenberg et al, have recently reviewed the elements of high fidelity simulation that contribute to successful learning, including the ability for repetitive practice and feedback. There are only a few studies which look at the efficacy of simulator-based training. Nyssen et al, compared the treatment scores and “time to diagnose” of anesthesiast residents and anesthesiasts trained on a full-scale simulator versus a computer screen-based simulator. They found no difference based on the type of simulator used.

Surveys and recommendations for education and training for residents in Anaesthesia have been produced. One of the last in ultrasound-guided regional anesthesia (UGRA) that was established through a joint committee effort of the American Society of Regional Anesthesia and the European Society of Regional Anesthesia.

In recent years, the demand for 3-Dimensional computed tomography and magnetic resonance image (MRI) reconstruction have significantly increased thanks to technological improvements achieved. Nowadays, 3D image reconstruction techniques constitute a unique resource in research, clinical practice and anatomical teaching, and undoubtedly a useful adjunct in anesthesia as it may contribute to more accurate identification of structures relevant in regional anesthesia such as spinal meninges, spinal nerve roots, cauda equina, cerebrospinal fluid (CSF) distribution or dural sac and its contents. After developing several 3D models to improve brain understanding for neuroanatomical teaching, research and surgical training, we focus now in the identification of neuroaxial structures and calculating of CSF. Regional anesthesia-related peripheral nerve block (PNB) techniques. However, much less attention has been paid on the histological aspects of the nerve structure, the organization of axons and the tissues surrounding them. Knowledge of these relationships will allow better understanding of the tissue layers that local anesthetics must traverse, and more accurate estimates of the risk for intrafascicular injection.


References


ESRA1-0727

Refresher Course:

REGIONAL ANAESTHESIA FOR OUTPATIENT SURGERY

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Ambulatory surgery represents 50-70% of all surgical cases in USA. In Europe, data are variable between countries going from 20- 50% of cases. Moreover, selection of patients for daycase surgery became easier with all the advances observed in surgical techniques (minimally invasive surgery), in anesthetic techniques and also in new drugs. Indeed, ambulatory surgery is proposed for more extensive surgical procedures (laparoscopic cholecystectomy, knee surgery, shoulder surgery, thyroid, etc. . . ) in sicker patients (stable ASA 3,4).

Anesthetic techniques that provide the most rapid discharge and fewest side effects are desirable. Regional anaesthesia, by reducing postoperative pain and nausea from opioids, plays a strong role, especially for orthopedic procedures on the upper and lower extremities. Regional anaesthesia has contributed significantly in extending the indications of ambulatory surgery. Regional anaesthesia provides a smooth and progressive transition from surgery to postoperative analgesia especially with long lasting nerve blocks. Discharging patients with residual analgesia is considered as a significant advantage of regional anaesthesia, provided rescue-drugs are provided to the patient at home. Although many advantages of regional techniques are obvious, clinical comparative studies are still lacking to demonstrate all these advantages. A meta-analysis of regional techniques for outpatients has shown a prolongation of the “presurgical” time, but the use of an induction room and incorporation of ancillary personnel into the patient flow pattern can make these techniques effective alternatives for outpatients.

Recent large surveys have demonstrated the very low incidence of serious complications related to regional anaesthesia techniques. In the French survey, neurologic deficits occurred only in 34 / 103730 patient who had regional techniques. In Aromaa study, 7 claims were reported from 550.000 Spinals and 170.000 epidurals.

Pain remains the first cause of prolonging stay in PACU and ambulatory Unit. Fortier et al showed that postoperative pain represented the key factor (12%) of unplanned admissions after ambulatory surgery. In addition, pain increases the incidence of nausea-vomiting, increases time spent by nurses post-operatively and increases the rate of unanticipated admissions. Moreover, Chung et al showed that orthopedic patients had the highest incidence of severe pain in outpatients.

Spinal anaesthesia: Low-dose single shot spinal anaesthesia is an excellent alternative for short surgical procedures. The use of non-traumatic spinal needles (25-27G) has contributed to the increasing number of spinal anaesthesia in ambulatory surgery since the incidence of postdural puncture headache with such needles is as low as 1%.

This technique provides a rapid onset and a reliable offset of anaesthesia in this setting.

The administration of low-dose of hyperbaric local anesthetic solutions can be used to achieve a unilateral spinal anaesthesia which is commonly used for outpatient knee arthroscopy. As low as 4–6 mg of hyperbaric bupivacaine can be administered in this setting.

Lidocaine has been progressively replaced in outpatient spinal anaesthesia by bupivacaine, mevipacaine, prilocaine, articaine or recently 2-chloroprocaine. Indeed, lidocaine has been associated with major spinal neurotoxicity (especially with high doses) and also with the occurrence of self-limited benign postoperative “transient radicular symptoms” (TRS) which is more frequent after lidocaine than bupivacaine or other local anesthetics. While major neurotoxicity is dose-dependent, the TRS phenomenon is not dose-related. 3 risk factors have been identified for TRS: lidocaine, lithotomy position and ambulatory surgery.

Lumbar epidural analgesia and Combined spinal-epidural technique: These two techniques are less popular than spinal anaesthesia in ambulatory surgery. Indeed, the easiness of spinal anaesthesia and especially all the technological (needles design) and pharmacological (low dose bupivacaine or short-acting local anesthetics, lipophilic opioids) advances in spinal anaesthesia, make epidural and CSE techniques less frequently used. CSE has been an excellent research method for studying the optimal spinal dose of local anesthetics in ambulatory surgery.

Peripheral nerve blocks: Compared to general anesthesia, peripheral nerve blocks provide superior and longer analgesia, reduced postoperative nausea-vomiting, a shorter stay in PACU (and even PACU bypass) and enhanced patient satisfaction. Wu et al reported that patients receiving an interscaneline brachial plexus blockade had a shorter length of stay (63±25 minutes) compared with patients receiving general anesthesia (85±33 minutes) for shoulder surgery. Pavlin et al confirmed these findings reporting a 90-minute reduction in discharge times when peripheral nerve blockade (PNB) techniques were used for ambulatory surgery when compared with GA. In addition, the use of PNB has been shown to reduce recovery times in ambulatory surgery patients when compared with GA. Regional anaesthesia techniques facilitate the “fast-tracking” process. Hadzic et al demonstrated this fact in their report of 79% of patients undergoing day-case hand surgery under infraclavicular brachial plexus block being able to bypass phase 1 PACU compared with only 25% of patients receiving GA. In addition, time to home readiness and discharge were, on average, 100 minutes shorter in the PNB group when compared with the GA group. The reductions in discharge times demonstrated by such studies help to validate the fast-tracking process by improving discharge times, reducing staffing requirements in PACU, and decreasing healthcare costs.

Single injection techniques are used for less extensive surgical procedures whereas continuous peripheral nerve catheters are indicated for more complex procedures. Disposable infusion pumps can be used to prolong analgesia at home after discharge.

Multiple studies have described the effective and safe management of postoperative pain by patients using home infusion pumps. Continuous PNB can increase the magnitude of surgeries safely performed in the ambulatory setting while enhancing the quality of postoperative pain and patient satisfaction.

Infiltration and incisional blocks: Wound infiltration with long-acting local anesthetics (with or without catheters) have been extensively studied but are still underused in clinical practice in many countries. Inguinal hernia repair, laparoscopic surgery, superficial surgeries and even minor orthopedic surgery (arthroscopy of shoulder or knee) can benefit from these simple and safe techniques which provide excellent and reliable postoperative analgesia. The insertion of a catheter for postoperative administration of local anesthetics can also be suggested in some indications, excepting intra-articular infusion, due to the potential risk of severe chondrolysis.

Management in PACU: Discharge from hospital has been one of the most important issues to discuss for many years. In the last 5 years, the cost-sensitive healthcare environment led many departments to shorten the duration of stay in PACU and even to avoid PACU if patients meet the required criteria. Herealso, regional techniques, when possible and administered, can contribute to reduce or even bypass the traditional PACU (recovery room).

PACU monitoring in PACU reduces morbidity and is the standard of care. It requires large nurse to patient ratios which contributes to the cost of care. Unfortunately, there is still no agreement in the literature on describing the optimal length of stay in PACU based on objective variables. In our daily practice, many
scores have been proposed to allow transfer of operated patients from PACU to surgical wards.

Once discharged from PACU, the patient is transferred to the SSRU (second stage recovery unit) where nursing care is less labor intensive and less expensive. In this unit, only basic monitoring and observation are performed and the patient and his escort are prepared for home readiness. The patient-to-nurse ratio is considerably higher than in PACU.

The concept of PACU bypass: The ability to send surgical patients at the end of surgical procedure directly to SSRU without going through PACU as a first stage is called “PACU bypass”. Apfelbaum et al showed in a large multicentric study performed on 2508 patients, that “PACU bypass” is possible in 59% of cases after ambulatory surgery. Moreover, 10% of spinal anesthetics and 82% of peripheral nerve blocks were able to avoid PACU since these patients fulfilled all discharge criteria at the end of surgery. Another study published by Williams et al showed that PACU bypass was possible in 87% of outpatient knee surgery patients whatever the anesthetic technique used. However, significantly more patients in this group required nurse intervention in SSRU when compared to patients who went earlier through PACU (31% vs 16%).

Conclusions: Ambulatory surgery continues to rapidly expand in Europe, and the types of surgery performed in this setting have become more invasive and complex. Regional anesthesia techniques also present a low rate of complications when performed by experienced and trained hands, which make them even more attractive for outpatient. Unquestionably, the routine use of RA in ambulatory orthopedic surgery, as well as in other types of surgery when applicable (paravertebral blocks for breast and hernia surgery), is fundamental for improvement of perioperative outcomes in outpatients.

Regional anesthesia offers many advantages in ambulatory surgery despite all the advances made with modern general anesthesia, such as new short-acting drugs and improved monitoring. When compared to general anesthesia, regional techniques are more suitable when significant postoperative pain is expected. In this setting, nerve blocks and wound infiltration are highly recommended.

References

ESRAI-0728
Panel Discussion: Interventional spine procedures. Are all evidence based?

MINIMALLY INVASIVE ENDOSCOPIC SPINE SURGERY
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FOCUSED REVIEW
Electrodiagnostic Neurophysiological Testing for Spinal Decompression
Abstract: Electrodiagnostic testing (EDX) and Intraoperative monitoring (IOM) of the central nervous system dates to the 12th century. More recently, technologic advances have extended these techniques to pathologies of spine, as multimodality IOM is sensitive and specific for detecting intraoperative neurologic injury. It is suggested this be considered in spinal decompression where the spinal cord and/or nerve roots are at risk, including procedures which require instrumentation. As patient access and technology evolve, surgeons well versed in these modalities are paramount for their continued valuable and safe application.

Keywords: Intraoperative Neurophysiological Monitoring (IOM), Somatosensory Evoked Potentials (SEP), Electromyography (EMG), Motor Evoked Potentials (MEP), Electrodiagnostic Physiological Examination, Nerve Conduction Studies (NCS), Brachial Plexus, Lumbosacral Plexus, Median Nerve, Radial Nerve, Ulnar Nerve, Femoral Nerve, Obturator Nerve, Peroneal Nerve, Sciatic Nerve, Tibial Nerve.

Intraoperative Neurophysiological Monitoring (IOM): Intraoperative monitoring dates back to the first half of the 12th century when it was used for epilepsy surgery. At that time, Penfield and Boldrey used direct cortical stimulation to map the motor and sensory homunculus. It wasn’t until several decades later that electroencephalography (EEG) was used in carotid endarterectomy.

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During the infancy of these procedures, the patient was kept awake during the carotid clamping because of worries about cortical ischemia. Since better ways to evaluate ischemia were being researched, EEG provided a means of determining what degree of ischemia could be tolerated during surgery. In the 1970s, spinal instrumentation and aggressive surgical techniques contributed to the widespread use for the treatment of severe spinal deformities. Cord monitoring grew from the early 1970s research, which discovered electrical spinal potentials (EP's) were obtainable from the epidural space upon direct spinal stimulation. 1970’s research also lead to the discovery that Somatosensory EPs (SEPs) could be recorded from the scalp. Nash and colleagues initially applied these SEPs in the operating room, but were impeded by variability of signals and sensitivity to anesthesia. Problems remained for excess noise or irreproducible background variability. By the late 1970s, Nuwer and Dawson evaluated the causes of variability and determined that use of short-latency SEP techniques, restricted filters, and other technical modifications substantially reduced background variability and greatly improved reliability in the SEP tracings. With these technical improvements, SEP became a widely adopted method of spinal cord monitoring during vertebreal surgery. A somewhat different approach was developed in the UK, where Jones used the spinal recordings, but moved the stimulator to the posterior tibial nerve, thereby avoiding concerns regarding the safety of repeated spinal cord epidural electrical stimulation.

In 1982, Grundy published a series of reports about anesthetic effects, described techniques to reduce adverse effects, and extended the techniques into neurosurgical procedures. For two decades, monitoring the sensory pathways with SEPs and measuring the epidural spinal potentials were the techniques of choice for spinal cord monitoring. As techniques improved there were still limitations, as those available monitored sensory and not motor tracts. The only way to monitor motor function at that time was the Wake Up Test developed by Vauzelle and Stagnara, and understandably these were found difficult to conduct under anesthesia. In 1980, Merton and Morton reported a technology to stimulate the brain transcranially, which opened the door for motor tract monitoring. Burke subsequently popularized the use of transcranial electrical stimulation as a practical corticospinal technique for use under anesthesia. Many monitoring teams now use this technique to measure corticospinal pathways in the operating room. Controversy remains however about where to measure the responses.

Today, monitoring of motor-related pathways is routinely performed, yet no single method can sufficiently cover the complex functions of the spinal cord. Multimodality combinations of the available technologies are thus considered necessary for practical and effective intraoperative monitoring. Most common procedures include: Somatosensory Evoked Potentials (SSEP), Transcranial Motor Evoked Potentials (TcMEP), free Running EMG (EMG), and Spinal Cord Evoked Potentials (SCEP) however, SCEP is more common during “open” spinal cases and in this author’s opinion, not necessary in spinal procedures unless other extenuating circumstances prevail.

The American Academy of Neurology (AAN) convened a panel of experts who reviewed the results of a comprehensive literature search and identified published studies relevant to the clinical question of efficacy in IOM. These studies were classified according to the evidence-based methodology of the American Academy of Neurology. Objective outcomes of postoperative onset of paraparesis, paraplegia, and quadriplegia were used because no randomized or masked studies were available. Four Class I and 8 Class II studies met inclusion criteria for analysis. The 4 Class I studies and 7 of the 8 Class II studies reached significant in showing that paraparesis, paraplegia, and quadriplegia occurred in the IOM patients with EP changes compared with the IOM group without EP changes. All studies were consistent in showing all occurrences of paraparesis, paraplegia, and quadriplegia in the IOM patients with EP changes, with no occurrences of paraparesis, paraplegia, and quadriplegia in patients without EP changes. In the Class I studies, 16%–40% of the IOM patients with EP changes developed postoperative-onset paraparesis, paraplegia, or quadriplegia. IOM is established as effective to predict an increased risk of the adverse outcomes of paraparesis, paraplegia, and quadriplegia in spinal surgery (4 Class I and 7 Class II studies). Surgeons and other members of the operating team should be alerted to the increased risk of severe adverse neurologic outcomes in patients with important IOM changes (Level A). The conclusion reached by the AAN was the release of an evidence-based guideline update that recommends monitoring evoked potentials during spinal surgery and certain chest surgeries to protect the spinal cord and lessen the danger of paralysis.
The principle goal of every EDx study is to identify the longitudinal level(s) of the lesion(s) and assess its severity. This can ultimately aid in determining what underlying pathophysiology may be involved. Temporal relation may also be assessed if testing is performed in a timely manner, which can be important in traumatic injury from both a clinical and legal perspective (e.g. personal injury), especially in the motor component of the peripheral nerve root. Both the sensory and motor nerve exit the neurofamina and continue for example, into the upper extremities. There is an additional branch, which arises from the Dorsal Root Ganglion (DRG) and becomes the Dorsal Medial Branch supplying the midline components of the spinal column including facets. This has no significance in NCS however; it is of importance to the interventionist when differentially diagnosing a nerve root versus facet pathology.

Components of NCS: There are three general studies performed as components of an NCS: sensory and motor nerve conduction velocity studies, and late responses. Two Late Responses are commonly tested in an NCS study: the H-Reflex and F-Waves. The sensory examination is generally the more demanding to perform than the motor exam, as the sensory response has much smaller amplitude than a motor response.

When testing and obtaining a Sensory Nerve Action Potential (SNAP), only the sensory fibers are assessed and represent the summation of all the individual sensory fiber action potentials. These waveforms present as biphasic and on occasion, triphasic responses. Numerous technical factors (e.g. proper pad placement, surface temperature) and correct filtering are essential as sensory fibers are quite small, and testing directly measures nerve action potentials. A SNAP waveform includes several components:

- **Onset Latency**: the time from stimulus to initial negative deflection with a biphasic waveform, and from positive peak for triphasic waveforms.
- **Peak Latency**: measured at the mid point of the first negative peak and represent the fast fibers.
- **Amplitude**: measured from baseline to negative peak reflecting the sum of all the individual sensory fibers that depolarize.
- **Duration**: measured from the onset of the potential to the first baseline crossing.
- **Conduction Velocity**: measurement is determined by dividing the distance traveled by the onset latency.

(SNAP): A Compound Motor Action Potential (CMAP) is considered much less difficult to obtain as opposed to a SNAP, and it represents the summation of all underlying individual muscle fiber action potentials. The CMAP waveform is biphasic and typically begins with a negative (upward) deflection from the baseline. A CMAP includes several components of the waveform that require knowledge:

- **Latency**: the time from stimulation until the initial deflection from baseline.
  - Nerve conduction time from the stimulus site to the neuromuscular junction (NMJ).
  - The time delay across the NMJ.
  - The depolarization time across the muscle.
  - Onset: the initial deflection from baseline.
  - Amplitude: measured from baseline (onset) to negative peak (peak).
- **Conduction Velocity**: measure of the speed of the fastest conducting motor axons.
- **Duration**: measured from the initial deflection from baseline until the first return to baseline.
- **Area**: reflects the number of muscle fibers that depolarized.

Electromyography (EMG): EMGs are performed in order to differentially diagnose a primary neuropathy, or document denervation. These should be performed in conjunction with an NCS, as the two are mutually inclusive in obtaining proper diagnosis. Clinical EMG most frequently involves a needle electrode being inserted into a muscle to record electrical potentials inside the muscle.

The EMG waveform is referred to as a Motor Unit Action Potential (MUAP). The motor unit is defined as one motor neuron, and all the muscle fibers it innervates. When a motor unit fires, the action potential is carried down the motor neuron to the neuromuscular junction (NMJ), also known as an end plate. After the action potential is transmitted across the NMJ, an action potential is elicited in all of the muscle fibers innervated by those particular motor neurons.

(MUAP): There are numerous observations made in evaluation of the MUAP:

- Morphology.
  - Amplitude, duration and number of phases.
  - Stability (insertional/spontaneous activity).
  - Firing characteristics.
  - Discharge pattern.
  - Firing rate.
FIGURE 6. The Brachial Plexus gives rise to the Median Nerve.

FIGURE 7. The Brachial Plexus also gives rise to the Ulnar Nerve.

FIGURE 8. The Brachial Plexus also gives rise to the Radial Nerve.

FIGURE 9. The Brachial Plexus also gives rise to the Radial Nerve.

FIGURE 10. The Lumbosacral Plexus Anatomy.

FIGURE 11. The Femoral Nerve.
General considerations in your physical, neurological and electrodiagnostic examinations of the patient

When to Consider an EDx Examination?

Though there are many considerations in determining who may require an EDx, findings that may aid consideration are:

1. Muscle Weakness.
2. Muscle cramping and/or spasm.
3. Sensory Disturbances (e.g. numbness, tingling, burning).
4. Abnormal Myotatic Stretch Reflex (MSR).
5. Peripheral Neuropathy/Polyneuropathy (e.g. Diabetes).
6. Nerve Root compression (e.g. Pre-Operatively due to discogenic or osseous stenotic issues).

When performing an EDx examination, use a working diagnosis:

1. Physical examination of the patient should already provide you information regarding a specific level(s) of nerve root involvement and/or peripheral entrapment.
2. If your EDx findings are inconsistent with your physical exam findings, review the technical portion of the study performed (e.g. pad placement, pulse width…), and if there are still questions, you may have to perform the physical examination again. Poor technique and simple errors will often cause erroneous results.
3. Always be cognizant of your clinical and EDx correlation. If you find yourself in a situation where your EDx findings are inconsistent with your initial diagnosis, you may have to reconsider your initial diagnosis, and/or consider that there may be greater involvement and/or additional pathologies.
4. When in doubt, do not over diagnose. Remember that there may always be subclinical findings, as well as a variety of physiological and non-physiological factors, which may alter both the NCS and EMG. Take a step back and reconsider what ancillary tests may assist in reaching a diagnosis.

Review of the Brachial and Lumbosacral Plexus as well as the Peripheral Nerves

Mastery of this anatomy is critical as it separates the master from the pupil, and is the foundation for accurate diagnosis. To this point, the diagram below was chosen as a review for its simplicity of presentation and understanding. Again, mastery of this diagram will help to improve understanding of the anatomical origins of the nerves and greatly improve your clinical diagnostic skills.

The Sciatic Nerve gives rise to the Peroneal Nerve as well as the Tibial Nerve

Case Review:
The patient is a 61-year-old female status post MVA with complaints of constant, achy cervical pain. The pain originated in the cervical spine and refers up
### Motor Summary Table

<table>
<thead>
<tr>
<th>Site</th>
<th>NR</th>
<th>Peak (ms)</th>
<th>Norm Peak (ms)</th>
<th>P-T Amp (μV)</th>
<th>Norm P-T Amp</th>
<th>Onset (ms)</th>
<th>Site1</th>
<th>Site2</th>
<th>Delta-P (ms)</th>
<th>Dist (cm)</th>
<th>Vel (m/s)</th>
<th>Norm Vel (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Median Anti Sensory (2nd Digit) Wrist</td>
<td>3.8</td>
<td>&lt;3.6</td>
<td>26.9</td>
<td>&gt;10</td>
<td>3.1</td>
<td>Wrist</td>
<td>2nd Digit</td>
<td>3.8</td>
<td>14.0</td>
<td>37</td>
<td>&gt;48</td>
<td></td>
</tr>
<tr>
<td>Right Median Anti Sensory (2nd Digit) Wrist</td>
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### F Wave Studies

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### EMG

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to the back of the head resulting in severe headaches. The pain also refers to the mid scapular region bilaterally in what she describes as a sharp poker pain, “It feels like fire.” She also complains of radicular symptoms in the left upper extremity. She denies frank weakness in the upper extremities.

Physical Examination (pertinent positives)

Sensation
Vibration: Perception of vibration was diminished at the distal fingers on the right when compared to the distal fingers on the left. When compared ipsilaterally, perception was diminished at the fingertips of the 4th and 5th digits, the right medial wrist and right medial forearm. Long tract testing is unremarkable.

Pinwheel: Perception of pinwheel was diminished along the left C5 dermatome. Perception was diminished along the left medial antebrachium and palm. Perception was normal along the palmar aspects of the fingers (4th & 5th digits), and the fingertips were spared. Perception was also diminished over the lateral antebrachium on the right. Perception was greater at the hypothenar palm than the fingers (medial aspect of the 4th digit and the 5th digit), but less as compared to fingers 1 and 2. The medial palm and palmar aspects of the fingers (4th & 5th digits) and fingertips were spared on the right. Perception was also diminished along the dorsal superficial radial division of the right hand.

Soft Touch: intact in both the upper and lower extremities but diminished along the symptoms in the patient’s right and left medial and lateral forearms.

Muscle Bulk, Tone, Contracture and Fasciculation: normal muscle bulk and tone in the upper and lower extremities without evidence of atrophy or fasciculation.

Muscle Strength: 4/5 fingers adduction bilaterally, 4/5 fingers extension was 4/5 in the left. The remainder of the muscles of the upper extremities was found to be 5/5.

Reflexes: Biceps, brachioradialis, triceps, patellar, and ankle reflexes 2+ and symmetrical.

Imaging Studies:
• Anterolisthesis at C3-4 and C4-5
• C5-C6, there is a right para-central broad-based protrusion type herniation
• C6-C7 there’s mild spinal stenosis with underlying disc bulge.

Nerve Conduction Studies: Anti Sensory Summary Table: Discussion:
Given the patient’s physical examination findings, her subjective sensory complaints are greater than the electrodiagnostic (EDx) findings. As well, her subjective complaints were greater in the left upper extremity, yet the EDx findings are much more significant in the right upper extremity. If this study had been performed only on the patient’s symptomatic presentation, the significant electrodiagnostic findings involving the Median and Ulnar Motor Nerves on the right would have been missed.

The symptoms in the patient’s left upper extremity are consistent with the findings demonstrated by the Left median Sensory NCV.

Provocative testing was performed on the Median Motor Nerve not just because of the EDx findings but the additional MRI findings, which revealed anterolisthesis at C3-4 and C4-5.

Recall that provocative testing of the left median motor nerve did not result in change, however cervical extension resulted in a slight decrease in amplitude when testing the right median motor nerve, and flexion resulted in a marked decrease in amplitude and these findings are most consistent with the C5-6 disc lesion.

The right Median F-Wave latency of 2.71 ms suggests irritation of the right Median Motor Nerve roots, which is most likely the result of the aberrant biomechanics demonstrated on MRI.

Given the combination of EDx and MRI findings, a cervical Digital Motion X-ray (DMX) or plain film cervical flexion / extension series should be obtained to better assess stability. The aberrant biomechanics suggested by the MRI are likely associated with the patient’s headache complaint, and may not respond to treating the patient’s spinal pathology. However, that treatment should result in improvement in the peripheral complaints and findings.

The EDx findings also demonstrated a decrease in amplitude in the right Ulnar Motor Nerve and this is most consistent with the central stenosis and underlying disc lesion at C6-7.

Conclusion: Electrodiagnostic testing (EDx) and Intraoperative monitoring (IOM) of the central nervous system dates to the first half of the 12th century. More recently, improved anatomic and neurophysiologic understanding has extended these techniques to pathologies of spinal origin. Additionally, evidence-based guidelines recommend monitoring evoked potentials (multimodality IOM) during spinal surgery to protect the spinal cord and lessen the danger of paralysis. As patient access and technology evolve, better surgical understanding is paramount for their continued valuable and safe perioperative application.

Acknowledgement and Authorship Statement: No financial support of any kind was received during the preparation of this manuscript. The authors approved the final draft for submission.

References
12. De Viribus Electicitatis in Motu Musculari Commentarius. Ex Typographia Instituti Scientiarum 1791

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ESRA Abstracts

Regional Anesthesia and Pain Medicine • Volume 39, Number 5, Supplement 1, September-October 2014

ESRAC-0731
Panel Discussion: Regional anesthesia in children

US FOR NEUROAXIAL BLOCKS IN CHILDREN
Lönnqvist P. 1 Karolinska University Hospital, Stockholm, Sweden. American Journal of Urology 1993; 30: 245–249

Spread of Caudal blockade in Children

CAUDAL ANESTHESIA IN CHILDREN1
MEREDITH F. CAMPBELL
From the Departments of Children’s Medicine and Urology, Bellevue Hospital and the Surgical Service of Babies’ Hospital, New York City
TABLE 4. Median ± sem height of anatomic spread for each caudal volume

<table>
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<th>Caudal volume (ml·kg⁻¹)</th>
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<td>0.5</td>
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<td>0.75</td>
<td>L1 ± 0.32</td>
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FIGURE 1.

FIGURE 2.

FIGURE 3.

FIGURE 4.

FIGURE 5.
This study found an inverse relationship between age, and longitudinal cranial spread. The observed bi-directional movement of cerebrospinal fluid (coined ‘the CSF rebound mechanism’) does explain a major part of the difference between the initial ultrasound-assessed cranial level and the final level determined by cutaneous testing.

(a) Ultrasound- assessed cranial level of LA spread immediately after caudal injection (blue filled bars) and after 15 min (green striped bars).


(a) Diameter of the dural sac before caudal injection and during the 15 min observation period.


Regression lines indicating LA volume per segment in relation to patient weight.


Schematic drawing showing the spinal canal with the spinal cord (grey), dural sac with CSF (white), and the epidural space (yellow): before (a), immediately after (b), and 15 min after (c) a high-volume (1.5 ml kg−1) caudal block.


Regional Anesthesia and Pain Medicine

ESRA: THE ROLE OF REGIONAL ANESTHESIA IN PATIENT’S OUTCOME: AMBULATORY SURGERY

Capdevilla X.1, Department of Anesthesiology and Critical Care, Montpellier I University and Montpellier University Hospital; Institut National de la Sante´ et de la Recherche Medicale (INSERM), Equipe soutenue par la Region et l’Inserm (ERI)-25, Montpellier, F-34295 Cede` 5 France.

The past ten years have demonstrated real and dramatic growth in the number and complexity of ambulatory surgeries. The remaining real problems are the postoperative pain and the adverse effects due to systemic opioids promoting hospital readmissions and increasing costs. This event limit the expansion of outpatient surgery. Regional anesthesia techniques such as spinal anesthesia and peripheral nerve blocks are ideal techniques for one day hospital admissions surgical procedures. It is now fully demonstrated that these techniques allowed rapid and complete anesthetic blocks, a limitation of adverse events and unplanned hospital admissions and increased the quality of postoperative pain relief and patient’s outcome if continuous peripheral nerve blocks are used.

Ambulatory surgery has gained massive growth in the past twenty years. 75% of all surgical procedures performed in the United States are done on an ambulatory basis. In addition, more complex and extensive surgical procedures are now being performed in the outpatient basis. This progress was due to the advent of rapid elimination anesthetics, short-acting sedatives and muscle relaxants, and modern surgical techniques. However, postoperative pain is still a major limiting factor to expanding the type of surgeries performed on a day-case basis. Chung et al (1) quantified the failure of outpatient pain management on more than 10,000 outpatients reporting that 40 to 70% had severe postoperative pain (coted > 50 mm on a visual analog scale). As well, Rawal et al (2) reported that 35% of day-surgery patients experienced moderate-to-severe pain at home. These authors demonstrated that regional anesthesia technique really optimized pain relief. Regional anesthesia is the ideal technique for ambulatory surgery but is underutilized in this setting. Dexter and colleagues (3) demonstrated this fact when analyzing data from the United States Data for Health Statistics between 1994 and 1996. They reported that only an average of 8% of ambulatory cases were performed under regional anesthesia.

We have to choose the best anesthesia technique for outpatient surgery. The patient must go home quickly and safely; side effects that may be tolerated in the patient, such as nausea vomiting, and pain, become totally unacceptable in the outpatient setting, potentially resulting in delayed home discharge and even unanticipated overnight admission. In this setting, advantages and problems due to regional anesthesia are well-known (table 1). Obviously, regional anesthesia represents a good option for outpatient anesthesia, being associated with less nausea and vomiting than general anesthesia, and better postoperative pain relief patient’s outcome (4–6).
Spinal anesthesia: Spinal anesthesia was one of the choices. The introduction of non traumatic pencil-point needles with small gauge become an optimum for outpatient anesthesia, providing a fast, reliable and deep surgical block with simple injection of very small doses of local anesthetics. Spinal anesthesia provide a fast, reliable and deep surgical block with a simple injection of small amounts of local anesthetics. Problems related to spinal anesthesia in the outpatient setting relate to the effect of spinal block on recovery of motor function after the block, bladder function, and post-dural puncture headaches.

Recovery of motor function after spinal block is usually evaluated with the Bromage's scale, and the ability of the patient to flex the ankle, knee, and hip joints is considered as an index of complete motor recovery. A recent study (7) compared clinical markers of motor block resolution (Bromage'scale) and objective data of functional balance (computerized force platform method). The results of the study suggested that the standard markers of motor function are poor predictors of functional balance following ambulatory spinal anesthesia, while actual ability to deambulate became more important for safe patient discharge.

Voidsing is usually required before patient discharge. Mulroy et al (8) recently evaluated the efficacy and safety of applying an accelerated discharge strategy after spinal block by not requiring the patient to void. Young patient, without a history of voiding dysfunction were included. Consultation included all standard criteria but voiding. If patients voided before fulfilling home discharge criteria the were discharged, otherwise received a bladder ultrasound urine volume less than 400 ml, the patients were discharged; volume more than 400 ml the patients were reassessed after 1 h and discharged. Patients were discharged 22 min before patients with standard discharge criteria including voiding. None of these patients reported difficulty in voiding after home discharge. This study suggests that waiting for voiding after short-durational spinal anesthesia for surgical procedures at low-risk of urinary problems might be not necessary, and could result in prolonged discharge time.

Accordingly, the dose and drug used for spinal anesthesia must be balanced in order to have the fastest recovery of ambulatory anesthesia after the procedure maintaining adequate efficacy of intra-operative nerve block. Lidocaine provide intensive and short-lasting spinal block. However, in the last ten years, the occurrence of transient neurologic symptoms after spinal lidocaine has increased concerns about its use. Freedman et al (9) evaluating the epidemiology and risk factors for transient neurologic symptoms (TNS) after spinal anesthesia in more than 1800 patients, clearly demonstrated that TNS commonly follow spinal anesthesia. Lethotomy and surprisingly outpatient procedures were other independent risk factors. TNS is a benign syndrome, usually resolving spontaneously and quickly, however, these symptoms may be particularly concerning to a patient that needs to go back soon at home and chooses to perform the procedure at the patient setting, profound analgesia, minimal side effects, and avoidance of premature regression of an analgesic block. CPNB can assist anesthesiologists with the ability to extend postoperative analgesia at home, treating patients in a more compassionate way. Case reports or series of ambulatory perineural infusion as well as randomized comparative studies were described for peripheral nerve catheters in various locations (24–31). Klein et al (32) involved 40 subjects undergoing major shoulder surgery who received an interscalene block and perineural catheter preoperatively, and were randomized to receive either perineural ropivacaine 0.2% or normal saline postoperatively (10 ml/h). Patients receiving perineural ropivacaine averaged a 10 mm on a visual analog pain scale (VAS) of 0–100, compared with a 30 mm for subjects receiving placebo. Since patients remained hospitalized, the investigators had the opportunity to provide more than oral analgesics; patients had access to intravenous morphine via a PCA device. Therefore, patients receiving placebo theoretically received a greater degree of analgesia than that available to ambulatory patients who must rely on oral instead of IV opioids.

Recent randomized double-blinded, placebo-controlled trials provided data involving patients discharged at home with CPNB (26,27, 29–31). These studies included patients scheduled for moderately-painful orthopedic procedures who had an infrascapular, interscalene, or posterior scapular block. Patients receiving perineural local anesthetic infusions achieved clinically lower resting and breakthrough pain scores while requiring fewer oral analgesics. Patients who received perineural local anesthetic experienced additional benefits related to improved analgesia. Zero to 30% of patients with perineural ropivacaine reported insomnia due to pain, compared with 60% of patients with perineural saline. Patients receiving perineural ropivacaine infusion awoke from sleep because of breakthrough pain episods an average of 0 times on the first postoperative night, compared with 2 times for patients receiving perineural saline. Obviously lower opioid consumption in patients receiving perineural local anesthetic resulted in fewer opioid-related side effects. Patients receiving interventions for common postoperative symptoms. Patients receiving epidural anesthesia showed discharge outcomes similar to those patients receiving general anesthesia with femoral nerve block. Post-anesthesia care unit bypass (fast-tracking) was more likely in clinical pathway regional anesthesia patients (regional or spinal), when compared with the clinical pathway for general anesthesia use. Problems related to spinal anesthesia in the outpatient setting relate to the effect of spinal block on recovery of motor function after the block, bladder function, and post-dural puncture headaches.

Peripheral Nerve Blocks: Peripheral nerve blocks (PNB) with long-acting local anesthetics are an attractive anesthetic alternative for outpatient surgery (4–5). These techniques are site specific, have few side effects, provide excellent surgical conditions, as well as superior analgesia than systemic opioids use. PNB reduce the stress response to surgery, enhance patient satisfaction, and improve patient's outcome. PNB are not associated with opioid-related side effects and are not contraindicated in patients receiving anticoagulants.

First of all, we have to consider the main problematic point that can happened during a continuous postoperative regional analgesia regimen. The pharmacodynamic muscle dysfunction due to regional anesthesia, mainly a persistent motor blockade after an epidural or a continuous peripheral nerve block can be a specific question which depends on concentration (differential blockade) and duration of action of local anesthetics and adjuvants. This problem seems crucial for some type of surgery, due to the establishment of an active rehabilitation program, and the patient's medical history. Must be shown that during peripheral nerve block a lack of locking of the knee (stiffness) and muscle stability during rotations and direction changes could limit the quality of postoperative rehabilitation. These problems are mainly encountered after a dual femoral and sciatic nerve blockade several hours after the block. However, Williams and colleagues (22) reported in a recent study that the use of a Femoral-Sciatic block was associated with less pain of invasive knee surgery. If no nerve blocks were used, a complex (vs. less invasive) knee surgery was associated with a 10-fold greater risk of hospital readmission. The use of FNB or FSF13 (vs. no blocks) was associated with a 2.5-fold reduction in unplanned admissions.

Data is supporting the advantages over systemic opioids post-operative analgesia (23 ), single-injection PNB interest can be limited due to the duration of long-acting local anesthetics (10–24 hours) (4–5,23). After resolution of PNB, postoperative pain management is often difficult to manage and inadequate in the ambulatory setting. Patients usually have available oral opioids to control their pain. Continuous peripheral nerve blocks (CPNB) are a technology that allows prolonged site-specific local anesthetic delivery in the outpatient setting, profound analgesia, minimal side effects, and avoidance of premature regression of an analgesic block. CPNB can assist anesthesiologists with the ability to extend postoperative analgesia at home, treating patients in a more compassionate way. Case reports or series of ambulatory perineural infusion as well as randomized comparative studies were described for peripheral nerve catheters in various locations (24–31). Klein et al (32) involved 40 subjects undergoing major shoulder surgery who received an interscalene block and perineural catheter preoperatively, and were randomized to receive either perineural ropivacaine 0.2% or normal saline postoperatively (10 ml/h). Patients receiving perineural ropivacaine averaged a 10 mm on a visual analog pain scale (VAS) of 0–100, compared with a 30 mm for subjects receiving placebo. Since patients remained hospitalized, the investigators had the opportunity to provide more than oral analgesics; patients had access to intravenous morphine via a PCA device. Therefore, patients receiving placebo theoretically received a greater degree of analgesia than that available to ambulatory patients who must rely on oral instead of IV opioids.
perineural local anesthetic reported satisfaction with their postoperative analgesia of 8.8-9.8 compared with 5.5-7.7 for patients receiving placebo. The benefits of such analgesia appear to be highlighted by less hospital readmission. Whether these benefits result in an improvement in patients' health-related quality of life or outcome benefits is only partially studied. Ilfeld and colleagues (33) compared an overnight continuous femoral nerve block (cFNB) to a 4-day ambulatory cFNB with ropivacaine 0.2%. The CPNB technique did not increase the ambulation distance the afternoon after surgery but significantly decreased the time until three specific readiness-for-discharge criteria (adequate analgesia, independence from intravenous analgesics, and ambulation of at least 30 m) are met after total knee surgery but significantly decreased the time until three specific readiness-for-discharge criteria (adequate analgesia, independence from intravenous analgesics, and ambulation of at least 30 m) are met after total knee arthroplasty in 50 patients. Catheters were removed on postoperative day 4. Patients given 4 days of perineural ropivacaine attained all three discharge criteria in 25 (21-47) h, compared with 71 (46-89) h for those of the control group receiving saline. Capdevila et al (34) compared a CPNB infusion of ropivacaine 0.2% to patient controlled intravenous morphine in 83 patients scheduled for ambulatory orthopedic surgery for functional recovery and postoperative analgesia. Basal-bolus ropivacaine infusion decreased the time to a 10 minutes' walk, optimized all daily activities (figure 1), and decreased the amount of ropivacaine used. The morphine group had greater pain scores and consumption of morphine and ketoprofen compared with ropivacaine group. The incidence of nausea/vomiting, sleep disturbance, and dizziness increased, and the patient satisfaction score decreased in the morphine group. Authors concluded that ambulatory orthopedic surgery using 0.2% ropivacaine delivered as a perineural infusion optimizes functional recovery and pain relief.

In conclusion, the benefits of regional anesthesia techniques can be extended from the ambulatory surgery setting into the patient's home postoperatively via spinal anesthesia for the quality of the anesthetic blockade and for postoperative analgesia via perineural catheter placement (35,36). Obviously, for a successful program, new aspects of the facility's structures need to be addressed to be sure that RA techniques have the potential to decrease the hidden costs of procedures related to morbidity, hospital readmissions and delayed rehabilitation.

References
TABLE 1. Potential benefits and problems related to RA vs GA in one-day surgery

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<th>Advantages to patients</th>
<th>Problems related to RA vs GA in one-day surgery</th>
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<tr>
<td>Improved quality of recovery</td>
<td>less postoperative pain (mainly for CPNB)</td>
</tr>
<tr>
<td>less postoperative nausea and vomiting</td>
<td>Less unplanned hospital admissions</td>
</tr>
<tr>
<td>able to observe the procedure</td>
<td>communication with surgeon during procedure</td>
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<tr>
<td>as an option to receive no, light or heavy sedation</td>
<td>earlier mobilization</td>
</tr>
<tr>
<td>Assessment of function before wound closure</td>
<td>&quot;fast tracking&quot;, i.e. bypassing phase I recovery room</td>
</tr>
<tr>
<td>shorted recovery time</td>
<td>less requirements in PACU/PALF recovery room</td>
</tr>
<tr>
<td>fewer unanticipated overnight admissions</td>
<td>needs active cooperation with patients and surgeons</td>
</tr>
<tr>
<td></td>
<td>risk of complications (nerve damage, Transient neurological symptoms, e.g. after lidocaine spinal anesthesia?)</td>
</tr>
<tr>
<td></td>
<td>variable failure rate (up to 8–10% with PNB)</td>
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<td>urinary retention with spinals</td>
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FIGURE 1.
(3-D) ultrasonography guidance seems able to image nerves, local anesthetic spread, and their 3D anatomical relationships. (Feinglass et al. 2, Clendenen et al. 3, 4, 5, Karmakar et al 6)

One of the greatest advantages of ultrasound technology in performing Brachial Plexus Blocks is the non-invasive and dynamic nature of this technology, allowing the operator the ability to directly visualize the nerves and surrounding structures. However, the use of ultrasound is greatly dependent on the operator’s expertise with the technology as well as his/her knowledge of the relevant anatomy.

One problem for the “knowledge” of this anatomy is that the traditional descriptive scheme of the brachial plexus is unnecessarily complex and intimidating.

Learning spatial relationships appears to require both perception (derivation of information about pattern and form) and imagery (reconstructing the perception in one’s own mind). The greater the complexity of the image, the more difficult the reconstruction will be and with higher the error rate. Thus, 3-D learning requires time for both reconstruction and validation, Marks et al. Processing visual images appears to function of the right cerebral hemisphere, reviewed by Miller 8, it is clearly different from much other learning, and requires considerable time relative to that needed for one- or two-dimensional data.

The anatomical teaching method used internationally to learn more relationship structure and three-dimensional morphology is anatomical dissection. However this method requires unnecessary and difficult to avoid further learning for the anaesthetist. Furthermore the lacks of anatomical specimens, and the toxicity of conservators, have originated an intense search for alternative ways of demonstrating the human anatomy. As a solution to this difficulty, three-dimensional (3-D) images may be used, facilitating the learning process.

This study aims to describe the techniques of reproduction of bi-dimensional images into three dimensions, which is called stereoscopy. Our study proposes the use of the stereography to acquire the necessary knowledge of the most relevant three-dimensional braquial plexus anatomy.

Material and methods: The study was conducted on deceased adults who, under Andalucian legislation had bequeathed their bodies to science and education at the Department of Human Anatomy and Embryology at The University of Seville.

Gross Examination: Two embalmed cadavers were available for the study. The necks and shoulders were dissected to study the macroscopic appearance of the sheath enveloping the braquial plexus in supraclavicular, infraclavicular and axilar region. The regions were dissected in different depths.

Pair stereographs: Briefly summarising the 3D images are obtained using a pair of stereographs. Thus, two photographs are taken of an object from different angles. The pair stereography method of polarized light uses the codification of the images, which means separation and exclusivity with each eye, seeing its corresponding image. The final image quality has the natural colour of the specimen, conserving image clarity at lower cost, Meneses 9.

Results: The successful brachial plexus block run with ultrasonography depends on our knowledge of sectional anatomy or sonography of the region to block, as well as coordination between the image provided by the probe and needle lock or “coordination-needle probe”. This anatomical sectional view forces us to learn the three-dimensional topographic anatomy of the brachial plexus to interpret the sectional image. That is, we work in the same anatomical region, but viewed from a different perspective. The topographic anatomy allows us to identify different or related structures in proximity to the brachial plexus, while the sectional anatomy allows the identification of structures that are displayed on the ultrasound screen (La Grange 13).

We know (La Grange 13, Ambrosiani 14, De Andres 15) the origin of the brachial plexus in the neck and root of the terminal nerves, travelling in three anatomically distinct regions, which correspond to the classical approaches used for blocking; the supraclavicular region (posterior triangle of the neck), the infraclavicular region (anterior shoulder) and axillary region (root arm). However in this paper, we have only studied the supraclavicular region for demonstrating the method of stereoscopic observation.

Supraclavicular region: Topographical Anatomy: the posterior triangle of the neck at the base is bound by the clavicle, above the rear edge of ECM and in the back by the trapezius muscle, delimiting the supraclavicular fossa. The supraclavicular fossa is covered by skin and subcutaneous cellular tissue. Furthermore supraclavicular and supraacromial superficial cutaneous branches of the cervical plexus cross the supraclavicular fossa. The superficial cervical fascia and the ECM and trapezius muscles form a second plane. A third plane is formed by the deep cervical fascia and the sternocleidomastoid muscle. The SCM and trapezius muscles form a second plane. A third plane is formed by the deep cervical fascia and the sternocleidomastoid muscle.
to this interscalene space, the transverse process of C6 is located with an acoustic shadow and vertebral artery, also the vertebral vein at a previous location in relation to the artery. Small shifts or caudal cephalic make this shadow disappear and vertebral vessels can be located using the doppler. The ultrasound interscalene space level allows blocking of all the plexus, including T1, positioning the needle.

Supraclavicular: the subclavian muscle, caudal to the clavicle and the subclavian vein on the 1st rib is identified. On a more anterior plane the omohyoid muscle and the subclavian artery are located. The brachial plexus is located cephalic and posterior to the artery. At this level the trunk is braachial plexus are divided into anterior and posterior to the artery division. Sonographic visualization at this level may, due to supravascular depression, makes the handling of the probe and needle difficult. The identification of the plexus at this level is easy, observing a hypoechoic "honeycomb" structure without Doppler effect, unlike blood vessels (Fig 17) (Fig 1, rectangular form.) In this stereograph image, Figure 1A, is possible to appreciate the different component of peripheral tissue of the brauchial plexus (rectangular form). Thus the pair stereographic image of sagittal section of brachial plexus trunks is located below clavicular bone. In this anatomical preparation clavicular bone has been removed. This image is compatible with a classical ultrasound image “honeycomb” like, described more above. In Figure 1C, stereograph image illustrated a relative position of ultrasound probe. In other words, the sectional plane of stereograph image (Fig 1A) has been made in that plane.

Technical Note. How does the pair stereograph use to be viewed? This stereogram has been designed to be viewed on a high-resolution home television. It is possible to use other stereoscopic system or crossed viewing. But if you would have a comfortable view, you need use a polarized light system 3D image. Wear passive glass. In any case, cut and paste in your powerpoint presentation this slide. Configure page 16:9. Then used the red line to determine the middle line. Although it possible that certainly deformity of image, don’t worry. You might occupy whole surface of slide. View the image in 3D mode and enjoy.

Discussion: Brachial nerves are blocked by local anesthetic and not by the needle. The key aspect for effective peripheral nerve block should ensure optimal distribution of local anesthetic around the nerves that you want to block. It is more important to confirm the proximity of the needle than the target structure. Before the use of ultrasound in the practice of peripheral nerve blocks it was not possible to accurately determine the relative position of the tip of the needle to the nerve so as to know the distribution of local anesthetics administered. Currently, the use of ultrasound high-resolution equipment is possible (La Grange 13, Ambrosiani 14, De Andres 15, Mian 16, Chan 17, Cash 19, Demondion 20, Martinoli 21, Sheppard 22, Yang 23).

In 1838 Sir Charles Wheatstone 10 described the theory of stereoscopic vision. His mirror stereoscopic viewer required that both pictures in the pair be reversed laterally. The advantage of the arrangement was that one could cope with large pictures, which is why the principle is still in use today when viewing X-Ray stereoscopic pictures and aerial photographs.

Though most associate Brewster with the invention, it was Sir Charles Wheatstone who, in June 1838, addressed the Royal Scottish Society of Arts on the phenomena of binocular vision. In describing the equipment, he said: "I...propose that it be called a Stereoscope, to indicate its property of representing solid figures."

Cunningham11 did the most representative work of anatomical stereoscopy in 1909. Ten volumes of stereoscopic images of the whole body are created. Images need the use of a stereoscopic viewer to be observed. This caused a great difficulty in the presentation at meetings.

Among the various innovative applications of stereo photography in medicine and anatomy, one period in particular stands out because of the reflective nature of its subject matter: Arthur Thomson’s Anatomy of the human eye, as illustrated by enlarged stereoscopic pictures, Thomson12. Also known as "Stereoscopic Atlas of Thomson’s Eye", the work consisted of sixty-seven "extended stereoscopic photographs" of human eyeballs in various states of dissection.

Nowadays 3D images can be observed in both high-resolution home television screens and projectors in large rooms. However, the last is not very good for non-commercial screenings in halls or cinemas.

The anatomical dissection is basic for learning the more relevant system of observing polarized light pictures to appreciate the 3D structure naturally. Learning for the anaesthetist can be easy using this system. Although required to have anatomical preparations, stereoscopic photographs are of high quality learning ultrasound anatomy.

References


ESRA1-0069
THE ADDITION OF EPIDURAL OR INTRAVENOUS DEXAMETHASONE DID NOT AFFECT POSTOPERATIVE ANALGESIA FOLLOWING COMBINED SPINAL EPIDURAL ANESTHESIA FOR CESAREAN DELIVERY: A RANDOMIZED CONTROLLED TRIAL
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Background and aims: Combined spinal epidural (CSE) anesthesia is commonly used to provide anesthesia and postoperative analgesia for Cesarean section. The beneficial effects of intravenous (IV) or epidural (EPI) dexamethasone (DXM) on postoperative analgesia have been demonstrated in several non-obstetric patient populations.

We hypothesized that IV or EPI dexamethasone would both decrease postoperative morphine consumption after Cesarean delivery.

Methods: Following Ethical Committee approval and obtaining written informed consent, 150 patients presenting for elective Cesarean delivery were included in this double blind, randomized, placebo controlled study. All patients received a CSE with hyperbaric bupivacaine 0.5% (1.5ml) and sufentanil 2.5 μg intrathecally. Patients were randomized to three groups: Group1 received EPI-DXM 10mg and IV saline, Group2 received EPI saline and IV DXM 10 mg and Group 3 received EPI and IV saline. Study drugs were administered following delivery of the neonate.

Intravenous patient controlled morphine analgesia (bolus only mode, PCIA) was started postoperatively. Primary study outcome was total morphine consumption during the first 48hours.

Descriptive statistics were used for baseline demographics. Results are reported as medians and interquartile range. Kruskal-Wallis test was used to analyze differences between groups.

Results: The median total morphine consumption for the first 48hours was 8 (3–13), 9 (2–18) and 9 (3–19) mg for groups 1, 2 and 3 respectively (p=0.56). In addition, analysis of cumulative morphine consumption at specific time intervals (postoperative time +6hrs, 12hrs, 24hrs, 48hrs) could not demonstrate significant differences between groups.

Conclusions: The IV or EPI administration of DXM has no effect on total morphine consumption following elective Cesarean delivery. This is in contrast to previous studies in the non-obstetric population.

ESRA1-0167
IMPACT OF BLOCK TECHNIQUE ON RESPIRATORY FUNCTION IN SHOULDER SURGERY: A COMPARISON OF CONTINUOUS SELECTIVE SUBOMOHYOIDAL SUPRASCAPULAR NERVE VS INTERSCALENE BLOCK
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Background and aims: Interscalene nerve blocks (ISC) include major risks for neural damage and a significant impact on respiratory function due to phrenic nerve paralysis. Selective subomohyoidale blocks of suprascapular nerve (NSS) provide an effective pain reduction in major shoulder surgery by leaving the phrenic nerve unaffected. The present study therefore investigated incidence and extent of impaired respiratory function with either technique in a randomized controlled trial.

Methods: After IRB approval (BB093/13), 48 patients scheduled for elective shoulder surgery were randomized to receive either a continuous ISC or NSS block, applied using ultrasound and using a bolus of 10 ml Ropivacaine 0.2% followed by a continuous infusion of 4 ml/h as an anesthetic during and after the surgical procedure. The anatomical conditions for NSS identification within the subomohyoidal path, the respiratory function by means of ultrasonographically measured diaphragmatic inspiration amplitude (DIA), and the cumulative opioid consumption for 72 hours were assessed.

Results: In all 48 patients, the NSS could be readily identified in the subomohyoidal path, 24 patients received the ISC vs. 24 patients the NSS block. While NSS blocks were as effective in reducing pain scores as ISC blocks in the intra- and postoperative course, (p=0.47), phrenic nerve paralysis, as defined by reducing the DIA more than 40% was significantly linked to the ISC, compared to the NSS block (62.5 vs. 4.8%, p=0.001).

Conclusions: Continuous selective blocks of the subomohyoidal path of the suprascapular nerve provide a comparable pain reduction for shoulder surgery,
while significantly reducing the impact on respiratory function compared to the interscalene block technique.

**ESRA1-0173**

**IMPACT OF THE EPIDURAL ANESTHESIA ON IMMUNE CELL REDISTRIBUTION AND CYTOKINES IN SPINAL DEFORMITY SURGERY**

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**Background and aims:** Surgical stress and postoperative pain can cause accelerated apoptosis of lymphocytes (Delogo G, 2001). Accelerated lymphocyte depletion may be associated with an increased risk of infection, thus EA can improve resistance to infections.

**Methods:** In a randomized, controlled, prospective trial 103 patients were divided into two equal groups as follows: Group E (n=54) had continuous epidural analgesia and sevoflurane anesthesia during surgery and continuous epidural analgesia with ropivacaine and fentanyl after surgery (PCEA); Group G (n=49) had general anesthesia with sevoflurane and fentanyl and systemic administration of opioids after surgery (PCA). Circulating cytokines (IL-1β, IL-6, IL-8, IL-10, TNF), C-reactive protein (CRP), cortisol, and cell-surface receptor expression of immune cells (cluster of differentiation HLA-DR+/CD3+, HLA-DR+/CD5+, HLA-DR, CD3, CD4, CD8, CD16, CD19 CD16/56+, and CD16/56+/CD3+) were measured perioperatively to characterize immunological functions.

**Results:** Natural killer cells have decreased significantly in Group E receiving PCEA compared with Group G. T-lymphocytes, (CD3) have decreased in all patients, but they were significantly lower in patients receiving opioids, compared with PCEA. In patients receiving PCEA postoperative CD4/CD8 ratio and B cells have increased, and NK-cells (CD16/56 +) have reduced by postoperative day 3. All circulating cytokines, CRP and cortisol were significantly less in Group E. Thus, epidural anesthesia is important in modulating immune system response in patients. Epidural anesthesia may reduce postoperative stress responses and thereby influence immune functions. All immune changes have strongly correlated with pain scores postoperatively.

**Conclusions:** Epidural anesthesia attenuates surgical stress response in patients undergoing spinal deformity surgery and prevents lymphocyte apoptosis, thereby protects against infection during perioperative period.

**ESRA1-0215**

**MECHANISMS OF ANALGESIC EFFICACY OF ADDUCTOR CANAL BLOCK (ACB): A CADEVER STUDY**

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**Background and aims:** The ACB provides excellent analgesia after knee surgery. Branches of the sciatic nerve contribute to the sensory innervation of the knee, so branches of the femoral and the obturator nerves. Therefore, we performed a cadaver study to test the hypothesis that in addition to the block of branches of the femoral nerve in their path through the adductor canal, the analgesic efficacy of the ACB is related in part to a spread of the local anaesthetic solution outside the adductor canal, into the popliteal fossa resulting in the block of branches of the sciatic nerve.

**Methods:** Institutional Review Board approval has been requested, and anatomic studies were conducted in 6 lower limbs of fresh cadavers to determine the disposition and spread of local anesthetic and methylene blue (20ml) injected into the Hunter's canal at the hiatus level under ultrasound guidance.

**Results:** In each thigh, methylene blue was present in the adductor canal. The dye spread consistently into the popliteal fossa and bathed the sciatic nerve and branches of this nerve (fig 1). Mostly associated, these extensions occurred via the inferior hiatus (n=1), another osseo-aponeurotic opening (n=2) or by skirting around the adductor magnus (n=5).

**Conclusions:** The analgesic efficacy of the ACB could be related in part to a block of branches of the sciatic nerve in the popliteal fossa.

**Figure 1.**

**ESRA1-0220**

**CAN WE BLOCKADE THE AXILLARY REGION? A CADEVERIC AND RADIOLOGICAL EVALUATION**

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**Background and aims:** Patients undergoing breast surgery suffer substantial postoperative discomfort and pain arising from the thoracic wall incision, thoracic muscle manipulation and especially the axillary surgery. The axillary region doesn’t have own blockade, it is a difficult zone to reach. We will discuss the ultrasound-guide approaches that become an alternative to provide postoperative analgesia after axilla dissection, are to block entry sensory nerve supply axillary region.

**Methods:** After verbal informed consent, 15 patients listed for axillary surgery were recruited to a radiological study. Institutional review board approval was obtained to conduct the magnetic resonance imaging (MRI) studies.

The ultrasound blocks were performed in the side of surgery. The injected usually consist of twenty ml of levobupivacaine 0.25%/adrenalina 1.200 000. Then we conducted a Pec’s ultrasound-guide block technique and a Serratus-intercostal fascial ultrasound-guide (SIFP) block: anterior approach. We review the results in a MRI to determinate the axillary region spread of agents injected via anterolateral interfascial thoracic planes, in order to determinate the axilla analgesia of the Pec’s block and SIFP block.

**Results:** This study evaluates and demonstrates the feasibility to use an ultrasound guided approach to block the axillary region. Our study shows that the IPFP and SIFP provide a potential space into which local anaesthetic can be deposited to achieve sensory blockade of the axilla.

**Conclusions:** The administration of LA into the axilla via interpector al fascia plane (IPFP) and via serratus-intercostal fascial plane (SIFP) before surgery represents a simple and efficacious means to provide postoperative analgesia.

**ESRA1-0233**

**OPTIMAL VOLUME OF LOCAL ANESTHETICS FOR THE ADDUCTOR CANAL BLOCK — USING THE CONTINUOUS REASSESSMENT METHOD TO ESTIMATE THE ED95**

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**Background and aims:** Theoretically, the optimal volume of local anesthetics for adductor canal block (ACB) would ensure sufficient spread throughout the...
canal as well as avoidance of proximal spread to the femoral triangle. In this dose-finding study we aimed to investigate the minimal effective volume needed to fill the adductor canal distally.

Methods: We performed a blinded, prospective trial, enrolling 40 healthy men. The continual reassessment method (CRM) was used to determine the ED<sub>95</sub> for 1% lidocaine. The dose closest to the ED<sub>95</sub> of 1% lidocaine needed to fill the adductor canal distally with a response probability of 95.1% (95% confidence interval: 0.91 to 0.98). Proximal spread to the femoral triangle was seen in: 0/4 (0%), 7/12 (58%), 4/8 (50%) and 8/16 (50%) of subjects, at the 5, 10, 15 and 20 ml dose levels, respectively. Seven subjects had a decrease in muscle strength, but there was no difference between the groups (P=0.85). However, figure 1 indicates that impairment may be more pronounced for 20 ml.

Conclusions: The dose closest to the ED<sub>95</sub> of 1% lidocaine needed to fill the adductor canal distally with an ACB is 20 ml.

ESRA1-0544

PERIPHERAL NERVE FIELD STIMULATION (PNFS) IN CHRONIC LOW BACK PAIN: A PROSPECTIVE MULTICENTER STUDY

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Background and aims: The goal of this study was to evaluate the long-term efficacy and safety of PNFS (Peripheral Nerve Field Stimulation) for cLBP (chronic Low Back Pain).

Methods: In this prospective, multicenter observational study 118 patients were admitted to 11 centers throughout Austria and Switzerland. After a screening visit, all patients underwent a trial stimulation period of at least 7 days before implantation of the permanent system. Leads were placed in the subcutaneous tissues of the lower back directly in the region of greatest pain. 105 patients were implanted with a permanent stimulating system. Patients’ evaluation of pain and functional levels were completed before implantation and 1, 3 and 6 months after implantation.

Adverse events, medication usage, and coverage of the painful area and predictive value of TENS were monitored.

Results: All pain and quality-of-life measures showed statistically significant improvement during the treatment period. These included the average pain visual analogue scale, the Oswestry Disability Questionnaire, the Becks Depression Inventory and the SF–12. Additionally, medication usage with opioids, NSAIDs and anticonvulsants showed a highly significant reduction. Complications requiring surgical intervention were reported in 9.6% of the patients. The degree of coverage of painful areas seems to be an important criteria for efficacy of PNFS, whereas TENS is presumably no predictor.

Conclusions: This prospective, multicenter study confirms that PNFS is an effective therapy for the management of chronic low back pain. Significant improvements in many aspects of the pain condition were measured, and complications were minimal.

ESRA1-0546

TUG OF WAR: EFFECTIVE NERVE BLOCKS REVEAL COMPETING PAIN SOURCES IN A RANDOMIZED STUDY ON ANTERIOR CRUCIATE LIGAMENT (ACL) SURGERY

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Background and aims: Pain is considerable after arthroscopic ACL reconstructive surgery. Several pain management regimens employ peripheral nerve blocks as adjuvants to systemic therapy, but the use of widely popular femoral nerve blocks has often been disappointing. Our aim is to investigate sources of postoperative pain with various combinations of nerve blocks.

Methods: After IRB approval, 82 patients participated in a double-blind, randomized study comparing ultrasound-guided femoral-obturator (n=26), saphenous-obturator (n=28) and placebo blocks (n=28) for primary ACL reconstruction using hamstring tendon graft. All patients were given general anaesthesia (propofol-remifentanil), sufentanil 0.2 mg/kg iv, ketorolac 30 mg iv, paracetamol 1 g po and postoperative morphine by iv PCA. Patients were asked to register the location of pain hourly within the first 6 postoperative hours.

Results: Patients receiving no nerve blocks primarily experience pain in the anteromedial and central parts of the knee (Figure 1). When adding saphenous-obturator nerve blocks, pain in these locations is significantly reduced (p<0.05), but pain in the posterolateral part is significantly increased (p<0.0001). When adding femoral-obturator nerve blocks, a similar transition of pain is observed, with a more pronounced anterior pain reduction and posterior pain increase (p<0.0001).

Conclusions: Our results suggest that postoperative pain after arthroscopic ACL surgery is dominated by a tug of war between two sources of pain: a primary anteromedial component innervated by the femoral nerve and a secondary posterolateral component innervated by the sciatic nerve. A partial or complete femoral nerve block significantly reduces anteromedial pain but increases posterolateral pain, causing the overall pain experience to basically remain the same.
effects via activation of Src-Kinase and Mitogen-activated protein kinase (MAPK) signaling pathways.

**Methods:** Human lung microvascular endothelial cells (HLMVEC) were stimulated with 0.1–100 nM morphine for 1-30 min, lysed and blotted for pTyr418-Src and total Src (loading control). In parallel, cells were pretreated either with 100 μM lidocaine or 100 nM methynaltrexone (MNTX) and then stimulated with morphine, lysed, and blotted.

**Results:** Morphine increased the activation of Src Tyr 418 phosphorylation, thus proangiogenic signaling. Pretreatment with the LA lidocaine at the maximal dose of 100 μM significantly reduced morphine-induced Src activation. Pretreatment with the MOR antagonist MNTX inhibited the morphine-induced Src activation likewise.

**Conclusions:** Morphine induces Src-kinase activation in HLMVEC in a time and concentration dependent manner. Results may suggest that lidocaine, by reduction of Src activation, can reduce morphine-induced angiogenesis. Since only the primary stages of the pathway were involved and the agents were administered as pretreatment, further investigation is needed.

This work was supported by a grant from the European Society of Regional Anaesthesia.
ESRA1-0591
Obstetric

REMIFENTANIL FOR LABOUR ANALGESIA: DIMINISHING USE AND SAFETY CONCERNS WITHIN A GLASGOW TEACHING HOSPITAL
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Background and aims: Remifentanil PCA in labour was introduced in our institution in 2009. A protocol driven prescription and monitoring chart has existed since 2010.

Recent case reports of significant adverse events have questioned its safety profile.

We aimed to ascertain the frequency of remifentanil prescription in our unit, adherence to the monitoring protocol and the incidence of adverse effects.

Methods: The West of Scotland Research Ethics Service confirmed that formal review was not required.

Seventy patients received Remifentanil in labour since 2009. 49 case notes were evaluated.

Results: Monitoring chart was complete in only 43% cases.

No fetal or maternal adverse outcomes were reported.

Maternal desaturation below 94% occurred on three occasions.

The chart failed to demonstrate one episode of recurrent desaturation necessitating dose adjustment.

Drowsiness, nausea and vomiting were the commonest adverse effects (41% and 15%).

Conclusions: Safety concerns have reduced Remifentanil use. Prescription is predominantly reserved for when regional anaesthesia fails or is contraindicated. Adherence to the monitoring protocol was poor. When good, it still failed to identify a significant event. This underlines the difficulties inherent in standardising monitoring and improving patient safety for a drug with such a short duration of action.

ESRA1-0564
Postoperative Pain Management

EFFICACY OF CONTINUOUS WOUND INFUSION (CWI) OF ROPIVACAINE FOR POSTOPERATIVE ANALGESIA: A QUANTITATIVE SYSTEMATIC REVIEW OF RANDOMISED CONTROLLED TRIALS (RCT)

Background and aims: Subsequent to the meta-analysis by Liu (JAmCollSurg 2006; 203:914-32) mostly including data on bupivacaine, several new RCTs have been published. This systematic review aims to confirm the efficacy of ropivacaine CWI.

Methods: Literature searches (EMBASE, MEDLINE) retrieved studies meeting the criteria: Double-blind RCT of ropivacaine versus either placebo or an active comparator; ropivacaine solution without added active agents; no other confounding analgesics given during the study period except patient-controlled analgesia. Standardized effect sizes (ES) for ropivacaine versus placebo were calculated for opioid rescue medication and pain scores at rest and on mobilization.

Results: Fourteen RCTs comparing ropivacaine CWI versus placebo were identified: opioid rescue use data were available for 10 studies, pain at rest and on mobilization data were available for 12 and 11 studies. Effect size estimates revealed significantly less opioid use for ropivacaine patients (ES of -1.3; 95% CI -1.5 to -1.1; Figure) and significantly less pain for ropivacaine patients both at rest (ES of -1.1; 95% CI -1.3 to -0.9) and on mobilization (ES of -1.5; 95% CI -1.7 to -1.3). Weighted mean reductions were 22.4 mg for morphine use, 13.3 and 20.0 mm for VAS pain at rest and mobilization scores, respectively.
Conclusions: Ropivacaine CWI for postoperative pain management provides clinically meaningful reductions in opioid use and pain outcomes in a wide range of surgical procedures.

ESRA1-0552
Peripheral Nerve Blocks

TEMPORAL PROGRESSION OF ETHANOL-ON-SKIN INSENSITIVITY AND MUSCLE PARALYSIS FOR BRACHIAL PLEXUS BLOCKS. A RANDOMIZED, DOUBLE-BLIND STUDY USING ROPIVACAINE 0.75% FOR ELBOW, FOREARM AND HAND SURGERY

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Background and aims: Brachial plexus blocks are often used for elbow, forearm and hand surgery. Previous studies have explicitly documented the progressive sensory impairment for the musculocutaneous, radial, median and ulnar nerves, but muscular function and the effects on lesser-known sensory nerves are rarely investigated [Table 1].

Methods: After IRB approval, 120 patients participated in a randomized, double-blind comparison of ultrasound-guided supraclavicular [n=40], infracavicular [n=40] and axillary [n=40] blocks for upper extremity surgery. Linear transducer, short-axis, in-plane, multiple-injection technique with 20 ml of ropivacaine 0.75% was used for all blocks. Insensitivity to ethanol-on-skin and muscle paralysis at elbow, wrist and fingers were noted at 10, 20 and 30 minutes after block placement.

Results: Completeness of sensory and motor block are seen in Figures 1 and 2. Summary data for all block types are used.

Conclusions: Apart from slight differences between block types, a characteristic temporal progression in sensory and motor impairment following brachial plexus blocks may be identified.

ESRA1-0549
Peripheral Nerve Blocks

THE GOLDEN AGE IS BEFORE US, NOT BEHIND US. A SYSTEMATIC REVIEW OF CLINICAL FAILURE RATES FOR ULTRASOUND-GUIDED BRACHIAL PLEXUS BLOCKS

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Background and aims: Since ultrasound was introduced to brachial plexus blocks twenty years ago, a great deal of scientific effort has gone into refinements of block efficacy for upper extremity surgery. Ten years ago, electrostimulation was added to confirm needle-to-nerve proximity, and reductions in local anaesthetic (LA) volume has gradually been introduced. We wanted to discover if these changes have had any impact on clinical failure rates in the scientific record.

Methods: A systematic Medline review on supraclavicular, infracavicular and axillary plexus blocks using ultrasound guidance with or without supplementary nerve stimulation. All prospective cohort studies with extractable failure rates, both paediatric and adult regardless of study aim, are included. Studies using retrospective data acquisition, dose-finding or Dixon up-and-down designs are excluded. Extractable data include failure rate, LA volume, guidance...
132 cohorts including 5,385 patients were analyzed [Table 1]. Femoral-obturatur nerve blocks are superior to saphenous-obturator block groups (p<0.04). The femoral-obturator group had significantly more motor paralysis than placebo (p=0.007). No differences in any other effect parameter were observed between any groups using area-under-the-curve comparison (p>0.05). Total morphine demand was significantly less in both active groups compared to placebo (p<0.03), with the saphenous-obturator group having equal opioid demand to the femoral-obturator group (p=0.41).

Conclusions: While some differences in efficacy do seem to exist between block types, twenty years of research involving more than 5,000 patients have not significantly reduced failure rates for these upper extremity nerve blocks. This study did not compare to electrostimulation alone, but previous systematic reviews seem to find similar rates with that technique [1].

References

ESRA-0548
Postoperative Pain Management

DO NERVE BLOCKS INFLUENCE OPIOID-SEEKING BEHAVIOUR? EXPERIENCES FROM A RANDOMIZED STUDY ON ACL RECONSTRUCTIVE SURGERY

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Background and aims: For many reasons, postoperative pain and opioid analgesic demand do not necessarily follow a predictable relationship. Patients ask for opioids in low pain states because of psychological issues or low tolerance to pain, and ask for no opioids in high pain states because of high pain tolerance or to avoid dependency or side effects. We wanted to investigate if opioid-seeking behaviour was influenced by the nerve blocks administered.

Methods: After IRB approval, 82 patients participated in a double-blind, randomized study comparing ultrasound-guided femoral-obturator (n=26), saphenous-obturator (n=28) and placebo blocks (n=28) for primary ACL reconstruction using hamstring tendon graft. All patients were given general anesthesia (propofol-remifentanil), sufentanil 0.2 mg/kg iv, ketorolac 30 mg iv, paracetamol 1 g po and postoperative morphine by iv PCA. Pain and opioid demands were analyzed in the first 6 postoperative hours. Pain tolerance was evaluated using the number of requests for opioids during low-to-moderate pain states (pain less than 6 on a 0-10 NRS scale).

Results: The total amounts of opioids requested in low-to-moderate pain states were the same in the active groups (p>0.05), and both significantly less than the placebo group (p<0.03). Patients receiving no nerve blocks requested opioids in low-to-moderate pain states half the time (Figure 1). Saphenous-obturator nerve blocks did not change this preference (p>0.33). However, patients asked for significantly less opioids during low-to-moderate pain states in the femoral-obturator nerve block group, compared to both placebo and saphenous-obturator block groups (p<0.04).

Conclusions: Following ACL reconstructive surgery, patients receiving no nerve blocks often ask for opioids even when pain is limited. While not influencing overall opioid demands, a complete femoral-obturator nerve block

adjus the pain response to seek opioid analgesics primarily when pain is high, while an incomplete nerve block does not. Our results suggest that effective nerve blocks may modulate the central perception of pain and opioid-seeking behaviour.

ESRA-0547
Peripheral Nerve Blocks

REQUIEM FOR THE FEMORAL NERVE BLOCK IN ANTERIOR CRUCIATE LIGAMENT (ACL) SURGERY? RESULTS FROM A DOUBLE BLIND, RANDOMIZED STUDY

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Background and aims: The femoral nerve block (or lumbar plexus, 3-in-1, fascia iliaca compartment blocks) have been a key element in postoperative pain therapy following ACL surgery in the majority of studies published. However, several studies document an increased risk of potentially catastrophic falls caused by quadrecips motor paralysis [1], and evidence is accumulating that the overall beneficial effect of the block may be limited [2]. We present results from a clinical study on the subject.

Methods: After IRB approval, 82 patients participated in a double-blind, randomized study comparing ultrasound-guided femoral-obturator (n=26), saphenous-obturator (n=28) and placebo blocks (n=28) for primary ACL reconstruction using hamstring tendon graft. All patients were given general anaesthesia (propofol-remifentanil), sufentanil 0.2 mg/kg iv, ketorolac 30 mg iv, paracetamol 1 g po and postoperative morphine by iv PCA. Quadriceps motor paralysis was judged by the Jensen-Børglum motor test [3], and pain and opioid demands were analyzed in the first 6 postoperative hours.

Results: Mean pain scores using a 0-10 NRS scale is presented in Table 1; no significant differences were observed between any groups using area-under-the-curve comparison (p>0.05). Total morphine demand was significantly less in both active groups compared to placebo (p<0.03), with the saphenous-obturator group having equal opioid demand to the femoral-obturator group (p=0.41). The femoral-obturator group had significantly more motor paralysis than placebo (p=0.007). No differences in any other effect parameter were observed between the active groups.

Conclusions: Femoral-obturator nerve blocks are not superior to saphenous-obturator nerve blocks in terms of pain or opioid demands following ACL surgery. Given the inherent risk of falls and secondary ligament rupture, there is little clinical evidence to warrant the continued use of femoral nerve blocks for ACL reconstructive surgery.

References
ESRA1-0513
Postoperative Pain Management

PLASMA ROPIVACAINE CONCENTRATIONS AFTER PERIARTICULAR INFILTRATION FOLLOWED BY INFUSION OF LOCAL ANESTHETIC FOLLOWING TOTAL HIP AND KNEE ARTHROPLASTY

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Background and aims: The periartrial infiltration followed by infusion of local anesthetic prolongs the duration of analgesia following total hip and knee joint arthroplasty. However, the information regarding the potential for local anesthetic systemic toxicity with the use of this technique is lacking. We measured the plasma ropivacaine concentration during a continuous periartricular infiltration analgesia to assess the safety of this technique.

Methods: After institutional ethics approval 232 patients scheduled to undergo primary total hip arthroplasty and total knee arthroplasty (THA/TKA) were enrolled in the study. All patients received spinal anesthesia and periarticular infiltration consisting of a mixture of ropivacaine 0.35% 100 ml, ketorolac 30mg, morphine 10 mg and epinephrine 2.5 mcg.mL-1. Patients undergoing total hip arthroplasty received local anesthetic infusion at rate of 4 ml/h. The patients undergoing total knee arthroplasty received local anesthetic infusion at rate of 6 ml/h. The plasma ropivacaine levels were measured on arrival to the post anesthesia care unit (PACU) and first post operative day (POD1).

Results: No patient had clinical signs and symptoms of systemic local anesthetic toxicity.

<table>
<thead>
<tr>
<th>PACU</th>
<th>POD1</th>
</tr>
</thead>
<tbody>
<tr>
<td>THA (n=50)</td>
<td>0.4 (0.3-0.6 [0.1-1.5])</td>
</tr>
<tr>
<td>TKJA (n=50)</td>
<td>0.3 (0.2-0.4 [0.0-1.2])</td>
</tr>
</tbody>
</table>

Conclusions: This study shows that the plasma ropivacaine concentrations, during continuous periartricular infiltration analgesia after total hip and knee arthroplasty, remain below the recommended toxic limit, suggesting a low risk of local anesthetic systemic toxicity associated with this technique.

ESRA1-0501
Peripheral Nerve Blocks

A NOVEL LIA TECNIQUE FOR SHOULDER SURGERY VERSUS INTERSCALENE AND SUPERACULAR PLEXUS BLOCK

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Background and aims: Shoulder surgery can be performed under general and/or regional anaesthesia. The number of shoulder surgeries has increased in the last 2 decades and different anaesthetic techniques have emerged to provide anaesthesia and post-operative analgesia. The objective of this audit was to demonstrate the effectiveness of a novel use of LIA versus the standard ultrasound guided nerve blocks.

Methods: A total of 285 patients ASA 1,2 and 3 were included into the audit from January 2013 until December 2013. Age was not an exclusion criteria. Patients receiving periarticular infiltration with ropivacaine were recruited into the study. All patients received spinal anesthetic and periarticular infiltration followed by infusion of ropivacaine. Majority of the patients underwent either Dupuytren’s contracture correction or a trapeziectomy. After sedation with 2mg Midazolam, 50 mcg Fentanyl median, ulnar and radial nerves were blocked with 5ml 0.5% Bupivacaine each. A sterile mid forearm tourniquet was applied. Data was collected for anaesthetic time, tourniquet time, need for GA or surgical supplementation of local anaesthetic. Tourniquet pain was measured using VAS score(0-10) immediately prior to deflation of the tourniquet. The tourniquet time was recorded and the surgeon was asked to subjectively rate the effectiveness of the haemostasis as either “poor”, “adequate” or “excellent”.

Results: Average anaesthetic time was 17 minutes and tourniquet time was 41 minutes. 6 patients(8%) needed surgical local supplementation and none needed a GA. Nearlly all patients reported only mild(<3 VAS) discomfort from the tourniquet. The surgeons reported the quality of hemostasis as excellent in 64 patients, average in 6 and poor in 2 patients.

Conclusions: Forearm tourniquet with elbow blocks provides an alternative to the traditional brachial plexus block with low failure rates and excellent haemostasis. The risks of brachial plexus blocks like phrenic nerve palsy, pneumothorax and vascular injury can be avoided by this technique.

ESRA1-0466
Peripheral Nerve Blocks

EVALUATION OF THE EFFECT OF STIMULATING NEEDLE-TIP POSITIONS AND THEIR ANGLES OF INCIDENCE UPON THEIR CAPACITY TO ACTIVATE A NERVE USING THE ACTIVATION FUNCTION

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Background and aims: Computational models can describe the electrical properties of stimulating needles. The activation function represents a heuristic method to describe the electrical properties of stimulating needles. The activation function represents a heuristic method to determine the effectiveness of different needle-tip positions and their angles of incidence.
tool to understand the electrical behavior of ideal neurons and their interaction with stimulating needles and catheters. The aim of this study is to evaluate the effect of needle-tip positions and their angles of incidence upon their capacity to activate a nerve.

**Methods:** The program Ansoft Maxwell® is used to compute the electrostatic field produced by the different needle conducting-tip designs:

A: Arrow® StimuCath Insulated Plexus Block Needle (17 G).
B: Pajunk® StimuLong Sono II Facet tip (19 G).
C: Vygon® SilverStim (18G - 30°).

After simulation, a macro in Maxwell® creates the nerve array associated with each image. The second voltage derivative, proportional to the activation function, is evaluated and exported for each nerve. Files are read by another script which post-processes data and presents them in a graphical manner.

**Results:** Different needle tips geometries demonstrate not only different patterns of activation as the needles are rotated about their long axis, but also differences given by their angle of incidence respect to the nerve. (Fig.1).

**Conclusions:** Our data suggest that stimulating needles have no spherical symmetry, and that the angle of incidence of conducting tips (longitudinal versus perpendicular) with respect to the nerves can affect their capacity to stimulate nerves.

**ESRA1-0455 Pediatric**

**PRELIMINARY EXPERIENCE WITH ULTRASOUND GUIDED TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VS WOUND INFILTRATION FOR UNILATERAL INGUINAL SURGERY IN PEDIATRIC PATIENTS**

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**Background and aims:** Transversus abdominis block provides effective analgesia in adult patients for postoperative period. In this study we aimed to compare analgesic efficiency of ultrasound guided TAP block or local anesthetic infiltration in pediatric patients undergoing unilateral inguinal surgery. We present preliminary experience with the postoperative analgesic efficiency of TAP block versus wound infiltration in pediatric patients.

**Methods:** 60 patients, aged 6-12 years (ASA I-II) undergoing unilateral inguinal surgery were randomly divided into two groups. At the end of the surgery, in Group TAP (n=30); TAP block was performed unilaterally and 2mg/kg (0.25%) bupivacaine was injected (maximum 20ml volum). In Group infiltration (n=30); the surgeon performed a wound infiltration using 2mg/kg (0.5%) bupivacaine (infiltration group n=30). Patients were assessed in the recovery room, the day-stay unit (30 min to 2 h after surgery) and at 24 h for age appropriate numerical pain score, analgesic consumption, and any adverse effects.

**Results:** In 26 of 30 patients have received TAP blockade, who did not require any analgesic agents in the first 8-12 postoperative hours. These 4 patients required oral ibuprofen during the first 24 hours. No adverse effects related to TAP block were identified. In infiltration group, all patients(n=30) required narcotic analgesia for the initial 30 minutes and all of them needed more than one times additional analgesic agents within 24 hours.

**Conclusions:** Our preliminary experience suggest that TAP block provides effective analgesia following inguinal surgery in children.

**ESRA1-0448 Postoperative Pain Management**

**ALGAESEC EFFECT OF POSTOPERATIVE TRANSVERSUS ABDOMINIS PLANE BLOCK (TAP) AFTER MINIMALLY INVASIVE ANTERIOR LUMBAR SPINE SURGERY**

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**Background and aims:** Minimally open techniques have been recently developed to perform anterior lumbar interbody fusion (ALIF) performed using either an anterolateral or a medial infra umbilical skin incision. The aim of our study was to prospectively evaluate the efficiency of ultrasound-guided TAP in relieving early postoperative abdominal pain after ALIF.

**Methods:** In PACU, all postoperative ALIF patients showing abdominal pain intensity measured using a numeral rating scale (NRS: 0 = no pain to 10 = worse imaginable) ≥ 4 (before) received TAP either unilaterally or bilaterally depending upon skin incision type (lateral or medial, respectively) using ropivacaine 0.375% for each injection. Analogic effect of TAP was assessed by a blinded investigator: before, 5, 10, 30 minutes after last injection, and 12 h postoperatively.

**Results:** A total of 66 consecutive patients (62 % females) were enrolled. A single ropivacaine injection was performed in 80 % patients.

**Conclusions:** We observed that postoperative TAP performed in the PACU significantly reduced NRS abdominal pain scores at all time points of the evaluation. However, the clinical efficiency of TAP seems to be of or below 12 h duration. This observation suggests that continuous TAP block infusion could be of interest after ALIF.

**ESRA1-0447 Peripheral Nerve Blocks**

**SEMI-QUANTITATIVE COMPARISON OF NEUROSENSORY EFFECTS OF LEVOBUPIVACAÏNE 0,5% IN THE CERVICAL DERMATOMES AFTER ULTRASOUND GUIDED INTERSCALENE BLOCK WITH LOW DOSES OF DIFFERENT LOCAL ANESTHETICS**

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**Background and aims:** This study investigated, with Thermal Quantitative Sensory Testing(QST), whether an interscalene block(ISB) alone or in combination with a stellate ganglion block(SGB) could result in additional neurosensory effects by blocking the sympathetic fibres coming from the stellate ganglion.

**Methods:** For this ethically approved, prospective, randomized, double-blinded study, 20 patients were enrolled. Patients, undergoing arthroscopic shoulder surgery, were randomly assigned into 2 groups of 10. In both groups an ultrasound guided ISB was performed with 3ml levobupivacaïne 0,5% at the C5 root. In the second group an additional ultrasound guided SGB was performed with 3ml levobupivacaïne 0,5% under the prevertebral fascia at the lower level of the C6 transvers process. QST was performed in dermatomes C4, C5, C6 and C7 and the contralateral C5(intra-subject control). Detection thresholds for cold sensation, warm sensation, cold pain and heat pain were measured. Testing was performed before infiltration and 30 minutes, 6 hours, 10 hours and on the following morning after infiltration. file:///Users/LucSermeus1/Desktop/goedkeuring%20EC%20SAS3.pdf

**Results:** Injection of the anesthetic solution resulted in significant increases in detection thresholds for all thermal sensations within the ipsilateral dermatomes, without any statistically significant or clinically relevant differences between the 2 experimental groups. The SGB had no additional effect on the thresholds of C5, nor on the roots at distance, which have significant less pronounced changes in detection thresholds, compared to C5.

**Conclusions:** No difference in block intensity or duration could be observed between the 2 groups, showing no additional effect when the sympathetic fibres of the stellate ganglion are blocked before a noxious stimulus.
Background and aims: With thermal Quantitative Sensory Testing (QST) we looked semi-quantitatively at if low dose local anesthetics (LA) in an inter-scalene block (ISB) resulted in differences in block intensity and duration in the different cervical dermatomes. QST assesses the cutaneous small nerve endings, more specifically the Aδ- and C-fibres, which transmit nociception.

Methods: For this ethically approved, parallel, randomized, double-blinded study 37 patients were enrolled. Patients, undergoing arthroscopic shoulder surgery, were randomly assigned into 3 groups for an ultrasound guided ISB (5ml aimed to block C5) with ropivicaine 0.75% (n=12), levobupivicaine 0.5% (n=13) or levobupivicaine 0.5% with epinephrine 1/200 000 (n=12).

QST was performed in dermatomes C4, C5, C6 and C7 and the contralateral C5 (intra-subject control). Detection thresholds for cold sensation, warm sensation, cold pain and heat pain were hereby measured. Testing was performed before infiltration and 30 minutes, 6 hours, 10 hours and on the following morning after infiltration.

Results: Injection of anesthetic solution resulted in significant increases in detection thresholds for all thermal sensations within the ipsilateral dermatomes without differences between the LA. In between the different dermatomes significant less pronounced changes in detection thresholds, resulting in a faster recovery, were observed in the dermatomes distant from C5.

Conclusions: The differences in thresholds between the dermatomes C4, C6 and C7, compared to C5, shows the importance of the injection site when using low doses of LA. Despite a residual functionality of cutaneous nociceptive fibres, patients displayed optimal analgesia. Compared with a previous study, low dose of LA accelerates the recovery of fibre function.

ESRA-0431
Chronic Pain Management

ENDOTHELINS IMPLICATED IN OROFACIAL HYPERALGESIA INDUCED BY TRIGEMINAL INJURY IN MICE: A ROLE FOR GLIAL CELL ACTIVATION?

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Background and aims: Endothelins and their ETα and ETβ receptors are involved in the intercellular interactions that occur in peripheral sensory trigeminal ganglia in altered nociceptive states. The trigeminal neurons can release endorphins and satellite glial cells display ETβ receptor. This study aims to assess the involvement of the endothelins system in glial activation that occurs after trigeminal injury (TI) in mice.

Methods: TI was induced in male Swiss mice by constriction of the right infraorbital nerve. Endothelin-1 (ET-1) (0.3; 1 and 3 pmol) or vehicle was injected directly in the trigeminal ganglion (TG) via infraorbital foramen in the naive mice. On day 5 after surgery, the contralicted mice were treated with the TG intraganglionaire injection of the peptide endothelin ETβ receptor antagonist, BQ-788 (0.5; 0.05 mmol) or vehicle and the satellite glial cell activation in the ipsilateral TG was assessed 3 hours after administration by immunohistochemistry. All the protocols were previously approved by USFCs’s Committee on Ethical Use of Laboratory Animals (PP00851).

Results: ET-1 (3 pmol) induced thermal hyperalgesia up to 4 h after administration. BQ-788 (0.05 mmol) treatment was able to reduce the thermal hyperalgesia in contralicted mice over the first 4 h after administration, however it did not reduce the satellite glial cell activation. We are now examining if systemic antagonist treatments influence TI-induced TG satellite cell activation.

Conclusions: Thus, the ET system is involved in promotion of the thermal hyperalgesia, but a causal relationship between this action and TG satellite cell activation still remains to be elucidated.

ESRA-0422
Postoperative Pain Management

PRESENCE OF EARLY NEUROPATHIC PAIN FEATURES AFTER KNEE ARTHROPLASTY CORRELATES WITH ACUTE POSTOPERATIVE PAIN INTENSITY

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Background and aims: Patients suffering knee osteoarthritus have high prevalence of neuropathic pain features as assessed by the Douleur Neuropathique 4 (DN4) score (Otero-Alvare et al, Pain Pract 2014). After total knee arthroplasty (TKA), postoperative pain still remains difficult to control in many patients (Wyld et al, Orthop Traumatol Surg Res 2011). This study assessed the relationship between early postoperative DN4 score and postoperative pain intensity after elective TKA for osteoarthritus.

Methods: 56 patients had DN4 score assessed preoperatively and at day3 after TKA. Intraoperative anesthesia protocols and postoperative analgesia were standardized. Postoperative pain (VAS, 0-10) at rest, movement and during night was recorded from day1 until day8. For data analysis, patients were classified into 2 groups according to a DN4 score positive or not at day3. Statistical analysis used Mann-Whitney Rank Sum test and Pearson correlation, P <0.05 was considered as significant.

Results: DN4+ was present in 16% and 15% of the patients, preoperatively and at day3 respectively. DN4+ patients displayed higher postoperative pain scores at mobilization from day1 to 3 (figure 1) and during postoperative nights 1 to 3. There were positive correlations between DN4 score value and pain intensity at mobilization and during night.

FIGURE 1.

Conclusions: Presence of neuropathic pain features can be found in early postoperative period in osteoarthritus patients undergoing TKA. DN4 score intensity correlates with acute postoperative pain severity. Specific analgesic treatments targeting neuropathic component might help to control severe postoperative pain in those patients.

ESRA-0421
Peripheral Nerve Blocks

COMPARISON OF SINGLE-INJECTION AND CONTINUOUS INFUSION ADDUCTOR CANAL BLOCK INITIAL AMBULATION TIMES AND DISTANCE AFTER TOTAL KNEE ARTHROPLASTY (TKA)

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Background and aims: Adductor canal blockade (ACB) has emerged as an alternative with less motor blockade for postoperative analgesia after TKA, potentially facilitating rehabilitation and early ambulation. We compared the efficacy of a continuous adductor canal block (cACB) for 48 hours to the efficacy of a single-shot ACB (sACB).

Methods: Retrospective analysis of all patients that underwent total knee arthroplasty and received an ACB from September 2013 to February 2014. Outcomes studied were post-operative time from block placement to time of first ambulation, time to ambulation ≥ 50 feet and total ambulation distance during the first two postoperative days.
Results: 59 patients (n=31 for sACB and n=28 cACB) underwent TKA. Average ages were 65.29 for SACB and 65.60 years in the CACB group. In the sACB group, time to first ambulation was 19.56 and 29.45 hours (hrs) in the cACB group. Average time to meet the milestone of 50 ft of ambulation (surrogate marker for discharge readiness/disposition by physical therapy) was 42.01 (cACB) and 34.65 hours (sACB) groups. 2/28 (7%) of the CACB and 7/31 (22.6%) of sACB patients failed to reach this endpoint. Total ambulation distance during the first 48 hours was 44.70 m (cACB) and 62.95 m (sACB).

Conclusions: Patients with a continuous adductor canal block ambulated later than patients receiving a single-injection adductor canal block but are more likely to meet physical therapy endpoints that might affect discharge disposition and/or outcomes for TKA patients.

ESRA1-0416
Peripheral Nerve Blocks
THE INFLUENCE OF INTRAVENOUS LIPID EMULSION IN PERIPHERAL NERVE BLOCK QUALITY AND DURATION
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Background and aims: Intravenous lipid emulsion (ILE) has been used successfully to revert LAST, but there are no reports as to any change on nerve block behavior after ILE injection.

Can ILE influence LA’s action at nerve tissue? This blind random controlled study was designed to evaluate rat's sciatic nerve block (SNB) behavior with bupivacaine 0.5% after ILE injection.

Methods: The animal-handling procedures were approved by the local Ethics Board for Animal Research, followed European Union laws on animal protection (86/609/EC).

After general anesthesia induction, a SNB (0.1ml/bupivacaine 0.5%) was performed with nerve stimulation, 17 Wistar rats were randomly allocated in two groups: Group ILE (received ILE intravenously) and Control Group (received saline intravenous) 15 minutes after SNB placement. The investigator was blind to rat allocation and intravenous solution injected.

Tactile placing response, thermal nociception and motor function’s (extensor postural thrust, sciatic functional index) degree and duration were accessed and registered for both groups before and after SNB (at 30/45/60/90/120/150/180/210/240/270/300/330/360 minutes).

Results: 14 rats (of 17) completed the study (2 ILE Group/1 Control where excluded). Block placement was achieved in all but one animal. Normal contralateral limb movement was observed in both groups. Baseline block evaluation scores before and after SNB (time after SNB and before injection of ILE/saline) did not differ significantly between groups. There was no significant difference in nociception, sensory and motor block scores, except in the last SFI data (330 and 360 minutes). All animals recovered completely.

Conclusions: ILE seems to not influence the SNB quality and duration in rats.

ESRA1-0411
Postoperative Pain Management
PREDICTIVE VALUE OF PREOPERATIVE TEMPORAL SUMMATION FOR POSTOPERATIVE PAIN INTENSITY AFTER ELECTIVE HIP ARTHROPLASTY
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Background and aims: Individual differences in endogenous pain modulation place individuals at risk to develop severe acute pain (Edwards R, Neurology 2005). Temporal summation (TS) is an indirect method to evaluate nociceptive system hyperexcitability and sensitization. Total hip arthroplasty (THA) a major orthopedic procedure may carry severe postoperative pain. The study assessed the predictive value of preoperative TS for postoperative pain after elective THA.

Methods: 49 patients scheduled for THA underwent preoperative TS evaluation on volar forearm by pricking pain score (VAS, 0-10) recorded after single application and after the last application of a train of 10 mechanical stimuli (rate 1 Hz) with a 180 g von Frey filament (Weissman-Fogel et al, J Pain 2009), the difference between scores being mechanical TS. Intraoperative anesthesia protocol and postoperative analgesia were standardized. Postoperative pain trajectories (VAS, 0-10) at rest, movement and during the night were recorded from day1 until day8. For data analysis, patients were classified into 2 groups according to the presence or not of a preoperative positive TS. Statistical analysis used Mann-Whitney Rank Sum test, P<0.05 was considered as significant.

Results: There were no demographic differences between the groups. Median TS score was 1 (IQR:0-1.5) in TS+ group (n=17), 0 (IQR:0-0) in TS- group (n=32). TS+ patients displayed higher postoperative pain scores at mobilization from day2 to 8 (Figure1and during nights 2and 3

Conclusions: Preoperative positive mechanical TS is a significant psychological predictor of postoperative pain intensity after THA as previously found after other surgical procedures.

ESRA1-0401
Postoperative Pain Management
ANXIOLYTIC EFFECT OF INTRAVENOUSLY ADMINISTERED PARECOXIB IN PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY (TKA) WITH CONTINUOUS FEMORAL BLOCK. A RANDOMIZED DOUBLE-BLIND PROSPECTIVE STUDY
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Background and aims: Intravenous infusion of parecoxib could provide significant pain relief in situations that require additional forms of analgesia. However, very little is known about its effects of on the anxiety levels of patients before a surgical procedure. The aim of this prospective study was to investigate whether intravenous parecoxib, pre-emptively administered, has an effect on anxiety levels experienced prior to continuous femoral block for postoperative analgesia after TKA and if it influences the reported pain of the procedure; continuous femoral block itself.

Methods: Ninety patients were randomised in two Groups D, P. All of whom underwent TKA under spinal anesthesia. Prior to this, all patients received continuous femoral nerve block (CFNB). Group D consisted of 45 patients who received parecoxib intravenously in addition to CFNB. Group P consisted of 45 patients who received parecoxib intravenously in addition to CFNB. Group P consisted of 45 patients who received placebo (NS/0.9%) intravenously instead of parecoxib. All patients filled in a questionnaire, in order to evaluate anxiety levels both pre-surgically, as well as post-surgically, i.e. STAI1 and STAI2 respectively. This happened to distinguish personality- trait-anxiety from state anxiety, i.e. anxiety experience due to the actual perioperative events and the actual pain endured.

Results: The non-parametric Mann-Whitney test was performed to verify statistically significant differences. The group receiving parecoxib appeared to have lower anxiety levels both pre- and post-surgically, as compared to the placebo group, with statistical significance p=0.012 and p=0.002, respectively.

Conclusions: Parecoxib a potent analgesic appears to have anxiolytic effects in addition to its primary action and this was demonstrated by this study.

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ESRA1-0344
Peripheral Nerve Blocks

PERINEURAL VS. INTRANEURAL (INTERFASCULAR) APPLICATION OF LIPOSOME BPVACAINE IN A SCIATIC NERVE OF PORCINE MODEL
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Background and aims: Liposome bupivacaine is a novel prolonged release formulation which can produce local anesthesia for up to 72 hours. That could lead to the useful clinical application for peripheral nerve blocks in terms of replacement for currently used cathers. However, it is not known whether liposome bupivacaine can lead to neurotoxicity, given its novel formulation and prolonged nerve exposure. Our study aims at assessing the possible sensory and motor dysfunction as a result of perineural and intraneural (interfascicular) injection of liposome bupivacaine, as well as evaluating the difference between groups for motor and sensory block quality.

Methods: After approval by Review Board for Animal Research, 15 piglets were studied in this double-blind prospective randomized trial. After endotracheal anesthesia, sciatic nerves were exposed unilaterally. Using automated inflating pump 4 ml of 1.3% liposome bupivacaine was injected either perineurally (n=5) or intraneurally (n=5). 0.9% NaCl was also injected intraneurally (n=5) as a negative control. Injection pressure monitor was used to minimize the risk of intrafascicular injections. After injection, the animals were awakened and subjected to serial neurologic examinations using modified Thalhammer’s scale during two weeks.

Results: Neither of the injections resulted in persistent motor or sensory deficit throughout the study period. Intraneural injections exhibited longer sensory block (p<0.003).

Conclusions: Under conditions of our study, the use of liposome bupivacaine for peripheral nerve block did not cause clinically evident nerve injury. Intraneural injections exhibited longer sensory block without persistent neurological deficit. Further researches are needed to understand the significance of intraneural injections with respect to injury.

ESRA1-0355
Peripheral Nerve Blocks

COMPARISON OF HEMODYNAMICS, RECOVERY PROFILE AND POSTOPERATIVE ANALGESIA OF UNILATERAL SPINAL ANESTHESIA WITH COMBINED SCIATIC-FEMORAL NERVE BLOCK IN KNEE ARTHROSCOPY
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Background and aims: In this randomized, controlled, blinded study, combined sciatic-femoral nerve block with levobupivacaine was compared with unilateral spinal anesthesia with respect to: effectiveness, patient's and surgeon's satisfaction and the effect on postoperative pain in arthroscopic knee surgery.

Methods: The study, after obtaining required ethics committee approval and patient consent, was randomized undergoing elective knee arthroscopy. A total of 40 cases were randomly divided into two groups; Group I (n=20) received combined sciatic-femoral nerve block with levobupivacaine 0.5% totally by 40ml In group II (n=20), spinal anesthesia in lateral decubitus position (ULSIA) with 7.5mg levobupivacaine 0.5% was performed and patients were kept in the same position to achieve an anesthesia level at T12 (maximum 10 minutes). Development of motor and sensorial block on both sides and onset time to surgical anesthesia were recorded. The time required for postoperative recovery score to be ≥12 was recorded. In the postoperative period, postoperative analgesia (VAS), motor block, side effects, patient's and surgeon's satisfaction were recorded at 1, 3, 6, and 12. hours.

Results: Time to be ready for surgery was significantly shorter in Group II (p<0.05). All patients were satisfied for both techniques. There were no differences in judgment between the groups. VAS scores at sixth hours were significantly lower in group I than in group II (p<0.05).

Conclusions: Combined sciatic-femoral nerve block for outpatient arthroscopic knee surgery offers satisfactory anesthesia, with a clinical profile similar to that of low-dose spinal anesthesia. Sciatic-femoral nerve blocks are associated with significantly lower pain scores during the first 6 postoperative hours.

ESRA1-0301
Obstetric

TOO FAST? TOO BAD. TIMING OF THE EPIDURAL BLOOD PATCH FOR POSTDURAL PUNCTURE HEADACHE AND HOW IT AFFECTS THE SUCCESS RATE
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Background and aims: The aim of the audit was to establish how the timing of epidural blood patches (EBP) affects the success rate.

Methods: Review of the obstetrics audit charts completed over 2010-2012 in tertiary maternity unit, identification of cases with postdural puncture headache (PDPH) with subsequent review of the interventions, timing of EBP and the outcomes.

Results: A total of 83 cases with postdural puncture headache were identified over a 3 year period, during which 21,040 deliveries occurred. There were 5778 epidurals performed, 3122 spinals for caesarean delivery (CD) and 360 combined spinal-epidural (CSE) blocks. PDPH after an epidural developed in 55 women (0.95%), and in 11 parturients after spinal for CD (0.35%). There were a total of 54 primary EBP performed, 78% of them post epidural (n=42) and 22% after a spinal (n=12). Most EBP were performed over 48 hours post primary procedure (89%, n=48) and 9.2% (n=5) 24-48 hours following the primary procedure. All of the EBP performed within 24-48 hours required repeated EBP (100%, n=5) whereas only 10% (n=5) of the EBP done after 48 hours required repeating (p=0.006). There were a total of 10 cases of second EBP, 5 of them were successfully 2 gave partial relief, 1 refused follow up, 2 required further EBP.

Conclusions: Timing of the EBP is important factor influencing the outcome. In our audit all primary EBP performed within 48 hours required repeated EBP compared to only 10% of EBP performed after 48 hours. So delaying EBP by >48 hours gives a higher success rate for the procedure.

ESRA1-0337
Miscellaneous

WOMEN’S DYSMENORRHEA ALTERS BRAIN’S PAIN-RELATED INTRINSIC FUNCTIONAL CONNECTIVITIES
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Background and aims: Dysmenorrhea or pelvic pain in women have been reported to alter pain perception and might be related to the symptoms of chronic pain. Although recent studies have showed that brain metabolism and regional morphology would be changed by dysmenorrhea. Pathophysiological mechanisms behind these influences are not elucidated. Hereby we used resting-state fMRI (rsfMRI) to investigate the possible changes in functional connectivity for these pain-related networks in dysmenorrheic patients.

Methods: Thirty-five healthy young female subjects who suffered from dysmenorrhea and 37 age-matched female controls were recruited. All subjects received rsfMRI scanning in their periovulatory phase (without menstrual pain). Regions-of-interest were selected according to ‘pain matrix’, based on results of previous meta-analysis, to assess further functional connectivities. Changes of functional connectivity for these networks in dysmenorrheic patients were compared with normal controls.

Results: Dysmenorrhea indeed changed the functional connectivities from regions in pain matrix. Regions with significant different functional connectivity included pain-perception regions, such as insular cortices and opercular cortices. Further analysis showed that connectivity changes to regions in default mode network and central executive network, or other sensory regions.

Conclusions: This study is the first report of functional connectivity changes in women with dysmenorrhea. The involved brain regions suggest that regions in salience network are most susceptible to a long-term stimulation of menstrual pain, and also changes the functional connectivities to other intrinsic brain
network. These findings provide further understanding of sensory and emotional processing for pain in the women with dysmenorrhea.

**Background and aims:** Therapeutic ultrasound (TU) could treat carpal tunnel syndrome and treadmill exercise alleviate neuropathic symptoms. Here we estimated the effects of treadmill training and/or ultrasound on nerve injury-induced pain hypersensitivity and cellular changes.

**Methods:** Treadmill training and TU were administered, 5-day/week, beginning on postoperative day 3 (POD3) after a constricted injury on rat’s sciatic nerve and continued until POD27. Heat and mechanical sensitivity, interleukin-6 (IL-6), and ionized calcium binding adaptor molecule 1 (Iba1) in the spinal cord were evaluated in the sham-operated, chronic constriction injury (CCI), TU after CCI, treadmill training after CCI (TT), and TU with treadmill training after CCI (TU+TT) groups.

**Results:** Treadmill training and/or ultrasound reversed the changes in mechanical and thermal hypersensitivity in rats submitted to the CCI surgery. The rats after CCI exhibited the upregulation of IL-6 and increased numbers of Iba1 in the spinal cord on PODs 14 and 28, whereas CCI-operated rats after TU, treadmill training, or the combination reversed this upregulation. The data showed that the combination of treadmill and ultrasound is more effective to reverse pain hypersensitivity induced by sciatic nerve ligation than each treatment alone. The behavioral observations following three therapy methods are correlated with a reduced and increased expression of IL-6. Reduced activation of microglia is also observed after the different therapeutic approaches.

**Conclusions:** Each of TU & TE separately, as well as the combination TU+TE, reduced these animals pain as measured by increases in the mechanical- and thermal-stimulation threshold values. Reduction of IL-6 is associated with the reduction of central sensitization.

**FIGURE 1.**

**ESRA Abstracts**

**ESRA-0234**

Peripheral Nerve Blocks

**EFFECT OF ADDUCTOR CANAL BLOCK WITH 10 ML VERSUS 30 ML LOCAL ANESTHETICS ON QUADRICEPS STRENGTH: A RANDOMIZED STUDY IN HEALTHY VOLUNTEERS**

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**Background and aims:** Adductor canal block (ACB) is predominately a sensory nerve block, but excess volume may spread to the femoral triangle. We hypothesized that ACB with 10 ml would lead to fewer subjects with impaired quadriceps strength than ACB with 30 ml.

**Methods:** We performed a blinded, randomized, crossover trial, including healthy men. All subjects received bilateral ACBs with 0.1% ropivacaine; 10 ml in one leg and 30 ml in the other leg. The primary outcome was the difference in limbs with decreased quadriceps strength by more than 25% from baseline, in two consecutive assessments. Secondary outcomes were quadriceps strength at predefined time-points, the 30-second Chair-Stand test (one leg at a time), and sensory block. IRB approval: H-3-2013-135.

**Results:** We included 26 subjects. For each volume, two subjects had decreased quadriceps strength by more than 25% from baseline (RR 1.00, 95% CI: 0.07 to 13.8, P>0.99). Furthermore, there were no differences in quadriceps strength at any of the predefined time points (Figure 1) or in sensory block (P>0.05). The only
statistically significant difference between volumes was found in the 30-second Chair-Stand test at 2 h (P=0.02), this difference had disappeared at 4 h (P=0.06).

**Conclusions:** Varying the local anesthetic volume in ACB between 10 and 30 ml had neither a statistically significant nor clinically relevant impact on quadriceps strength.

**ESRA1-0186**

Peripheral Nerve Blocks

**DOES CORRELATION BETWEEN ULTRASOUND-GUIDE PERIULAR BLOCK IMAGES AND REALITY EXIST?**

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**Background and aims:** Real-time ultrasound (US) visualisation during peribulbar anesthesia (PBA) has been recently introduced in order to improve the quality and safety of the block.

**Methods:** 4 PBAs in two fresh human cadaver heads were performed under US guidance using a microconvex 6C2s probe (Mindray M7). A 22mm Atkinson needle (27G Beaver-Visitec) was introduced in infero-lateral approach until its tip was seen on the posterior and lateral side of the eyeball. Then, a 5 ml mixture of local anesthetic (LA) and blue dye was injected. The spread of LA was located between the inferior rectus muscle and orbit bone (Fig. 1a). The same manoeuvre was performed with 3ml in the supero-medial approach. The spread was this time located between superior rectus muscle and bone (Fig. 1b). All the US images were documented.

**Results:** The anatomic slides (Fig.1c) showed similar dye distribution as US images. No contrast dye was found inside the orbital muscles, optic nerve or eyeball. However the existence of blue dye in other locations like intraconal, perineural, inside eyelids even in the maxillary sinus confirm the long way diffusion of LA.

**Conclusions:** There was a reliable and consistent relationship between the images obtained by PBA ultrasound-guided and the anatomic view in the cadaver heads.

**ESRA1-0165**

Peripheral Nerve Blocks

**EFFICACY OF PECS BLOCK FOR PERIOPERATIVE PAIN MANAGEMENT IN BREAST CANCER SURGERY**

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**Background and aims:** Recently, thoracic wall block, such as PECS block, was reported by Blanco and colleagues, whereas the efficacy of this procedure in the anesthesia for breast cancer surgery has been unclear. We surveyed the efficacy of PECS block as an anesthetic technique for breast cancer surgery with a retrospective chart review.

**Methods:** IRB approval was obtained. Breast cancer patients who underwent total or partial mastectomy under propofol-based general anesthesia (GA) at the Niigata University Medical and Dental Hospital from January 2013 to March 2014 were reviewed. Both PECS-I and PECS-II blocks were performed using a 20-gauge Tuohy needle under direct ultrasound-machine visualization as per Blanco’s method. Intraoperative narcotics consumption, postoperative pain score with numerical rating scale (0-10), postoperative NSAIDs consumption, and incidence of postoperative nausea during the first 48h after surgery were extracted from the anesthesia chart and medical record of each patient.

**Results:** We included 36 patients receiving only GA and 35 patients receiving both GA and PECS block in this survey. Intraoperative remifentanil requirements and postoperative pain scores were significantly less in the patients with PECS block than in the patients without PECS block (remifentanil (mean ± SD) mg/kg/h, 11.9 ± 6.4 vs 16.8 ± 7.8, respectively, P=0.006, postoperative pain score (median [range]), 1 [0-5] vs 2 [1-5], respectively, P=0.03). There was no difference between two groups in aspect of incidence of postoperative nausea and postoperative NSAIDs requirement.

Conclusions: This survey demonstrated that a PECS block effectively reduced requirement of intraoperative narcotics, although its role as a postoperative pain reliever might be limited.

**ESRA1-0159**

Peripheral Nerve Blocks

**PROSPECTIVE RANDOMIZED CLINICAL TRIAL COMPARING FEMORAL AND SCIATIC NERVE BLOCKS TO PERIARTICULAR INJECTION FOR PAIN MANAGEMENT AFTER TOTAL KNEE REPLACEMENT**

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**Background and aims:** This randomized clinical trial compared the outcome of two commonly used modalities: combined femoral and sciatic nerve block (peripheral nerve block, PNB) versus periaricular injection (periaricular injection, PAI), as part of a multimodal pain protocol following knee replacement.

**Methods:** The trial was approved by the Mayo Clinic IRB (10-003312) and registered on ClinicalTrials.gov (NCT01163214). 160 patients were randomized into two group: 1) PNB group (n=79) with an indwelling femoral nerve catheter and a single shot sciatic block or 2) PAI group (n=81) using ropivacaine, epinephrine, ketorolac, and morphine. All patients received general anesthesia and oral medications. The primary outcome was post-operative pain the afternoon of post-operative day 1 (POD 1). Secondary outcomes were narcotic use, length of stay, and peripheral nerve complications.

**Results:** Mean pain scores on POD 1 were similar between groups (PNB: 2.9, PAI group 3.0 (p=0.76). Mean pain scores taken at three times on POD 1 and patient satisfaction were also similar between groups. Hospital length of stay was significantly shorter for the PAI group (2.44 days vs 2.84 days p=0.02). Narcotic consumption was significantly higher the day of surgery for the PAI group (11.7 vs 4.6 mg Morphine equivalents p=0.001), but thereafter no difference. More patients in the PNB group had Peripheral nerve injury (dysesthesia) at 6 wk follow up (9 vs 1 p=0.009).

**Conclusions:** Patients receiving periaricular injections had similar pain scores, shorter lengths of stay, but greater narcotic use on the day of surgery compared to patients receiving peripheral nerve blocks.
ESRAI-0148
Peripheral Nerve Blocks

INTRAVENOUS DEXAMETHASONE IS AS EFFECTIVE AS PERINERVIOUS DEXAMETHASONE TO INCREASE THE DURATION OF INTERSCALENE BLOCK FOR AMBULATORY ARTHROSCOPIC SHOULDER SURGERY


Background and aims: This single center prospective study compares the duration and the effectiveness of an interscalene block (ISB) with perinervous dexamethasone or intravenous dexamethasone for shoulder surgery. This is a before-after study: a 1st period using intravenous dexamethasone, then a second period using intravenous dexamethasone (1).

Methods: The study was approved by the local ethic committee.

An ultrasound-guided ISB (30 ml of ropivacaine 0.375% plus clonidine 150μg) was performed for all patients. During the first period, 4 mg of dexamethasone was administered in the ISB solution. During the second period, intravenous dexamethasone (10 mg) was injected. No general anaesthesia was performed. The primary endpoint was the duration of sensory block. A secondary outcome was time for first tramadol taken.

Results: 230 patients were included (118 in the perinervous group, 112 in the intravenous group).

There was no significant difference in the duration of the nerve block in the 2 groups. Median [range] duration was 25 hours [17.5 - 41] in the perinervous group and 24 hours [13.5 - 60] in the intravenous group.

Figure 1 shows the Kaplan-Meier curves, not significantly different (p=0.22, HR=1.18, 95% confidence interval 0.90-1.53).

Median time for first tramadol taken was close in the 2 groups: 27 hours [17.5 - 37] in the perinervous group and 26 hours in the intravenous group [13.5 - 39].

Conclusions: 10 mg of intravenous dexamethasone is as effective as 4 mg of perinervous dexamethasone to prolong analgesia after an ISB with Ropivacaine 0.375% for an ambulatory shoulder arthroscopic procedure.

References


ESRAI-0129
Peripheral Nerve Blocks

THE HUNDRED AND ONE PECS II BLOCK: A BOOST EXPERIENCE, NOT A TALE

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Background and aims: Thanks to the incoming role of ultrasound, anesthesiologist start to perform new techniques of regional anesthesia also for breast surgery. PECS block is a technique developed in 2011, then modified (PECS II block, 2012) by Blanco. Like every thoracic wall block, it provides incomplete anesthesia, so it must be associated to sedation in spontaneous breathing, due to the complex innervation of breast.

Methods: From 10 November 2013 to 10 May 2014 we performed around one hundred PECS II blocks with a double injection under ultrasound guidance: in the first one we injected Leuobupivacaine 0.125% 10 ml between the major and minor pectoral muscles, in the second one we injected Leuobupivacaine 0.375% 20 ml on the plane of the serratus muscles above the 3th-4th ribs. During surgery we associated sedation with Fentanyl 100 mcg and Propol in TCI with a target concentration between 2-3 mcg/ml on the effector site. Paracetamole 1 gr was administered as starter antalgic dose.

Results: After surgery Patients woke up referring the absence of pain, in the postoperative period we reported VAS 0-2. Postoperative pain was controled by Paracetamolone 1 gr x3/die, but many Patients refused it. They were discharge in 2nd day P.O.; in the 10% they were discharge as outpatient.

Conclusions: In conclusion, PECS II block allowed the Patients to undergo breast surgery breathing by themselves, without recurring to general anesthetics, analgesic and its collateral. The use of regional anesthesia technique leads to consider some of them outpatient, whereas they’d be admitted to the Surgical Ward.

ESRAI-0114
Peripheral Nerve Blocks

FINE NEUROLOGIC ASSESSMENT TO DETECT SUBCLINICAL NEUROPATHY FOLLOWING UPPER EXTREMITY BRACHIAL PLEXUS BLOCKADE – A PROSPECTIVE STUDY

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Background and aims: Ultrasound guided brachial plexus blockades are commonly used for anesthesia in upper extremity surgical cases. Clinically evident neuropathy following nerve blocks is very rare. We used Semmes Weinstein monofilament testing; a fine evaluation of sensory alterations, to investigate whether perineural blocks cause post-operative subclinical neuropathy.

Methods: After IRB approval and informed consent, fifty-one patients undergoing brachial plexus blockade using ultrasound guided injection of Mepivacaine and Ropivcaine and subsequent upper extremity surgery were included prospectively. Patients undergoing nerve compression or repair were excluded. Semmes-Weinstein monofilament testing was performed pre-operatively on the operative and non-operative extremities. At the first follow-up visit, within two weeks of surgery, monofilament testing was repeated on both hands. Sensation was tested in seven different area encompassing the ulnar, median and radial nerve distributions. Pre- and post-operative monofilament testing scores were compared.

Results: A two-sided chi-squared analysis revealed no statistically significant difference in monofilament sensibility in any nerve or finger distribution when comparing the operative and non-operative extremity.

Conclusions: Brachial plexus blockade does not appear to result in subclinical neuropathy as measured by monofilament testing. It is a safe method of anesthesia for upper extremity surgery.
ESRA1-0101
Postoperative Pain Management
ANALGESIA FOR BREAST SURGERY: AN AUDIT OF THE ANALGESIC EFFICACY OF THE PARA-VERTEBRAL AND TWO LEVEL PECTORAL (PECS) BLOCK

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Background and aims: Recently the two level pectoral block and thoracic paravertebral block have been advocated for patients undergoing breast surgery. We evaluated their analgesic efficacy against conventional opioid analgesia with local anaesthetic infiltration, in the post-operative period.

Methods: 18 patients having major breast surgery under general anaesthesia had a regional block; 9 a PECS block, 9 a thoracic paravertebral block (ultrasound guidance, same anaesthetist, L- Bupivacaine, average dose 100 mg). 20 patients undergoing similar breast surgery with intravenous morphine and subcutaneous local anaesthetic infiltration were compared. The worst pain scores (0-10 NRS), need for rescue opioid analgesia, presence of post-operative nausea and vomiting were recorded in the post anaesthetic care unit and at 24 hours.

Results:

<table>
<thead>
<tr>
<th>Analgesia</th>
<th>Number</th>
<th>PECS Worst pain score in PACU (mean)</th>
<th>PONV in PACU (%)</th>
<th>Rescue opioid in PACU (%)</th>
<th>Worst pain score in 24 hours (mean)</th>
<th>PONV in first 24 hours (%)</th>
<th>Rescue opioid analgesia in first 24 hours (%)</th>
<th>Light touch (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PECS</td>
<td>9</td>
<td>2.2 (7-0)</td>
<td>3 (33.3%)</td>
<td>0.25 (2-0)</td>
<td>8 (0-0)</td>
<td>3 (11%)</td>
<td>3 (11%)</td>
<td>40 (40%)</td>
</tr>
<tr>
<td>Paravertebral</td>
<td>9</td>
<td>1.8 (6-0)</td>
<td>3 (33.3%)</td>
<td>0.5 (2-0)</td>
<td>1 (11%)</td>
<td>1 (11%)</td>
<td>1 (11%)</td>
<td>40 (40%)</td>
</tr>
<tr>
<td>IV Morphine (8.5mg)</td>
<td>20</td>
<td>3.2 (6-0)</td>
<td>7 (35.0%)</td>
<td>1.7 (0-0)</td>
<td>3 (15%)</td>
<td>3 (20%)</td>
<td>3 (20%)</td>
<td>40 (40%)</td>
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<td>and subcutaneous</td>
<td></td>
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<td>local anaesthetic</td>
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</table>

Conclusions: Regional analgesia is associated with significantly reduced post-operative pain. The paravertebral block has better initial pain scores, less need for rescue analgesia, but not after 24 hours. For less experienced practitioners, the ultrasound guided PECS block may be the better initial option. It is easier to perform and equally effective at 24 hours.

ESRA1-0085
Peripheral Nerve Blocks
INCIDENCE AND EFFECTS OF POSTOPERATIVE MIGRATION OF INTERSCALENE CATHETER TIPS PLACED WITH AN ULTRASOUND-GUIDED IN-PLANE POSTERIOR APPROACH: A PROSPECTIVE STUDY USING ULTRASOUND IMAGING

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Background and aims: Ultrasound imaging can help accurately place an interscalene catheter, which has made continuous interscalene brachial plexus block (CISB) increasingly popular these days. However, because of head and neck movement, the catheter may be susceptible to incidental dislodgement and migration, precluding CISB from working consistently. Although the ultrasound-guided posterior approach has theoretically good catheter fixation, little information is available on catheter tip migration. Accordingly, we used the ultrasound-guided posterior approach to place the catheters and then monitored the tip position of the catheters using ultrasound for two postoperative days to observe incidences of migration and effects of this migration on the analgesic effect of CISB in patients undergoing shoulder surgery.

Methods: With IRB approval and informed consent, we studied 25 patients (ASA I-II) undergoing arthroscopic shoulder surgery. Patients received CISB for at least 48 h with an ultrasound-guided posterior interscalene catheter, which was secured with topical skin adhesive and transparent tape. Measurements included sensory and motor testing, visual analogue pain scores (VAS), and ultrasound observations of the catheter tip before and immediately after, as well as at 24 h and 48 h after surgery.

Results: Six patients were excluded from this study due to catheter insertion length change or occlusion, or poor ultrasound images. Catheter tip migration was detected in 8 patients (42.1%) during 48 h. Patients with catheter tip migration showed significantly higher VAS at 24 h and 48h.

Conclusions: An interscalene catheter tip can migrate postoperatively without its length change in shoulder surgery patients. This migration decreases the analgesic effect of CISB.
ESRA1-0058
Postoperative Pain Management

ULTRASOUND GUIDED BILATERAL CERVICAL PLEXUS BLOCK REDUCES POSTOPERATIVE OPIOID CONSUMPTION FOLLOWING THYROID SURGERY

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Background and aims: Thyroid surgery may cause severe postoperative pain and discomfort for patients. Superficial cervical plexus block (SCPB) is one of the regional anesthesia techniques that can provide postoperative analgesia for thyroid surgery. The purpose of this study was to evaluate analgesic effect of ultrasound (US) guided SCPB in patients undergoing thyroid surgery.

Methods: After obtaining ethical committee approval and written informed patients’ consent, 50 ASA I-II patients, aged 20-65 were included into the study. In a randomized and prospective manner patients were allocated to either SCPB or control group. Bilateral SCPB was performed preoperatively under US guidance using 10 ml 0.25% bupivacaine for each side. Postoperative analgesia was provided with patient-controlled analgesia method with morphine intravenous.

Primary outcome measure was postoperative opioid consumption and analyzed using Mann Whitney U test.

Results: Postoperative morphine consumption was lower in SCPB group compared to control group at postoperative 6th, 12th, and 24th hours (P<0.05). Eight patients in the control group and 6 patients in the SCPB group had vomiting. Seven patients in the SCPB and none in the control group had hoarseness.

Conclusions: Our study has shown that US guided SCPB has a significant analgesic effect in patients undergoing thyroid surgery. Further studies are required to search for the optimal LA dose during US guided SCPB.

ESRA1-0053
Pediatric

REGIONAL ANESTHESIA IN PEDIATRIC PATIENTS WITH EPIDERMOLYSIS BULLOSA PRESENTING FOR COMPLEX HAND SURGERY: FEASIBILITY, EFFECTIVENESS AND SAFETY OF AXILLARY PLEXUS BLOCKADE

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Background and aims: In patients suffering from epidermolysis bullosa (EB) trauma or friction cause separation of the skin from underlying tissue with consecutive painful blisters, scarifications, contractures, and mutilations. To retain functionality of the hands surgical procedures are necessary. Anesthesia is challenging since difficult airways make general anesthesia risky. Regional anesthesia was long deemed contraindicated in EB since accidental subcutaneous injections can cause severe blisters. In this case series we describe feasibility, effectiveness and safety of ultrasound guided plexus axillaris block in EB-patients undergoing hand surgery.

Methods: We performed a retrospective analysis of the charts of all children with EB undergoing hand surgery under plexus axillaris block and sedation between 2009 and 2013 in our institution and evaluated the feasibility, effectiveness and safety of axillary plexus blockade.

Results: 19 procedures in 9 children were performed (age [years]: 10 [7.3/15.5], weight [kg]: 33 [23/38], height [cm] 141 [124/154], BMI [kg/m2]: 16.5 [12.99/19.53]). Induction of anesthesia (securing monitoring, sedation, plexus block) took in mean 34 minutes. Perioperative analgesia was adequate in all procedures. No complications such as airway incidents, conversion to general anesthesia, movement during surgery, incomplete block, nor formation of new blisters were seen.

Conclusions: Ultrasound guided plexus axillaris block in pediatric EB-patients undergoing hand surgery is feasible, effective and safe.

ESRA1-0022
Peripheral Nerve Blocks

CAN THE CHOICE OF LOCAL ANESTHETIC AFFECT PERIOPERATIVE PROCESS COSTS IN ORTHOPEDIC AMBULATORY SURGERY? CHLORPROCAINE FOR PERIPHERAL NERVE BLOCKS.

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Background and aims: Short acting regional anesthesia have been successfully employed in peripheral nerve blocks in an ambulatory surgery setting; however their economical impact has never been assessed. Aim of this study is to quantify the saving in perioperative costs determined by the use of chlorprocaine 3% for popliteal block in patients undergoing ambulatory orthopedic foot surgery.

Methods: This case-control prospective observational study compares two consecutive cohorts of adult patients, scheduled for less than one hour long ambulatory forefoot orthopedic surgery procedures under popliteal block either with mepivacaine 1.5% or chlorprocaine 3%. A cost-minimization evaluation was applied to estimate costs related to material and personnel.

Results:

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Chloroprocaine</th>
<th>Mepivacaine</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory block onset (min, SD)</td>
<td>4.50 (2.59)</td>
<td>11.52 (3.03)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Motor block onset (min, SD)</td>
<td>7.06 (2.58)</td>
<td>18.32 (4.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sensory block duration (min, SD)</td>
<td>104.0 (25.57)</td>
<td>316.53 (45.02)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Motor block duration (min, SD)</td>
<td>90.74 (24.99)</td>
<td>215.7 (32.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Unscheduled ambulatory visits (%)</td>
<td>0</td>
<td>2.13</td>
<td>0.310</td>
</tr>
<tr>
<td>Length of stay (min, SD)</td>
<td>55.25 (15.2)</td>
<td>175.15 (22.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Perioperative costs (USD, SD)</td>
<td>338.4 (93.1)</td>
<td>1076.6 (137.8)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Conclusions: To our knowledge this is the first study to demonstrate that the choice of the local anesthetic drug can significantly impact hospital costs in patients undergoing ambulatory orthopedic surgery. In particular, the use of chlorprocaine for short (less than 1 hour) procedures was as effective as mepivacaine, but associated to a significantly quicker onset and a shorter motor block duration, allowing for a more rapid discharge home and a reduction in costs.
Abstracts and Highlight Papers of the 33rd Annual European Society of Regional Anaesthesia & Pain Therapy (ESRA) Congress 2014: ePoster Discussion

ESRA1-0010
Peripheral Nerve Blocks

INTRODUCING A STANDARDISED REGIONAL ANAESTHESIA RECORD FORM FOR CATARACT SURGERY
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Background and aims: Cataract surgery is the commonest ophthalmic surgical procedure and >90% are performed under regional anaesthesia (RA) without sedation[1].

To comply with clinical audit, governance, and for patient safety, record keeping must be comprehensive, clear and unambiguous[1].

Currently there is no ‘gold standard’ for RA documentation [2].

We audited the current practice of RA documentation for cataract surgery in our hospital and designed/introduced a standardised record form based on recent royal college guidelines [1].

Methods: We reviewed RA documentation of patients who had undergone cataract surgery over a two-week period. A standardised form was designed/introduced, and documentation practice was re-audited over two-weeks.

Results: 50 anaesthetic charts were analysed initially, followed by 50 charts in the re-audit.

Asepsis was recorded in 70% before versus 100% after new forms were introduced. Entry site of needle was recorded in 34% versus 80% while record of needle type/length was recorded in 2% versus 94%. 100% documentation of the volume/concentration of lignocaine used was observed before and after the new forms. Hyaluronidase use/dose was recorded in 86% versus 100% while sedation or lack of it was recorded in 6% versus 100%.

Finally, quality of the block was recorded in 70% versus 92% while complications or lack of it was recorded in 34% versus 100% following introduction of new forms.

Conclusions: The initial audit demonstrated the variable extent of documentation, which may be indirectly seen as a poor standard of anaesthetic care[3].

There was a vast improvement in documentation following the introduction of a standardised form.

ESRA1-0012
Pediatric

EFFECTS OF DEXMEDETOMIDINE ADDED TO CAUDAL BUPIVACAINE ON POSTOPERATIVE ANALGESIA AND STRESS RESPONSE IN PEDIATRIC LOWER ABDOMINAL SURGERIES
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Background and aims: This study investigated the efficacy of caudal dexmedetomidine added to bupivacaine on postoperative pain relief and stress response in pediatric lower abdominal surgeries.

Methods: This study was done after hospital ethical committee approval and informed written consent from the parents. In a randomized, prospective study, 100 children were recruited and allocated into two groups in a double-blinded study. After sevoflurane inhalational induction, an appropriate size LMA was inserted. All patients received a single caudal dose of bupivacaine 0.25% (1 ml/kg) combined with either dexmedetomidine 2 µg/kg in normal saline 1 ml in group Dexmedetomidine, or corresponding volume of normal saline in group Bupivacaine. Postoperative pain score, time to first request of analgesia, analgesic consumption and adverse effects were recorded for 24 hours. Behavior during emergence was rated with a 5-point scale. Blood samples were withdrawn before induction of sevoflurane anesthesia and at 1 hour after the end of surgery for measurement of blood cortisol level.

Results: The duration of postoperative analgesia was significantly longer in group Dexmedetomidine compared to group Bupivacaine. Postoperative fentanyl consumption was significantly higher in group Bupivacaine compared to group Dexmedetomidine. There was higher incidence of postoperative emergence agitation in group Bupivacaine compared to group Dexmedetomidine. Postoperative serum cortisol level was significantly higher in both groups, but in group Bupivacaine the level was significantly higher compared to group Dexmedetomidine.

Conclusions: Caudal dexmedetomidine with bupivacaine improves postoperative analgesia, reduces incidence of emergence agitation and decreases the stress response in pediatric lower abdominal surgeries.

ESRA1-0015
Case Reports

NEUROTOXIC EFFECTS OF ELEVATED CSF ASPARTIC AND GLUTAMIC ACIDS IN CEREBRAL MALARIAL PATIENTS
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Background and aims: Cerebral malaria (CM) is the most serious and life-threatening complication of malaria, caused by plasmodium falciparum. To know the significance of excitatory amino acids, the Aspartic acid (Asp) and the Glutamic acid (Glu) in causing neurotoxic effects, we analyzed their levels in the CSF of cerebral malarial patients.

Methods: We developed a High-performance liquid chromatographic method, based on a precolumn derivatization with o-phthalaldehyde to quantitate levels of those amino acids.

Results: In comparison to the control subjects, the levels of both amino acids (Asp and Glu) were found to be highly elevated in cerebral malarial patients.

Conclusions: The patients showed aggravating neurogenic signs and symptoms. The significant elevation reflects the neurotoxic effects of these amino acids in cerebral malarial patients.

ESRA1-0028
Obstetric

CRYSTALLOID VERSUS COLLOID COLOAD WITH PHENYLEPHRINE INFUSION DURING SPINAL ANAESTHESIA FOR ELECTIVE CAESAREAN DELIVERY: THE EFFECTS ON MATERNAL HAEMODYNAMICS AND FOETAL ACID-BASE STATUS
Rewari V.1, Singhal D.1, Ramachandran R.1, Trikha A.1, Chandrakala 1, Singh N.2.1 Anaesthesiology, All India Institute of Medical Sciences, New Delhi, India. 2Obstetrics and Gynaecology, All India Institute of Medical Sciences, New Delhi, India.

Background and aims: We designed a double-blind randomized controlled study to compare the effects of crystalloid versus colloid coload in combination with a prophylactic phenylephrine infusion. The primary outcome was the incidence of maternal hypotension. The secondary outcomes were incidence of reactive hypotension, bradycardia, nausea and vomiting, umbilical artery and vein gas analysis and neonatal Apgar score at 1 and 5 minutes.
Methods: 60 ASA physical status I and II parturients with singleton pregnancies scheduled for elective caesarean delivery under spinal anaesthesia were recruited in this study. Group A patients received coload with 500 ml of lactated Ringer’s solution whereas Group B patients received 500 ml of 6% Hydroxyethyl Starch solution at the start of spinal injection and infused within 5–7 minutes. The phenylephrine infusion was started simultaneously in a dose of 1 ml/min (50 µg/min) and was either on or off according to BP and HR measurements at 1-minute intervals till the uterine incision.

Results: Maternal demographics, surgical times, foetal acid base status and Apgar scores were similar between groups. The incidence of maternal hypotension was 20% in Group A and 10% in Group B (P > 0.05). The incidence of bradycardia was more in Group A (6.6% VS 0%, P < 0.05). The episodes of reactive hypertension, maximal and minimal recorded SBP and total dose of phenylephrine required did not differ statistically between the two groups (P > 0.05).

Conclusions: Crystalloid or colloid infusion, administered as coload in a volume of 500 ml along with a prophylactic phenylephrine infusion shows no difference in the incidence and severity of hypotension with similar neonatal outcome.

ESRA1-0029
Chronic Pain Management

AN AUDIT OF PATIENT SATISFACTION WITH SPINAL CORD STIMULATION

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Background and aims: Chronic pain is common, with an estimated prevalence of 1–1.5%. Symptoms include shooting or burning pain, allodynia and hyperalgesia. Spinal cord stimulation (SCS) is a type of neuromodulation used for the treatment of chronic pain. Neurostimulation alters the activity of a nerve as a result of electrical or pharmacological stimulation. SCS is based on the gate-control theory of pain but it is believed that endogenous inhibitory pathways, neurotransmitters and the autonomic nervous system may also be involved.

Methods: We analyzed all patients who had a spinal cord stimulator implanted at Beaumont Hospital in Dublin, Ireland. This involved review of the patient’s medical record and a telephone questionnaire. Only patients known to be actively using the device were contacted. Parameters evaluated included: - Demographics - Indication for SCS - Symptoms duration - Reduction in VAS - Analgesia requirement - Performance of activities of daily living - Mood - Employment status - Ease of use - Infection rate - Would they recommend the SCS? - Would they have the SCS again? - Overall satisfaction rating

Results: N = 72
Average age 54 years.
Indications were FBSS (46%) and CRPS (19%).
60% of patients currently using SCS VAS scores reduced by > 50% in 63% of patients.
Opiate consumption reduced in 72%.
Improved ability to perform ADLs was reported in 93% 19% returned work.
Satisfaction rating greater than 70% in 67% of patients

Conclusions: SCS appears to be an effective method for the treatment of chronic pain. Patient satisfaction rates with the device are high.
Background and aims: Multidisciplinary treatment is recommended to treat chronic low back pain (LBP). The aim of the present study was to show the associations among multidisciplinary treatment outcomes, pretreatment psychological factors, self-reported pain levels and history of pain in chronic LBP patients.

Methods: A total of 221 new chronic LBP patients were chosen for the study. The pretreatment scores of 10-cm Visual Analogue Scale (VAS), Hospital Anxiety and Depression Scale (HADS), Pain Catastrophizing Scale (PCS), Short-Form McGill Pain Questionnaire (SF-MPQ), Pain Disability Assessment Scale (PDAS), pain-drawings and history of pain were extracted from medical records. The patients were divided into two treatment outcome groups a year later: a good outcome group, for patients whose pain level in the VAS decreased by at least 50% compared with pre-treatment and; a poor outcome group for patients who did not. Pretreatment scores between the two outcome groups were then compared.

Results: Scores of VAS, PDAS, the affective subscale of SF-MPQ, and non-organic pain-drawings in the good outcome group were significantly lower than those in the poor outcome group. Duration of pain in the good outcome group was significantly shorter than in the poor outcome group. The patients who claimed that their pain was becoming progressively worse for days had poorer outcomes.

Conclusions: These findings have helped us better predict the efficacy of multidisciplinary treatment in chronic LBP patients.

Results: Serum lignocaine concentrations did not exceed safe levels. VAS scores were 0/10 at all measurements until discharge, and after discharge via telephone follow up.

Serum lignocaine plotted versus time after performance of transversus abdominis plane block. (Therapeutic range as antihyperthmic 1.5–5mg/L).

Conclusions: Hyaluronidase may improve the efficacy of subcostal transversus abdominis plane (TAP) blocks.

In this case study, serum lignocaine concentrations were comparable to previous studies of lignocaine levels without hyaluronidase.

Addition of hyaluronidase to local anaesthetic TAP blocks may present an important alternative to opioid-based analgesia for postoperative laparoscopic cholecystectomy.

ESRA1-0055
Peripheral Nerve Blocks
THE MODULATING EFFECT OF THE ADJUVANTS CLONIDINE AND EPINEPHRINE ON THE INFLAMMATORY RESPONSE CAUSED BY INTRANEURAL BUPIVACAINE INJECTIONS
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Background and aims: Intraneural as well as perineural injected local anesthetics are known to produce a relevant inflammation which might be the link to adverse neuropathic sequelae after performing nerve blocks. Adjuncts are widely used in regional anesthesia to enhance block time or reduce amount of local anesthetics. However, their influence on neuroinflammation is poorly understood.

Methods: Intraneural injection was performed in twelve anesthesized pigs to a total of 64 axillary brachial nerves and 18 tibial nerves. Either 1ml of Bupivacaine 0.5% alone or in combination with Epinephrine 1:100.000 or Clonidine (3.75μg/ml) or saline solution were injected intraneural with a 30G canulae. After 48 hours of maintaining general anesthesia, nerves including negative and positive controls were excised and underwent subsequently histological examination. Signs of inflammation, intraneural hematoma and myelin damage caused by the trauma were evaluated using an established histological score ranging from 0 (no lesion) to 4 (severe lesion). Experiments were permitted by local authorities.

Results: Statistical analysis showed a mild inflammation after injection of plain bupivacaine (score median 25th–75th IQR) 1(1–2)) that does not differ significantly from Bupivacaine with Epinephrine (score 2(1–2), p<0.51) or Bupivacaine with Clonidine (score 1 (1–2), p<0.37). Ligation of the nerve (positive control) caused a relevant inflammation (score 4(4–4, p=0.001) whereas intraneural saline injection caused only mild inflammatory response (score 0.5 (0–1), p<0.007).

Conclusions: In our experimental animal model, the addition of epinephrine or clonidine has no relevant modulating effect on the local inflammation caused by the local anesthetic bupivacaine.

ESRA1-0057
Case Reports
MIGRATION OF A CAUDALLY INSERTED EPIDURAL CATHETER INTO PRESCRAL AREA

Background and aims: Thoracic epidural anaesthesia via caudal route in infants is described in literature as early as 1988. This is a case report of a 3 month old baby boy of 4.34 kilograms who underwent a Duhamel pull through for Hirschprung’s disease. The surgery was planned as an elective procedure under general anaesthesia and with a caudal epidural.
ESRA1-0073

Peripheral Nerve Blocks

FASCIA ILIACA BLOCKS IN FRACTURED NECK OF FEMUR: AN OPIOID SPARING ADJUNCT?

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Background and aims: Fascia iliaca blocks (FIB) have been used as an opioid sparing technique for fractured neck of femur (NoF) repair. At East Surrey FIBs are routinely combined with general anaesthesia, whilst at Tunbridge Wells a single shot spinal (SSS) is preferred. We conducted a retrospective survey evaluating postoperative opioid consumption following these contrasting techniques.

Methods: The anaesthetic and drug charts of fracture NoF patients between March-July 2013 were examined. Opiate consumption during the immediate 48-hour postoperative period was recorded. Opiate consumed was calculated in oral morphine equivalent (OME), where 1mg of oral morphine equated to: 10mg codeine, 5mg tramadol and 0.5mg oxycodone orally, and 0.5mg SC/IV/IM morphine.

Results: 104 patients were surveyed. 40 patients underwent combined general anaesthesia with FIB, and 46 SSS. 18 patients were excluded: 9 received alternative anaesthetic techniques, 5 were on long-term opioid patches, in 2 individuals data was incomplete, and 2 died postoperatively within 48-hours. The OME was (Fig 1):

<table>
<thead>
<tr>
<th></th>
<th>1st 24 hours post op</th>
<th>2nd 24 hours post op</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA and FIB</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Spinal</td>
<td>14</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 1: Non-cumulative equivalent oral morphine consumption (mg) by intraoperative anaesthetic technique

FIGURE 1.

Conclusions: FIB augmented general anaesthesia appears to be opiate sparing compared to SSS within the 48-hour follow up period. A potential weakness of our survey is the variation in intra-operative opioid used intrathecally or intravenously, however the influence on postoperative opioid consumption, particularly in the second 24-hour period is likely to be minimal.

ESRA1-0074

Chronic Pain Management

RADIATION EXPOSURE OF THE EYE AND THYROID DURING FLUOROSCOPY-GUIDED CERVICAL EPIDURAL STEROID INJECTIONS

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Background and aims: Cervical epidural block requires frequent x-ray imaging and the operator performing the procedure is susceptible to frequent and high doses of radiation compared to other procedures. We evaluated the radiation exposure to the head of pain physicians when performing cervical epidural block.

Methods: The study was conducted on two pain physician who performed C-arm fluoroscopy-guide cervical epidural block. Among total of 6 dosimeters, 5 dosimeters were placed on the forehead, inside and outside of the thyroid protector, and inside and outside of the lead apron. A control dosimeter was placed in the procedure room. The dosimeters on the forehead and thyroid represented radiation exposure to the eyes and thyroid respectively. Also, age, sex, height, weight of patients and radiation exposure time, absorbed dose, distance from the center of the X-ray field to the physicians.

Results: There were no significant differences in the demographic datas and radiation related data among two physicians (Table 1). Only distance from the center of the X-ray field to the physicians showed significant difference, statistically (P=0.03). The level of radiation measured on the dosimeters were also no significant difference (Table 2).

Conclusions: This study reveals radiation exposure level of eyes and thyroid is far below the annual maximum permissible radiation doses.

<table>
<thead>
<tr>
<th>Physician</th>
<th>1</th>
<th>2</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>51</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>56.64 ± 12.40</td>
<td>53.25 ± 14.38</td>
<td>0.94</td>
</tr>
<tr>
<td>Sex (Male/Female)</td>
<td>17/13</td>
<td>17/13</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>163.02 ± 7.90</td>
<td>167.35 ± 2.763</td>
<td>0.14</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>63.05 ± 12.66</td>
<td>70.28 ± 6.79</td>
<td>0.19</td>
</tr>
<tr>
<td>Total time/procedure (min)</td>
<td>13.39 ± 1.70</td>
<td>10.64 ± 2.90</td>
<td>0.37</td>
</tr>
<tr>
<td>Time of radiation exposure/procedure (sec)</td>
<td>22.96 ± 8.83</td>
<td>18.75 ± 3.20</td>
<td>0.24</td>
</tr>
<tr>
<td>Total time/procedure (min)</td>
<td>13.39 ± 1.70</td>
<td>10.64 ± 2.90</td>
<td>0.37</td>
</tr>
<tr>
<td>Time of radiation exposure/procedure (sec)</td>
<td>22.96 ± 8.83</td>
<td>18.75 ± 3.20</td>
<td>0.24</td>
</tr>
<tr>
<td>Distance (cm)</td>
<td>37.5 ± 2.04</td>
<td>41.5 ± 4.68</td>
<td>0.03</td>
</tr>
</tbody>
</table>

FIGURE 1.

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Peripheral Nerve Blocks

CURRENT STANDARD OF CONSENT AND DOCUMENTATION OF INTERSCALENE AND SUPRACLAVICULAR NERVE BLOCKS: A SURVEY OF ANAESTHETISTS IN SCOTLAND

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Background and aims: 3 key elements of the General Medical Council guidelines on consent for medical procedures are:
- Clinicians should discuss any possible significant adverse outcomes including the possibility of the intervention failing
- Key elements of that discussion should be recorded
- Written information on the procedure should be available to patients

The aim of this survey was to compare current practice with these published guidelines.

Methods: An online questionnaire was sent to all anaesthetic departments in Scotland which provide anaesthesia for orthopaedic surgery.

Results: 161 anaesthetists completed the questionnaire (response rate ~14%). 91 (57%) were consultants. 15% of respondents stated that written information on nerve blocks was given to patients prior to surgery.

Conclusions: There is significant variation in individual anaesthetic practice when discussing and documenting risk. Many anaesthetists consider it inappropriate to unduly worry patients on the day of surgery, giving patients written information at preassessment may circumvent this issue.

An example of a patient information leaflet is available on the Royal College of Anaesthetists website.

http://www.rcoa.ac.uk/document-store/brachial-plexus-block-arm-hand-or-shoulder-surgery

FIGURE 1.

FIGURE 2.

ESRA1-0081
Central Nerve Blocks

ESTIMATION OF MINIMUM DOSE OF BUPIVACAINE IN DAY-SURGERY PATIENTS UNDERGOING HERNIORRAPHY UNDER SPINAL ANESTHESIA

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Background and aims: The aim of the study was to find minimal effective dose of spinal hyperbaric bupivacaine (ED50) which is also referred to as the minimum local anesthetic dose; in order to reduce the duration and cost of hospitalization and resume quickly the daily life activities.

Methods: In this prospective, up–down sequential allocation study, we enrolled 20 patients undergoing herniorrhaphy under spinal anesthesia. Patients received intrathecal hyperbaric bupivacaine 0.5% coadministered with 25 gamma fentanyl. The dose of local anesthetic was varied using up-down sequential allocation technique. The dose for the first patient was 7.5 mg, and the dosing variation was set at 0.5 mg. Subsequent dose were determined by the outcome in the previous patient using success or failure of the spinal anesthesia as the primary end point. A success was recorded if the surgery proceeded successfully after the intrathecal injection without supplementary analgesia. The median effective dose of Bupivacaine was calculated.

Results: The calculated ED50 of hyperbaric bupivacaine was 7.41 (95% confidence interval: 7.06–7.77) mg. The median upper limit of the sensory block was T5, recovery of motor function took place in 133±27min, Recovery of sensory function was 194±67min. Time to start walking was 233(155–315) min. Up to now, no one needed to be catheterized because of their inability to pass urine. All outpatient were discharged home as planned, and none of the study patients were readmitted to the hospital.

Conclusions: A low dose of bupivacaine allow safe ambulatory herniorrhaphy under spinal anesthesia; reducing the level of recovery of daily life activities without analgesic consumption increase.

ESRA1-0083
Chronic Pain Management

PREVENTING THE DEVELOPMENT OF POSTOPERATIVE CHRONIC PAIN WITH TEBANTIN: EFFICIENCY

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Background and aims: Chronic pain after surgery (postoperative chronic pain - PCP) is a significant problem. According to some studies, preoperative use of Tebantin reduces pain intensity postoperatively. Nevertheless, researches of prevention of PCP are fewer.

The aim is to study the possible prevention of PCP by Tebantin.

Methods: A prospective, double-blind, case-control randomized study has been carried out. 145 patients (44.8% female, 55.2% male) at age 49,±14,5, who underwent cholecystectomy, hernioplasty, venectomy, appendectomy, are randomized into 2 groups. Patients of the first group (n = 57) have received Tebantin 300 mg per os in 2 hours after exubation, further twice by 8 hour
interval in the same dose. Second (control) group patients (n=88) were given placebo in appropriate schedule. Pain occurrence was assessed by phone in subsequent 1, 3, 6 months using questionnaire (QN4). The t-test was used for statistical analysis.

Results: The PCP was recognized after 1 month in 19.3% and 13.6% in the first and control groups, respectively. In 3 months PCP existed in 10.5% patients of the first group and 10.2% in control. These results didn’t change after six months. There is no significant difference between the results of the two groups after 1 (differ 5.7%, t = 0.9, P>0.05) and 3 or 6 (differ 0.3%, t = 0.06, P>0.05) months.

Conclusions: Tebantin in dose of 900 mg/day isn’t effective for PCP prevention after cholectectomy, hernioplasty, venectomy and appendectomy.

ESRA1-0084 Obstetric

EPIDURAL COMPLICATIONS- DOES IT MATTER HOW MANY ATTEMPTS WE HAVE?

AL-SHATHER H.1, Thurlow J.1. Anaesthetic, Musgrove Park hospital, Taunton, United Kingdom.

Background and aims: There are many potentially serious complications that can occur after regional anaesthesia. It is known that rates vary between novices or ‘difficult-epidurals’ and good technique and supervision.

Does increasing the number of attempts increase these complications? If so, should we limit how many times we try epidural insertion?

Methods: We collected data on epidural insertions in labour over a 5-year period in our unit. We looked at who was inserting the epidural, how many attempts, and documented initial complications. Follow-up data was also collected.

Results: 2122 epidurals were inserted. 82.5% were inserted by trainee, 9.3% by staff-grades and 8.2% by consultants. 73.6% of epidurals were inserted at first attempt, 19% at second, 5.9% at third, 1.2% at forth and 0.9% at fifth or more attempts. There was no significant difference in number of attempts and grade of anaesthetist. Unsurprisingly difficulties were noted with increased insertion attempts. Maternal satisfaction revealed 59% of epidurals were very-good and 29% good. Increased attempts did not alter the block quality. There were no immediate complications in 86%. There was an overall 5.6% bloody-tap rate, 8% parasthesia rate and 0.8% dural-tap rate. There were no known long-term neurological complications. As the number of epidural insertion attempts increased, immediate insertion complications increased as detailed below.

Conclusions: For anaesthetists to gain informed consent for epidural insertion, various risks and complications are discussed. Our audit shows these risks may vary with increased number of epidural attempts. This should be borne in mind when obtaining informed consent especially when an epidural is predicted to be a challenge.

ESRA1-0087 Peripheral Nerve Blocks

SURVEY OF EDUCATION PRACTICES FOR REGIONAL BLOCK TECHNIQUES IN A UK UNIVERSITY TEACHING HOSPITAL

Chazapis M.1, Kaur N.1, West S.1, Kamming D.1. Anaesthetics, University College Hospital, London, United Kingdom.

Background and aims: Recent years have led to an unprecedented and daunting increase in the availability of educational materials for anaesthesia and medicine in general. The aim was to survey anaesthetist’s primary information source for regional anaesthesia while at work and at home.

Methods: A questionnaire was produced asking participants to rank their preferred source of information for regional anaesthesia when at home, and when at work. The five options were: Book, Internet Search, Colleague, Journal and Course materials.

Results: Forty anaesthetists responded to the questionnaire. When at home, the primary information source was an internet search (n=30, 75%). Of this, 53% (n=16) use the NYSORA website, 30% (n=9) use a Google search, and the remainder 16.7% (n=5) a You-tube search. The secondary choice at home was Books (n=8). At work, Internet search remains the primary source for 62.5% (n=25), being an even split between NYSORA and a Google / You-tube search. However, the secondary choice was discussion with Colleagues (37.5%, n=15).

Conclusions: Internet searches are the primary source of information for regional anaesthesia when at home and at work. This is split between the well-regarded NYSORA website and just generic Google searches. We are concerned about the quality of information available, and we will assess this in future work.

ESRA1-0088 Miscellaneous

WHO IS THE ANAESTHETIST? A PATIENT SURVEY

Chazapis M.1, Patel J.1, Kaur N.1, Anaesthetics, University College Hospital, London, United Kingdom.

Background and aims: Anaesthetists are highly trained peri-operative physicians. However, patients remain relatively unaware of the anaesthetist’s role within and outside the operating theatre despite efforts by professional bodies worldwide [1]. We present results of a survey of current patient’s understanding on the role of anaesthetists.

Methods: In a UK university teaching hospital, we surveyed patients admitted for elective surgical procedures, before their operations, over a period of two weeks.

Results: 134 patients responded to the survey. 92% of patients with previous anaesthetic experience stated that they understood the role of the anaesthetist,
but only 73% were able to provide an adequate description. 80% of patients presenting for their first operation, stated they understood the role of the anaesthetist, but only 50% were able to give an adequate description.

In both groups, most patients recognized that the anaesthetist is present throughout the operation. 55% of patients who had no prior experience of anaesthesia did not know that anaesthetists were doctors. 20% of patients were unaware that anaesthetists have a role outside the operating theatre.

Conclusions: Nearly half of patients could not give an adequate description of the role of anaesthetists. We will produce a patient information leaflet describing our roles, and distribute it in the pre-assessment clinic.

Reference:

FIGURE 1.

Conclusions: This study demonstrated intrathecal prilocaine was a better alternative to bupivacaine for spinal anaesthesia in endoscopic urological surgery due to faster onset and resolution of motor and sensory block together with greater haemodynamic stability.

ESRA1-0093
Peripheral Nerve Blocks

EFFECTIVENESS OF A MULTI-HOLE CATHETER FOR CONTINUOUS OBLIQUE SUBCOSTAL TRANSVERSUS ABDOMINIS PLANE BLOCK: A RETROSPECTIVE COMPARATIVE STUDY
Yoshida T.1, Furutani K.1, Baba H.1, 1Division of Anesthesiology, Niigata University Graduate School of Medical and Dental Sciences, Niigata-city, Japan.

Background and aims: We hypothesized that continuous oblique subcostal transversus abdominis plane (TAP) blocks using multi-hole catheters would provide superior analgesia after laparotomy because of a wider infiltration of anaesthetic than provided by epidural catheters.

Methods: The Research Ethics Committee at our institute approved this study. This retrospective, comparative study included 2 groups of patients who were administered bilateral continuous subcostal subcutaneous TAP blocks using either epidural (10 patients with 20 catheters, E group) or multi-hole (10 patients with 20 catheters, M group) catheters after gynaecological cancer surgery. The epidural catheter included 3 holes around the tip, while the multi-hole catheter included 8 holes within 15 cm of the tip. All patients received 0.1% ropivacaine through each TAP catheter at 10 mL/h, combined postoperatively with patient-controlled intravenous morphine. Postoperative morphine consumption and anaesthetised dermatome distribution were assessed. A p value < 0.05 was considered statistically significant.

Results: Cumulative morphine consumption (mean [SD] mg/kg) 24 h after surgery was higher in the M group (0.45 [0.28]) than in the E group (0.23 [0.17]) (p < 0.05). The median (range) of anaesthetized dermatomes per catheter 24 h after surgery was 2.5 (0–6) in the M group and 2 (1–3) in the E group (p = 0.22). Dermatomes of the upper abdominal wall were anaesthetized more frequently in the M group than the E group.

Conclusions: Contrary to our expectations, administration of bilateral continuous oblique subcostal TAP blocks with multi-hole catheters increased post-laparotomy morphine consumption compared to epidural catheter administration.

ESRA1-0094
Case Reports

ULTRASOUND GUIDED DEEP PERONEAL NERVE BLOCK FOR METATARSALGIA
Bangalore Puttappa A.1, Alister Joseph A.2, Sheshadri K.1, Harmon D.1. 1Anaesthesiology and pain medicine, University Hospital Limerick, Limerick, Ireland, 2Anaesthesiology and pain medicine, Midlmemore hospital & Mannkau Super Clinic, Auckland, New Zealand.

Background and aims: Metatarsalgia is a common cause of forefoot pain involving plantar aspects of second through to fourth metatarsal heads. Conservative management includes medications, modifying footwear and physical therapy. Surgery may be warranted with the inherent risk of non-union.
or mal-union. Deep peroneal nerve supplies metatarsophalangeal joints of the great toe and the middle three toes. Deep peroneal neurectomy is reported to be effective for midfoot and tarsometatarsal arthrosis. We propose that deep peroneal block may be an effective alternative in selected patients with metatarsalgia.

**Background and aims:** Crash Trolleys are vital for providing basic and advanced life support. Poorly stocked Crash Trolleys can increase morbidity and mortality, and in addition, increase stress levels in an already difficult situation. Therefore, the Resuscitation Council UK recommended that the responsible Clinical Team must check the resuscitation equipment on Crash Trolleys daily. We aimed to perform a Quality Improvement project to identify the accuracy of these daily checks and make changes to improve results.

**Methods:** 5 Nurses and 5 Health Care Assistants (HCA) were assessed in their accuracy of marking the checklist. Several alternative items that were not on the checklist were placed in the Crash Trolleys. We produced a new checklist with pictures next to the item name and repeated the assessments. Comparisons in accuracy between using a checklist with no pictures, with one containing pictures, were made.

**Results:** The Crash Trolley checklists differed throughout the wards; 2 wards had out-of-date lists that were not compliant with current Resuscitation Council evidence. When assessing the accuracy of completion of the checklist with no pictures, the Nurses correctly identified all items, but the 3 HCA’s made 5 errors. Re-evaluation following insertion of pictures on to the checklist showed 100% accuracy for both Nurses and HCA’s.

**Conclusions:** The high staff turnover and requirement for bank staff resulted in staff that were unfamiliar with the equipment and the list. We speculate that introducing a Crash Trolley with pictures will result in a reduced intervention time at cardiac arrests, giving improved patient care.

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**ESRA1-0095**

**Chronic Pain Management**

**Methods:** Written informed consent was obtained for three adult patients with persistent metatarsalgia for more than two years. One patient had previous surgery on metatarsals with ongoing, constant sharp pain. The second patient had secondary arthritis of 1st and 2nd metatarsophalangeal joints with persistent pain. The third patient had constant metatarsalgia but was not willing for any surgical procedure. Ultrasound guided deep peroneal block was performed using 5 millilitres of 0.25% levobupivacaine and 40mg of triamcinolone.

**Results:** First two patients received the block twice over a period of one year and reported VAS scores.

**Conclusions:** We report our early experience with the use of deep peroneal block for intractable metatarsalgia. Preliminary results indicate significant benefit in terms of pain and functional improvement and may be a valid option in selective cases but further evaluation needs to be conducted.

**Reference:**

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**ESRA1-0096**

**Miscellaneous**

**Methods:** The L’DISQ device is specifically designed to re-use similar ultrasound using a ‘sharable’ disposable transducer, a probe of triamcinolone.

**Results:** This study evaluated the efficacy of a new navigable perecutaneous disc decompression device (L’DISQ) in patients with lumbar radicular pain.

**Conclusions:** We aimed to perform a Quality Improvement project to identify the accuracy of completing the checklist with no pictures, with one containing pictures, were made.

**Reference:**

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**ESRA1-0095**

**Further Research on the Efficacy of a New Navigable Percutaneous Disc Decompression Device (L’DISQ) in Patients with Lumbar Radicular Pain (2-Year Follow-up)**

**Methods:** The L’DISQ device is specifically designed to re-use similar ultrasound using a ‘sharable’ disposable transducer, a probe of triamcinolone.

**Results:** This study evaluated the efficacy of a new navigable perecutaneous disc decompression device (L’DISQ) in patients with lumbar radicular pain.

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**Conclusions:** We report our early experience with the use of deep peroneal block for intractable metatarsalgia. Preliminary results indicate significant benefit in terms of pain and functional improvement and may be a valid option in selective cases but further evaluation needs to be conducted.

**Reference:**
An 80–100 mm needle is inserted in plane to the transducer and the tip of the needle is advanced to the posterolateral aspect of quadratus lumborum muscle, injecting the local anaesthetic 0.125% Levobupivacaine, 3.5–4 ml/kg between QL and latissimus dorsi muscle.

**Results:** The local anaesthetic spread reaches the paravertebral space. This provides pre, intra and postoperative analgesia for femoral neck fracture, abdominal surgery, LSCS and inguinal hernia.

**Conclusions:** This is one of the fascial trunk blocks. Good knowledge of sonoanatomy is essential to perform the block with safety.

**ESRA1-0110**

**Case Reports**

STEELLATE GANGLION BLOCK FOR CONGENITAL VENOUS MALFORMATION OF THE UPPER LIMB

Woo A.¹, Vargulescu R.¹, Zyada A.¹. ¹Anaesthesia, Kings College Hospital, London, United Kingdom.

**Background and aims:** A 27 year old male was referred by vascular surgeons for pain due to congenital venous malformation of the right forearm. This involved superficial tissues as well as infiltration of muscles, humerus and radius. The pain was described as burning and worse in the cold. He had tried many analgesics and was on pregabalin and ibuprofen with very mild analgesia but suffered side effects. He wakes up from sleep with pain.

**Methods:** Under local anaesthesia and ultrasound guidance a stellate ganglion block (SGB) was performed. Using an in-plane technique with a 21g sonoplex stim needle, a total of 5mls of 0.25% bupivacaine with 20mg of triamcinolone was injected at the C6 level superficial to the longus colli muscle.

**Results:** A ptosis and miosis was noticed 20 minutes after the injection. On follow up 6 weeks later he had stopped off all his analgesics and reported the pain as better by 80%. He no longer wakes up in pain.

**Conclusions:** SGB is known to be useful for arterial vascular insufficiency but to our knowledge this is the first case report of SGB for venous malformation. Its use should be explored in similar cases.

**ESRA1-0111**

**Case Reports**

OBSTETRIC ANESTHESIA FOR A PATIENT WITH BROWN-SÉQUARD SYNDROME AND EPILEPSY

Barros A.¹, Vico M.¹, Ventura C.¹, Assunção J.¹. ¹Anesthesiology, Centro Hospitalar Tondela-Viseu, Viseu, Portugal.

**Background and aims:** Brown-Séquard is a rare syndrome characterized by an incomplete spinal cord lesion. Women with this condition presenting for obstetric anesthesia is even rarer, so evidence-based management of complicated cases is limited and treatment continues to be individualized with experience from case reports.

**Methods:** Case Report

**Results:** A 39 year old woman 37 weeks pregnant presented for c-section. She suffered a horse fall 18 years before with cronoencephalic and spinal cord injury at cervical level developing Brown-Séquard syndrome with left hemiparesis and loss of pain and temperature sensation on the right side of the body. Any alicg cutaneous stimulus on the right side causes spasm of the musculature. She had a C2-C7 fixation plate with cervical movement limitation. Since 6 years ago she developed epilepsy controlled with levitaracetam. Seizure episodes occurred during pregnancy with need of dose adjustment. Whether we chose general or regional anesthesia there would be a unique set of challenges. We performed an epidural block in lateral decubitus. Initially the skin infiltration with local anaesthetic elicited muscular spasms, but later the...
Background and aims: After the introduction of stimulation techniques for the treatment of chronic pain by means of SCS and PNS in the 70s, PNS-stimulation for treating mononeuropathy, as well as sympathetic pain, underwent a renaissance.

Methods: We performed a “Periphery Field Nerve Stimulation” pilot study from May 2005 to February 2006 in 31 patients and due to the encouraging results in a further 45 patients mainly with neuropathic pain until January 2010.

Results: Approximately 70% of the patients displayed a pain relief of more than 50% for a period of up to three years. We show an improvement in VAS as well as in CSS by older patients with orthopedic problems like spinal stenosis. Since an adequate pain relief could not be achieved by either SCS or IDD, it can be assumed that simple subcutaneous stimulation can serve as a predictor for the complete invasive therapy.

Conclusions: PNS is a simple, promising method, with the best indication being a well localizable pain.

THE EVALUATION OF ANALGESIC EFFICACY OF ULTRASOUND GUIDED PREOPERATIVE THORACIC PARAVERTERBAL BLOCK FOR LAPAROSCOPIC CHOLECYSTECTOMY SURGERY

Kosar B., Gurkan Y., Toker K., Solaş, Z.M.

Background and aims: Although laparoscopic cholecystectomy (LC) is a minimally invasive surgical procedure, postoperative pain continues to be a common problem. The study aimed to evaluate the efficacy of preoperative paravertebral block (PVB) on postoperative pain and opioid requirements for the patients undergoing LC.

Methods: After obtaining ethical committee approval and written informed consent, 70 patients (ASA I–II), aged 18–70 scheduled for elective LC were included into this study. The study was prospective, randomized, single-blinded and the patients were divided into two groups. Control group was assigned to receive general anesthesia alone and PVB group received PVB before general anesthesia. Ultrasound guided PVB was performed at the T7 level using 20 ml of 0.5% bupivacaine. Patient controlled analgesia was performed using morphine iv in the postoperative period. Postoperative pain was measured using VAS for pain at 1, 6, 12, 24 postoperative hours. Statistical Analysis was performed using Student’s t-test and Mann Whitney U-test.

Results: Demographic data were similar in both groups. Morphine consumption in the first 24h period is significantly less in PVB group compared to the control group (median 7.5 mg and 19 mg in groups PVB and control respectively) (p< 0.001). VAS scores were lower in PVB group compared to the control group at 1h and 6h (p< 0.05). Shoulder pain was not observed in PVB group while 3 patients had shoulder pain in the control group.

Conclusions: Single level ultrasound guided PVB reduced postoperative opioid consumption in patients undergoing LC.

DOCUMENTATION OF REGIONAL ANAESTHESIA

Sinovich G., Krol A., Tredray A., Tong D.

Background and aims: For consent to be valid it must be voluntary and informed and documentation of the adequacy of this is a challenge. The person consenting must have the capacity to make the decision and discussion should be clearly documented for medico-legal purposes[1].

Methods: Conducted a re-audit of random sample of anaesthetic charts. Aim to assess if there was an improvement in documentation of consent after implementing the changes recommended from the previous audit. The audit did not require ethical approval.

Results: -Analysed 50 random set of notes of patients who had all undergone upper limb surgery, 35 in Day Surgery and 15 in Main Theatre. Of these, 40 had a peripheral nerve block and 10 had a general anaesthesia combined with a peripheral nerve block.

-Documentation from Day Surgery versus Main Theatre revealed the following:

-Block Failure, Nerve Injury, Prolonged Block, LA Toxicity, Infection, Care Mobilizing, and Difficulty in Breathing was documented in 3 notes (100%) versus 11 notes (73%).

-Adequacy of block documented in 34 notes (97%) versus 9 notes (60%).

-Site blocked documented in 33 notes (94%) versus 9 notes (60%).

Conclusions: Our audit showed that the quality of documentation of consent for regional anaesthesia has significantly improved throughout the trust since the introduction of the regional consent stickers. Future improvements could be achieved by having the consent stickers printed into the Anaesthetic charts.
ESRA1-0120
Peripheral Nerve Blocks

INFRACLAVICULAR BLOCK VERSUS AXILLARY BLOCK FOR UPPER LIMB SURGERY
Sinovich G.¹, Syed K.¹, Krol A.¹, Tredray A.¹, Tong D.¹. ¹Regional Anaesthesia, St George's Hospital NHS Trust, London, United Kingdom.

Background and aims: We sought to audit regional block techniques and performance for upper limb surgery in our day case unit.

Methods: We conducted a prospective audit of our practice in the Day Surgery Unit (DSU). We collected data on type of block performed, performance and on-set times for operations confined to below the shoulder joint over a period of 2 months.

Results: 32 regional techniques were recorded. 20 Infraclavicular and 12 Axillary. Infraclavicular Blocks were found to be performed quicker than axillary blocks and tended to be performed with less requirements for sedation, further results are given in the table below:

- Performance time: time that the needle puncture the skin to the end of the local anaesthetic injection.
- Onset time: Removal of needle to complete sensory and motor block
- Cumulative time: Onset time to surgical knife to skin
- Motor Block: score 1-unable to move finger, 2-able to move fingers but weaker than other side, 3-equal strength in both hands

Conclusions: Infraclavicular blocks are quicker to perform and provide better analgesia cover than Axillary Blocks. Infraclavicular Blocks saved 13 minutes of theatre time per patient and if the patients had no sedation there would be a total of 22 minutes saved on theatre time per patient. There was a 100% satisfaction score recorded whether the patients had sedation or not during the procedure.

This could mean more patients could be done on a DSU list and thereby increase theatre efficiency requiring surgery below the shoulder joint.

ESRA1-0121
Peripheral Nerve Blocks

DIFFERENT TYPES OF LOCAL ANAESTHETICS USED IN INFRACLAVICULAR BLOCKS FOR UPPER LIMB SURGERY
Sinovich G.¹, Syed K.¹, Krol A.¹, Tredray A.¹. ¹Regional Anaesthesia, St George's Hospital NHS Trust, London, United Kingdom.

Background and aims: There are a number of different local anaesthetic mixtures available for regional blockade. We sought to audit our use of local anaesthetics during regional anaesthesia for upper limb surgery.
Methods: We conducted a prospective audit of our use of local anaesthetics in the Day Surgery Unit (DSU) in infraclavicular blocks for upper limb surgery. We also collected data on onset of surgical anaesthesia, time to resolution of block and patient experience.

Results: 24 Infraclavicular blocks were performed. There were mixtures of 1.5% Lidocaine, 1.5% Lidocaine with 0.5% Levobupivacaine, and 2% Lidocaine with 0.5% Levobupivacaine. The characteristics of the mixtures used are given in the table below:

<table>
<thead>
<tr>
<th></th>
<th>1.5% Lidocaine</th>
<th>1.5% Lidocaine plus 0.5% Levobupivacaine</th>
<th>2% Lidocaine plus 0.5% Levobupivacaine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases in the mixture used</td>
<td>13</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Onset Time[1]</td>
<td>13 min</td>
<td>19 min</td>
<td>17 min</td>
</tr>
<tr>
<td>Cumulative Time[2]</td>
<td>19 min</td>
<td>25 min</td>
<td>24 min</td>
</tr>
<tr>
<td>Motor score achieved[3]</td>
<td>Score 1</td>
<td>Score 1</td>
<td>Score 1</td>
</tr>
<tr>
<td>Rescue analgesia in recovery</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Extra Analgesia required 24h post surgery</td>
<td>53%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>Time to hemovascular disapper</td>
<td>4.5hrs</td>
<td>6.4hrs</td>
<td>7hrs</td>
</tr>
<tr>
<td>Time feeling returned to fingers</td>
<td>7.5hrs</td>
<td>15hrs</td>
<td>12hrs</td>
</tr>
<tr>
<td>Any complications</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Conclusions: 1.5% Lidocaine provided the quickest onset surgical anaesthesia, but those patients required more analgesia in the first 24 hours post-surgery. 2% Lidocaine plus 0.5% Levobupivacaine seems to provide the most effective onset time while maintaining the effects of the analgesia 24 hours post-surgery. The Mixture of Local Anaesthetic used has to be tailored to the duration and complexity of the Surgery being done.

[1] Onset time: Removal of needle to complete sensory and motor block
[2] Cumulative time: Onset time to surgical knife to skin
[3] Motor Block: score 1-unable to move finger, 2-able to move fingers but weaker than other side, 3-equal strength in both hands

ESRA1-0123
Peripheral Nerve Blocks

TYPES OF ANAESTHESIA FOR UPPER LIMB SURGERY
Sinovich G.,1 Syeed K.,1 Tredray A.,1 Kroel A.,1 Tong D.1 Regional Anaesthesia, St George’s Hospital NHS Trust, London, United Kingdom.

Background and aims: Practice of regional anaesthesia is becoming more popular after the introduction of ultrasound. The biggest obstacle in conducting regional anaesthesia is the delay in operating room time and the unpredictable success of nerve blocks.

Methods: Conducted a retrospective audit of random sample of patients having upper limb surgery in Day Surgery Unit. Primary aim to assess type of anaesthesia given, performance time, time spent in recovery and patient satisfaction score. No ethical approval needed.

Results: ~65 patients, were sampled. 13 had GA, 7 had GA+block, 15 had sedation+block, 30 had regional block.
- The average performance time (in minutes) was 4.6 (GA only), 11 (GA + block), 8.5 (sedation+block) and 7.2 (block only).
- The total time from obtaining IV access in the anaesthetic room to patient being ready for surgery (in minutes) on average was 12.8 (GA only), 20 (GA + block), 27.3 (sedation+block), 22.6 (regional block only).
Background and aims: 77 years old woman received spinal block for femoro-popliteal bypass due to superficial femoral and popliteal artery closure.

Methods: Because of artery closure, dual antiplatelet therapy was started six days before the operation. This involved clopidogrel 75 mg and Acetylsalicylic acid 100 mg. The three doses of clopidogrel (last dose was given three days before the surgery) were inadvertently disregarded in pre-assessment clinic.

Results: Spinal block using 23-gauge Quincke needle was performed. At the level L 4–5 first attempt failed because of bone contact, second puncture was performed uneventfully and 2.2 ml of Marcain Spinal 0.5% Heavy was injected. During the surgical procedure bolus of 7500 IU of unfractionated Heparin was given and after 30 minutes subsequently antagonized with 7500 IU of Protamin and after 30 minutes subsequently antagonized with 7500 IU of Protamin ME. On the morning of the second day after the surgery patient complained of weakness and sensory loss of both lower limbs. Lower paraesthesia was diagnosed by a neurologist. Emergency magnetic resonance showed large spinal epidural haematoma T9 – L2. Patient was transferred to the university hospital and urgent laminectomy was performed. Motor and sensitive block up to T 10 was documented. AIS C. Four months after laminectomy patient was able to walk about 50 meters with a Zimmer frame.

Conclusions: The risk of epidural haematoma after spinal anaesthesia increases in patients who receive anti-coagulants. In our case patient received dual antiplatelet therapy and unfractionated heparin during the surgical procedure. Therapy – free interval of 7 days for clopidogrel was not observed.

ESRA1-0127
Peripheral Nerve Blocks

WHICH IS MORE SUFFICIENT FOR OPEN REDUCTION AND INTERNAL FIXATION OF HIP FRACTURE IN ELDERLY PATIENTS; ULTRASOUND GUIDANCE LPB OR CLSB?

Jiang W1, Zhao D.Q.2, Zhou Q.H.3. 1Department of anesthesia, Shanghai Jiaotong University Affiliated Sixth People’s Hospital, Shanghai, China.

Background and aims: Lumbar plexus block (LPB) or combined lumbar and sacral plexus block (CLSB) could be performed during surgery of hip fracture, but which nerve block is more sufficient has no conclusion. The aim of this study was to evaluate which nerve block was sufficient for this surgery in elderly patients, LPB or CLSB; and to assess target-controlled propofol infusion (TCI) as a technique of anesthesia for surgery of hip fracture in elderly patients under ultrasound guidance LPB or CLSB.

Methods: Sixty patients (>70 years old) with ASA physical status of II-III, scheduled for surgery of hip fracture randomly received ultrasound guidance LPB(LPB group, n=30) or CLSB(CLSB group, n=30). TCI was started immediately after positioning the patient on the fracture table. The minimal, maximal, optimal target concentration and cumulative propofol dose, postoperative visual analog scale(4th,8th,16th,24th hour), morphine consumption were recorded.

Results: The minimal, maximal, optimal target concentration and cumulative propofol dose in LPB group were significantly higher than those in CLSB groups. 14 patients in LPB group had representation of sacral plexus block and the other 16 patients didn’t have. The minimal, maximal, optimal target concentration and cumulative propofol dose in these 14 patients in LPB group were significantly higher than those in the other 16 patients in LPB group. There was no significant difference between two groups in postoperative visual analog scale(4th,8th,16th,24th hour), morphine consumption.

Conclusions: For the surgery of hip fracture in elderly patients, CLSB is more sufficient than LPB. In addition, TCI as a technique of anesthesia for surgery of hip fracture in elderly patients under ultrasound guidance LPB or CLSB is efficacious.

ESRA1-0126
Case Reports

THE ROLE OF MODIFIED PECTORAL NERVES (PECS) BLOCK IN BILATERAL SIMPLE MASTECTOMY

Phoon H.Y.P.1, Tay C.Y.W.1, Ng O.1, Chan X.H.D.1. 1Anaesthesiology, Singapore General Hospital, Singapore, Singapore.

Background and aims: The modified PECS block is a novel interfascial plane block which can provide anaesthesia during and after breast surgery. We report a case of a 46-year-old Chinese female with right breast carcinoma who underwent bilateral simple mastectomy and received bilateral modified PECS blocks as part of her analgesic regimen.

Methods: This was a ASA 1 patient (weight 48.4kg) from whom informed consent was obtained. Bilateral modified PECS blocks under ultrasound guidance were done after induction of general anaesthesia. Each modified PECS block consisted of 10ml bupivacaine 0.175% injected between pectoralis major and pectoralis minor muscles and anterior nerves, IV morphine 1mg bolus was given if mean arterial blood pressure (MAP) or heart rate exceeded 20% of the pre-operative value.

Results: A total of 4 IV morphine 4mg and IV paracetamol 1g was given for intra-operative anaesthesia. Post-operative sensory level testing with ice pack in the post-anesthetic care unit (PACU) showed reduced sensation in bilateral T2-T4 dermatomes extending towards the axillae. Numerical rating score (NSR) was recorded every 6 hours for the first 24hrs. NSR at rest was 0 for the first 24hrs and 2 on movement at 18 and 24hrs. No oral analgesics was required in the first 12hrs post-operatively. There was no post-operative nausea or vomiting.

Conclusions: The modified PECS block is a useful analgesic adjunct for reducing both intra- and post-operative pain after bilateral breast surgery. Decreased opioid consumption can lead to better side-effect profile and enhance patient recovery.

ESRA1-0125
Case Reports

EPIDURAL HAEMATOMA AFTER SPINAL BLOCK IN A PATIENT TREATED WITH THREE DOSES OF CLOPIDOGREL

Novacek M.I.1, 1Anaesthesia and Critical Care, General Hospital in Kolín, Kolín, Czech Republic.

Background and aims: 77 years old woman received spinal block for femoro-popliteal bypass due to superficial femoral and popliteal artery closure.

Methods: Because of artery closure, dual antiplatelet therapy was started six days before the operation. This involved clopidogrel 75 mg and Acetylsalicylic acid 100 mg. The three doses of clopidogrel (last dose was given three days before the surgery) were inadvertently disregarded in pre-assessment clinic.

Results: Spinal block using 23-gauge Quincke needle was performed. At the level L 4–5 first attempt failed because of bone contact, second puncture was performed uneventfully and 2.2 ml of Marcain Spinal 0.5% Heavy was injected. During the surgical procedure bolus of 7500 IU of unfractionated Heparin was given and after 30 minutes subsequently antagonized with 7500 IU of Protamin ME. On the morning of the second day after the surgery patient complained of weakness and sensory loss of both lower limbs. Lower paraesthesia was diagnosed by a neurologist. Emergency magnetic resonance showed large spinal epidural haematoma T9 – L2. Patient was transferred to the university hospital and urgent laminectomy was performed. Motor and sensitive block up to T 10 was documented. AIS C. Four months after laminectomy patient was able to walk about 50 meters with a Zimmer frame.

Conclusions: The risk of epidural haematoma after spinal anaesthesia increases in patients who receive anti-coagulants. In our case patient received dual antiplatelet therapy and unfractionated heparin during the surgical procedure. Therapy – free interval of 7 days for clopidogrel was not observed.

ESRA1-0133
Case Reports

ULTRASOUND-GUIDED RETROGRADE INTUBATION

Vieira D.1, Lages N.1, Maria L.1, Dias J.1, Correia C.1. 1Anaesthesiology, Centro Hospitalar Alto Ave Gualarães, Gualarães, Portugal.

Background and aims: Retrograde intubation is included in the difficult airway algorithm of the American Society of Anesthesiologists and has been used successfully in pharyngeal and laryngeal tumour surgery. The use of ultrasound in airway management is growing applications once the trachea and paratracheal soft tissues can be examined with ultrasound probes due to their superior position.

Methods: The authors present a case report that demonstrates the applicability of ultrasound in retrograde intubation. A 63-year-old male patient presents with ulcer-vegetating newformation of the oropharynx and hypopharynx that required tracheostomy. Ultrasound-guided bilateral superior laryngeal nerve block and trans-cricothyroid membrane block relieved stridor and permitted laryngoscopy, which revealed a vegetating, haemorrhagic tumour that preclude the view of the glottis. Under ultrasound guidance, a 16-G Tuohy needle was
Tracheal intubation was confirmed by capnography, general anesthesia induced and tracheostomy performed successfully.

**Results:** Tracheal intubation was confirmed by capnography, general anesthesia induced and tracheostomy performed successfully.

**Conclusions:** Ultrasound demonstration of the trachea and surrounding structures increases the success rate of correctly locating the Tuohy needle tip in the tracheal lumen. It may also decrease the likelihood of complications compared with "blind" retrograde intubation, although further studies are required to confirm these benefits. The authors consider that, for this case, ultrasound was a valid tool and may in the future be applied in similar situations.

**FIGURE 1.**

<table>
<thead>
<tr>
<th>Results in degree (data are median [95% CI])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before nerve blockade</td>
</tr>
<tr>
<td>Anterior elevation</td>
</tr>
<tr>
<td>Abduction</td>
</tr>
</tbody>
</table>

* p < 0.001 versus before nerve blockade

**ESRA Abstracts**

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**Case Reports**

**ULTRASOUND GUIDED PSOAS BLOCK USING SHAMROCK METHOD FOR DEVELOPMENTAL DYSPLASIA OF THE HIP:**

**Case Report**

Gürkan Y.1, Aksu C.1, Toker K.1, Solak M.1.1, Anesthesiology and Reanimation, Kocaeli University Faculty of Medicine, Kocaeli, Turkey.

**Background and aims:** Surgical procedures for developmental dysplasia of the hip (DDH) in pediatric population present a challenge to the anesthesiologist for postoperative analgesia as these procedures produce significant pain. Systemic analgesics and regional methods could be used for postoperative analgesia. Psoas compartment block is one of the regional methods and it was shown as an effective way of providing analgesia in children undergoing hip surgery (1).

**Methods:** A 4-year-old patient with DDH was scheduled for Pemberton osteotomy for right hip who had been operated for meningocele and has a ventriculoperitoneal shunt for hydrocephalus. Psoas compartment block (PCB) was performed to provide postoperative analgesia. Lumbar plexus was easily visualized using Shamrock method and the block was performed under real time USG under general anesthesia in lateral decubitus position (2) (fig 1). Surgical procedure lasted for 2 hours without any complications. The time for the first analgesic was 6 hours after the surgery. The patient was in a quiet and peaceful mood for first 24 hours after the surgery.

**Results:** Regional methods like caudal, epidural or psoas compartment blocks are used for maintaining the postoperative analgesia after hip surgeries in pediatric population. Patients operated for meningocele have a changed anatomy due to the surgical site.

**Conclusions:** We think that USG PCB using Shamrock method is an effective and safe method for analgesia for patients with difficult anatomy.

**ESRA-0140**

**Chronic Pain Management**

**CONTINUOUS SUPERASCAPULAR NERVE BLOCK IN THE MANAGEMENT OF FROZEN SHOULDER**

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**Background and aims:** Frozen shoulder is a condition characterized by stiffness and pain in the shoulder. Treatment focuses on pain control and improving motion using physical therapy. Continuous suprascapular nerve block (CSB) with local anaesthetic allows pain free shoulder manipulation. However, long-term effects of CSB on the outcome of such patients have not yet been assessed. The aim of this retrospective study was to determine the effects of CSB combined with physical therapy on the outcome of patients with frozen shoulder.

**Methods:** With the ethics committee approval, we reviewed 24 records of patients with frozen shoulder whose condition had improved for 12 months with conventional treatment. These patients received a CSB. Ropivacaine 0.2% was continuously infused via a catheter for 9 days. During the infusion, the patients received standardized physical therapy. Pain and range of motion of the shoulder were assessed before initiating the block, at the end of the infusion period and 3 months after. Adverse events were also recorded.

**Results:** In 2 patients the catheter was withdrawn before the 9th day because of signs of infection at the site of catheter insertion. In the 22 remaining patients, pain and shoulder motion were improved at the 9th day and 3 months later. No significant difference was observed between the latter two time points.

**Conclusions:** These results suggest that the combination of CSB and physical therapy may be beneficial in patients with frozen shoulder. Further randomized studies are needed to confirm the results of this pilot study.

**ESRA-0144**

**Postoperative Pain Management**

**A COHORT STUDY COMPARING CONTINUOUS VERSUS PATIENT-CONTROLLED EPIDURAL ANESTHESIA IN A THIRD LINE HOSPITAL**

van Samkar G.1, Lirk P.1, Hollmann M.W.1, Stevens M.F.1.1, Anesthesiology, Academic Medical Center, Amsterdam, Netherlands.

**Background and aims:** Postoperative epidural anesthesia can be inadequate and often needs to be readjusted by increasing the speed of infusion, combined with top ups of local anaesthetics, given by a physician, manually. Continuous epidural analgesia (CEA) is said to provide less effective analgesia than patient controlled epidural anesthesia (PCEA).

**Methods:** In a cohort study, we prospectively analysed patients receiving CEA or PCEA. Our aim was to reduce the number of physician intermediated (PI) top ups. Primary endpoint was the difference in number of (PI) top ups. Secondary endpoints were pain scores, side effects and opiate usage. A waiver for the study was provided by the institutional medical ethics committee (W14-051 # 14.17.005).

**Results:** 281 patients with CEA and 115 patients with PCEA were analysed. Pain scores were similar in both groups. The frequency of (PI) top ups was 26.6% in patients with CEA versus 12.1% in patients with PCEA. ( p=0.002, Chi Square test) Side effects (nausea, sedation, itching) were more frequent in patients with CEA.

**Conclusions:** The reduction in (PI) topups through PCEA, leads to decreased time investment by medical and nursing staff. Therefore PCEA is more efficient than CEA.

**ESRA-0149**

**Postoperative Pain Management**

**COMPARISON OF THE EFFECT OF ONDANSETRON AND COMBINED ONDANSETRON AND BETAHISTINE ON PONV AFTER GYNECOLOGICAL LAPAROSCOPY**

Nam B.1, Kim E.1, Cho J.S.1, Koo B.N.1.1, Department of Anesthesiology, Yonsei University College of Medicine, Seoul, Korea.
Background and aims: Postoperative nausea and vomiting remain the most common adverse events following anesthesia, and analgesia, with an estimated incidence of 70-80% among high risk group. Betahistine, an analog of histamine with H1 agonist and H3 antagonist activity, is effective anti-vertigo treatment for its H3-mediated vasodilatation and H1-related histamine synthesis. Despite the lack of explanation for its mechanism, betahistine has been shown to be effective in decreasing vertigo and preventing PONV. This study focused on the role of combined ondansetron and betahistine on PONV after gynecological laparoscopy surgery, the highest risk surgery for PONV.

Methods: Eighty-eight patients scheduled for gynecological laparoscopy surgery were randomly assigned to two groups, ondansetron (O) or ondansetron with betahistine (OB). Patients received either placebo or betahistine 10mg at three hours before and 24 hours after the surgery. Both group of patients received 4mg of ondansetron 15 minutes before the end of surgery. Patients were evaluated for the incidence and degree of PONV, pain, dizziness at 30 minutes, 1-6, 6-24, 24-48 hours postoperatively.

Results: The overall complete response for PONV was higher in the group OB, compared with the group O (67 vs 33%, p=0.068). The overall complete response for dizziness was higher in the group OB, compared with the group O (76 vs 39%, p=0.013). There were no significant differences in the needs for rescue antiemetics, postoperative pain score, and the Quality of recovery score-40.

Conclusions: Betahistine as an add-on to ondansetron can significantly reduce PONV and perioperative dizziness after high PONV risk gynecological surgery.

ESRA1-0153
Miscellaneous

REGIONAL AGAINST GENERAL ANESTHESIA IN BREAST SURGERY THE IMPORTANCE OF BEING EARNEST

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Background and aims: Breast surgery can be performed using general or regional anesthesia. When combined to sedation, PECS II block, allows to keep awake patients. Ultrasound-guided needle introduction and direct visualization of the whole technique improve safety and efficacy of the technique.

Methods: We considered 112 breast interventions implemented in our Operative Rooms (January-March 2014). The interventions were divided according to anesthetic technique; then we recorded the times of induction and recovery from anesthesia and calculated the average time of and their standard deviation.

Results: Regional anesthesia is safer and reduces operative room times. Furthermore, a significant time sparing was recorded in breast surgery performed under regional anesthesia. Induction and awake time during general anesthesia had shown a 21 min average (±7 min SD); while we recorded a 11min average (±5 min SD) during regional anesthesia. The effectiveness of the techniques of regional anesthesia and a smart organization of operating room can lead to these results. Before surgery, in the pre-operating room it is possible to perform peripheral nerve blocks safely through patients’ continuous monitoring, without affecting final surgical time; while after surgery, a nurse observes the patient in the PACU and signal pain signs.

Conclusions: PECS II block in breast surgery has led to an improvement in the efficiency of the use of operating room. A mean of 10 min time sparing has been recorded for each intervention. The operative room organization remarks its importance and regional anesthesia starts to be the earnest solution also in breast surgery.

ESRA1-0155
Case Reports

EPIDURAL ANAESTHESIA FOR CAESAREAN SECTION IN A PATIENT WITH SEVERE AORTIC STENOSIS AND TWIN PREGNANCY FROM OVODONATION: CASE REPORT

Quaglia S.1, Maio M.1, Menaldo E.1, Gollo E.1, 1SC Anesthesia and Rianimazione 4, AOU Città della Salute e della Scienza di Torino, Torino, Italy.

Background and aims: Anaesthesia for caesarean section in patients with severe aortic stenosis and twin pregnancy is at very high risk of mortality from the pathophysiology of the cardiac lesion, cardiovascular changes of pregnancy and haemodynamic anaesthesia-related alterations. With the patient’s consent, we present a report of successful epidural anaesthesia in such a case.

Methods: After multidisciplinary consultation, at onset of labour a 44-yr-old primigravida, pregnant with podalic-presenting twins from ovodonation, with severe bicuspid aortic valve stenosis (area: 0.5 cm²; peak gradient: 80-90 mmHg; mean gradient: 30-40 mmHg), left ventricular hypertrophy and preserved ejection fraction was scheduled for caesarean section at 24 weeks gestation. In the presence of a cardiac surgical team, after invasive cardiac monitoring and prophylactic right femoral artery and vein catheterization in the urgency of Extracorporeal Membrane Oxygenation (ECMO), epidural anaesthesia was performed in two divided doses with lidocaine 80 mg + levobupivacaine 40 mg + fentanyl 100 mcg. Phenylephrine was infused at 0.3 – 0.6 mcg/Kg/ min to prevent hypotension.

Results: Two healthy infants (a male and a female) were delivered. No haemodynamic instability was observed and the caesarean section was without complications. In the Intensive Care Unit (ICU) the postoperative course was complicated only by basal pleural effusion without hemodynamic worsening. The patient was discharged from ICU on postpartum Day 7 and from hospital on postpartum Day 9. The follow up echocardiogram conducted before discharge was unchanged.

Conclusions: Epidural anaesthesia performed under cardiac monitoring is effective and safe also in severe aortic stenosis.

ESRA1-0156
Peripheral Nerve Blocks

RETROBULBAR ULTRASOUND VIEW FOR REAL-TIME ULTRASOUND-GUIDED BLOCKADE: A CASE SERIES.

Martín Lorenzo M.C.1, Montón Giménez N.1, González Farita V.1, Martínez Parra L.M.1, Pineda Bolívar P.A.1, Montón Giménez C.1, Ferrer Pallás A.1, Anesthesiology, Hospital Universitario de Canarias, Tenerife, Spain, 2Ophthalmology, Hospital De la Cruz Roja, Madrid, Spain.

Background and aims: Retrobulbar anaesthesia allows eye surgery in awake patients. Ultrasound-guided needle introduction and direct visualization of the spread of local anesthetic may improve quality and safety of retrobulbar anaesthesia.

Methods: After patient consent, we collect4 patients diagnosed with cataract and 2 with retinal detachment. The ultrasound device used was a Quantel Medical Octopus (Compac Touch) with a 10 MHz curved array transducer. The ultrasound transducer was placed over the eyelid. During injection, the spread of the fluid could be observed by real-time sonography.

The injection was performed in the inferotemporal quadrant with a 25 gauge needle (Stimuplex D Plus, Braun, Melsungen, Germany). We injected 4 ml of local anesthetic mixture consisted of equal proportions of lidocaine 1% and bupivacaine 0.5%.

Results: Results are described in table 1. In all 6 cases, the placement of the needle and the infiltration of the local anesthetic could be easily visualized during the whole procedure. We obtained overall block in all cases except for a 1% quality of block in 1 case.

Conclusions: The ultrasound-guided technique improve safety and efficacy of the procedure by direct visualization of the needle placement and the distribution of the injected fluid. Furthermore, the precise injection near the optic nerve could lead to a reduction of the amount of the local anesthetic needed decreasing complications.
**ESRA1-0158**

**Postoperative Pain Management**

**POSTOPERATIVE THORACIC EPIDURAL ANALGESIA; A PROSPECTIVE AUDIT OF 1,515 PATIENTS**

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**Background and aims:** Postoperative epidural analgesia has been shown to have a significant impact on morbidity and length of hospital stay. If properly managed by acute pain teams, it is well established as a highly effective and safe method when used on surgical wards. We report our experience along complications incidence in 1,515 patients during a period of 51 months.

**Methods:** Epidural catheters (20G B.Braun Epidural Perifix®) were inserted via 18 G Tuohy needle at a spinal level appropriate for the proposed surgery. All patients received 0.2% ropivacaine with 2 μg.ml⁻¹ fentanyl prepared in elastomeric pumps with adjustable flow rate. Every 8 h the acute pain team nurse recorded pain, sedation, nausea, respiratory depression, hypotension, weakness and tingling in the legs. The initial infusion rate (mean 5ml/h) was modified daily in response to patients’ pain or side-effects.

**Results:** Median ( range) age of the patients was 67 (17–94) years. The duration of catheter placement was 5.0 (2–14) days. Sites of surgery were: colorectal 613(40%); upper abdominal 371(25%); urology 472(31%); thoracic 50(4%).

The maximum pain score was <3 in 1408 (93%) patients. Complications occurred in 198 patients (13%) as follow: catheter accidental removal/disconnected 108 (7.1%); insertion site subcutaneous swelling 27 (1.7 %); weakness 6 (0.4%); hypotension 23(1.5%); nausea 18(1.2%); sedation 12(0.8%); postepidural headache 3(0.2%). There was a case of epidural abscess that led to an emergency laminectomy. There were no cases of epidural hematoma or respiratory depression.

**Conclusions:** Postoperative thoracic epidural analgesia with ropivacaine/fentanyl is effective and can be properly managed in surgical wards with minimal complications.

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**ESRA1-0163**

**Case Reports**

**ULTRASOUND GUIDED PARASTERNAL CATHETERS FOR MANAGEMENT OF STERNAL FRACTURE PAIN**

Lambert I. 1, Thottungal A. 1. 1Anaesthetics, Medway NHS Foundation Trust, Kent, United Kingdom.

**Background and aims:** Sternal fracture pain can impair respiratory function leading to morbidity and mortality. Opioid and NSAIDs cause numerous complications in elderly patients. Regional anaesthesia techniques may offer a solution. We report the first case of ultrasound to place a periosteal catheter over a sternal fracture haematoma to manage pain effectively.

**Methods:** A 92-year-old female sustained a sternal fracture after a car accident. Opioid analgesia resulted in confusion and drowsiness. NSAIDs were contraindicated. Her only analgesia was Paracetamol. Inadequate pain control led to respiratory insufficiency and hypoxia. She could not tolerate chest physiotherapy or mobilization. Under aseptic conditions and ultrasound guidance, a peristomal catheter was placed over a sternal fracture haematoma to manage pain effectively.

**Conclusion:** Postoperative thoracic epidural analgesia with ropivacaine/fentanyl is effective and can be properly managed in surgical wards with minimal complications.
ESRA1-0169

**Chronic Pain Management**

**ANALGESIC EFFECT OF EPIDURAL INJECTION OF STEROID/LOCAL ANAESTHETIC/ADHESIOLYTIC AGENTS DURING EPIDUROSCOPY IN PATIENTS WITH DISEASE OF SPINE**

Papakitsos G.1, Papakitsou T.2, Kapsali A.3, 1Anesthesiology, General Hospital Arta, Arta, Greece, 2Haematology, General Hospital Mesologi, Mesologi, Greece, 3Epiduroscopy, St Paul General Hospital Thessaloniki, Thessaloniki, Greece.

**Background and aims:** It is used a relatively new minimally invasive diagnostic and therapeutic procedure, epiduroscopy with the use of a flexible endoscope. For the pain relief of the patients, we performed targeted epidural injection of steroids/local anaesthetic/adhesiveolytic agents in combination with endoscopic adhesiolyis. It was investigated the immediate, long-term results and epiduroscopic findings.

**Methods:** Contraindications were patients with coagulopathies, severe renal failure, pregnancy and patients under treatment with anticoagulants. The surgical technique included the introduction of a flexible endoscope to the epidural space via the sacral hiatus, under local anaesthesia, sedation and fluoroscopy. Mechanical adhesiolyis was performed with an endoscope and the infusion of N/S 0.9%. At the end, in the epidural space were targeted injected steroids/local anaesthetic/adhesiveolytic agents.

**Results:** We studied 94 patients (16 have had FBSS, 11 foraminal stenosis, 2 disc herniation, 49 spinal stenosis and 18 disc herniation) median age 67 years old. The decision for the further treatment was based to the epiduroscopic findings. In all cases we observed immediate relief to the symptoms after epiduroscopy for a variable period of time, 74% of the patients were relieved from their symptoms 4 months to 2.5 years. 2 patients were further treated surgically.

**Conclusions:** Epiduroscopy is a safe diagnostic method and it can be used as a therapeutical treatment option if conservative treatment fails. Our findings of epiduroscopy corresponded to the symptoms of the patients. Especially in elderly patients and patients who can’t be operated is a good alternative.

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**ESRA1-0168**

**Postoperative Pain Management**

**A COMPARISON OF TWO DIFFERENT CONCENTRATIONS OF LEVOBUPIVACAINE IN CONTINUOUS FEMORAL BLOCK FOR POSTOPERATIVE ANALGESIA AFTER TOTAL KNEE REPLACEMENT**

Papakitsos G.1, Kapsali A.2, Papakitsou T.1, Roimba A.4, 1Anesthesiology, General Hospital Arta, Arta, Greece, 2Dentistry, Private Clinic, Arta, Greece, 3Haematology, General Hospital Mesologi, Mesologi, Greece, 4General Practitioner, St Paul General Hospital Thessaloniki, Thessaloniki, Greece.

**Background and aims:** To study the minimum effective concentration of levobupivacaine in continuous femoral block after TKR.

**Methods:** This is a prospective, randomized, double blind study. We studied 48 patients, ASA II-III who were scheduled for TKR. All patients had spinal anaesthesia for the operation. In the PACU after sensory and motor blockade had worn off a femoral block was performed with a nerve stimulator using an aseptic technique. The patients were randomly allocated in two groups. Group A received 20 ml bolus dose levobupivacaine 0.5% and a continuous infusion of levobupivacaine 0.125% with a rate of 5 ml per hour for 26h. Group B received 20 ml bolus dose levobupivacaine 0.25% and a continuous infusion of levobupivacaine 0.0625% with a rate of 5 ml per hour for 26h. Both groups received PCA pethidine. The consumption of pethidine and the evaluation of pain according to the VAS scale were recorded 2 hours after initiation of the analgesia and then every 4 hours for the first 26 hours.

**Results:** There were no statistical differences of the pethidine consumption between the two groups. The average pain score was the same in both groups. There were no complications attributable to the femoral block.

**Conclusions:** The levobupivacaine of 0.0625% used for femoral block had equally analgesic effect as the levobupivacaine of 0.125% and there were no side-effects. We consider that the more diluted local anaesthetic can be used with the same efficacy in femoral block for postoperative analgesia in Total Knee Replacement.

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**ESRA1-0171**

**Central Nerve Blocks**

**BENEFICIAL EFFECTS OF REGIONAL ANESTHESIA ON OUTCOME AFTER MAJOR SPINAL FUSION**

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**Background and aims:** The aim of prospective, randomized, comparative study was to assess the effects of two anesthetic methods on surgical outcome in patients undergoing major spine surgery.

We hypothesized that continuous epidural anesthesia after major spine surgery could impact on blood loss, postoperative pain and morbidity.

**Methods:** 335 patients were randomly allocated to two equal groups as follows: Group E (n=170) had continuous epidural analgesia and endotracheal anesthesia with sevoflurane during surgery and continuous epidural analgesia with ropivacaine, fentanyl and epinephrine after surgery; Group G (n=165) had general anesthesia with sevoflurane and fentanyl and systemic administration of opioids after surgery. Blood loss, coagulation and systemic hemodynamic parameters, demographics, pain at rest and in motion and morbidity were assessed before, during and after surgery and on postoperative days.

**Results:** The study has demonstrated that in Group E intraperoperative blood loss has significantly decreased on 50% (568 ml p=0.0013). Noninvasive hemodynamic monitoring has shown that EA did not lead to life-threatening disorders in myocardial contractility, cardiac output, and systemic vascular resistance and did not critically increase the extravascular lung water.

Patients in Group E had significantly less pain at rest and in motion, improved bowel activity, and higher patient satisfaction. In comparison with Group G, they had significantly less such complications as deep vein thrombosis, pulmonary embolism, vomiting and nausea, and wound dehiscence.

**Conclusions:** Epidural anesthesia and PCEA with ropivacaine and opioids through the placed epidural catheters before surgery provided better analgesia, less postoperative morbidity, blood loss decreasing, patient satisfaction and early discharge from hospital.
ESRA1-0172
Miscellaneous

REGIONAL ANAESTHESIA DOCUMENTATION RE-AUDIT
Aldamluji N., Velayudam B., Ratnayake A.1.1 Anaesthesia and Intensive Care, Royal Wolverhampton Hospital, Wolverhampton, United Kingdom.

Background and aims: The importance of clear and thorough documentation in regional anaesthesia (RA) cannot be overemphasized in current ethical and medico-legal practice. A new RA documentation form which contains a list to check, was introduced in our department following a previous audit in 2008 to improve compliance with documentation and it was based on general consensus by practitioners, the key elements of which were obtained from national and local guidelines.

Methods: After approval from our Audit department, 50 consecutive anaesthetic notes that involved either central neuraxial blocks (CNB) or peripheral RA were audited. Anaesthetists were not aware that this audit was in progress so as not to interfere with record keeping.

Results: Asepsis was previously documented in 17% of cases compared to 88.8% currently and examples of good practice such as negative aspiration pre-injection was then documented in 57% of the cases as opposed to 84.2% currently.

Conclusions: This re-audit has demonstrated a leap forward in accuracy of documentation aided by a standard anaesthetic proforma which has helped all practitioners, across all grades, to keep high quality record keeping in an accurate and a consistent manner.

TABLE 1. demonstrates improved compliance with documentation using the new forms.

<table>
<thead>
<tr>
<th>Total patients</th>
<th>50</th>
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<tbody>
<tr>
<td>CNB</td>
<td>16</td>
</tr>
<tr>
<td>Peripheral RA</td>
<td>34</td>
</tr>
<tr>
<td>Consent</td>
<td>47/54 (87%)</td>
</tr>
<tr>
<td>Laterality</td>
<td>50/54 (92.5%)</td>
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<tr>
<td>Side confirmation</td>
<td>30/58 (78.9%)</td>
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<td>Patient’s position</td>
<td>39/54 (72.2%)</td>
</tr>
<tr>
<td>Asepsis</td>
<td>48/54 (88.8%)</td>
</tr>
<tr>
<td>Awake/asleep</td>
<td>41/54 (75.9%)</td>
</tr>
<tr>
<td>Needle type/length</td>
<td>47/54 (87%)</td>
</tr>
<tr>
<td>Negative aspiration</td>
<td>32/58 (58.2%)</td>
</tr>
</tbody>
</table>

Asepsis was previously documented in 17% of cases compared to 88.8% currently and examples of good practice such as negative aspiration pre-injection was then documented in 57% of the cases as opposed to 84.2% currently.

Conclusions: This re-audit has demonstrated a leap forward in accuracy of documentation aided by a standard anaesthetic proforma which has helped all practitioners, across all grades, to keep high quality record keeping in an accurate and a consistent manner.

ESRA1-0174
Miscellaneous

COMPOUND IMAGING TECHNOLOGY AND ECHOBENIC NEEDLES: A COMPARATIVE STUDY IN PORK PHANTOMS AND THIEL-EMBALMED CADAVERS.
Murouchi T., Iwasaki S., Yamakage M.1. Department of Anesthesiology, Sapporo Medical University of Medicine, Sapporo, Japan.

Background and aims: High visibility of the needle is mandatory for ultrasound-guided nerve block (USG-NB). The efficacy of echogenic needles and spatial compound imaging (SCI) were investigated.

Methods: A simulation of USG-NB was performed using pork phantoms and Thiel-embalmed cadavers. Four kinds of needle were used according to thickness and echogenic properties: A) 18-gauge non-echogenic Tuohy; B) 18-gauge non-echogenic Tuohy for NBs; C) 22-gauge echogenic short-bevel; and D) 22-gauge non-echogenic short-bevel. A needle guidance was used to perform accurate insertions at precise angles. USG-NB was performed at 15°-60°. Brightness of needles was evaluated using pixel intensity (0-255) of the corresponding areas, and by the maximum angle at which needles could be observed.

Results: The shafts of all four needles were poorly seen at steep angles in the pork phantom, and SCI was insignificant (Fig. 1). Tips of the two thicker needles were visible at steep angles. In contrast, shafts and tips of all four needles gained visibility with SCI in the Thiel-embalmed cadaver model (Fig. 2).

Conclusions: This study showed that an 18-gauge non-echogenic Tuohy needle was the most appropriate for USG-NB. Patient postures and shallow needle angles should be emphasized for best results.
Peripheral Nerve Blocks

THE ANALGESIC EFFICACY OF ULTRASOUND-GUIDED SUBCOSTAL TAP-BLOCK COMPARED WITH THORACIC EPIDURAL AND GENERAL ANAESTHESIA IN PATIENTS UNDERGOING EXTREME-LATERAL INTERBODY FUSION

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Background and aims: Today, procedure XLIF is often used as minimally invasive lateral access to the spine surgery. Subcostal TAP block has also been proposed as a new technique to provide analgesia for the supraumbilical abdomen. We compared the analgesic and opioid-sparing effects of a single-injection US subcostal TAP block with continuous thoracic epidural analgesia.

Methods: 85 patients undergoing XLIF were randomized to receive either combined general and subcostal TAP anesthesia (Group T), combined general and epidural anesthesia (Group E), or general anesthesia (Group G). In Group T, a unilateral US subcostal TAP block was performed after induction of general anesthesia using 30 ml of 0.75% ropivacaine. In Group E, a thoracic epidural was placed between T8 and T9 and bolused with 10 ml of 0.5% ropivacaine and 2 ml of fentanyl before induction of general anesthesia. Group G received standard general anesthesia.

Results: Patients were assessed at 48 hours postoperatively. Primary outcomes measured were opioid consumption at 24 hours and all VAS pain scores.

Conclusions: Single-injection US subcostal TAP-block was more effective than IV opioid analgesia, while continuous thoracic epidural analgesia was more effective than the single-injection subcostal TAP-block.

PAIN PERCEPTION EVALUATION IN 0–5 MONTH OLD PATIENTS WITH CLEFT LIP AND PALATE (CLP) UNDERGOING PERSURGICAL ORTHOPEDIC TREATMENT (POT)

Yudovich Burak M. 1, 2, Barron Aranda M. 1, 3, Baranda Escalona R. 4, Grybovskii G. E. 5, Jimenez E. 1, 3, Herrera Medina E. 1, 6, Stomatology-Orthodontics, Hospital General “Dr. Manuel Gea González”, Mexico City, Mexico, 7, Anesthesia and Pain Medicine, Instituto Nacional de Cancerología Instituto de Rehabilitación, Mexico City, Mexico, 3, Pediatrics, Hospital General “Dr. Manuel Gea González”, Mexico City, Mexico.

Background and aims: Considering that newborns are not able to verbalize feelings and express pain, there is a need to identify a primary measure of infant pain. The aim of the present study was to assess presurgical orthopedic pain using the Face, Legs, Activity, Cry, Consolability (FLACC) scale and to determine the reliability of this scale in such patients.

Methods: Six independent observers rated pain from videotapes in 20 CLP infants aged 0–5 months during 3 time points: 1) feeding technique (FT), 2) alveolar ridges impressions (ARP) 3) mouth plaque placement (MPP). The FLACC scale was scored at every time point throughout the procedure. And measurement of ARP and MPP were compared to FT using Wilcoxon paired test. Intraclass correlation coefficients (ICC) were used to assess reliability of the FLACC scale.

Results: Significant increases in FLACC scores during ARP and MPP vs FT were found. (median, 6 vs median 0; P<.001 and median, 6 vs median 0; P<.001) respectively. ICC (2, k) results were 0.76 (95% CI 0.56, 0.89), 0.83 (95% CI 0.68, 0.92); 0.82 (95% CI 0.66, 0.92) for FT, ARP and MPP respectively.

Conclusions: The general pain report during ARP and MPP in presurgical orthopedic treatment and good scale reliability in these patients and settings, provide preliminary support to consider alternative or pharmacological procedures to complement patient’s treatment, This study creates awareness about pain perception by parents, medical and dental staff involved in inter and multidisciplinary treatment.

INFERIOR MESENTERIC PLEXUS BLOCK FOR LOW BACK PAIN IN PATIENTS WITH RETROPERITONEAL FIBROSIS: A REPORT OF TWO CASES

Mimura M. 1, 2, Goda Y. 1, 2, Miyamoto N. 1, 3, Asano S. 1, 3, Tachiibana N. 1, 3, Yamasawa Y. 1, 3, Hazama K. 2, 3, Oda H. 1, 3, Yamakage M. 1, 3, (Pain Clinic Center, Sapporo Medical Center NTT EC, Sapporo, Japan, 2, Palliative Care Medicine, Sapporo City General Hospital, Sapporo, Japan, 3, Emergency Care, National Hospital Organization Hokkaido Medical Center, Sapporo, Japan, 4, Anesthesiology, Sapporo Medical University School of Medicine, Sapporo, Japan.

Background and aims: Retroperitoneal fibrosis (RPF) is a rare fibrosing disease of the retroperitoneal tissue. The most common symptom is low back pain.

Methods: Two cases of RPF with severe low back pain that was effectively decreased by inferior mesenteric plexus block (IMPB) are reported.

Results: Case 1: A 39-year-old man with idiopathic RPF had a 2-year history of low back pain. Corticosteroids improved the fibrosis, but the severe low back pain remained. There was fibrosis at the 1st to 3rd lumbar vertebral levels on the CT scan. Lumbar epidural block relieved his pain for 3 days. IMPB then reduced the intensity of the pain and the amount of oxycodone. Case 2: A 70-year-old man with a bladder tumor and low back pain was found on CT to have RPF at the 2nd to 3rd lumbar vertebreal levels. A one shot lumbar epidural block allowed him to sleep well at night for several days. His low back pain then resolved completely after IMPB.

Conclusions: About two-thirds of RPF cases are idiopathic. Remaining causes include drugs, abdominal aortic aneurysm, infection, and retroperitoneal malignancy. Low back pain in RPF sometimes has a poor response to pharmacotherapy. IMPB is usually used for patients with lower abdominal pain from colon cancer, but it is also effective for low back pain due to RPF. It is valuable to try this neural block for patients with intractable low back pain due to RPF.

INCIDENCE OF SURGICAL SITE PAIN AND TOURNIQUET PAIN IN PATIENTS UNDERGOING UPPER LIMB SURGERY UNDER ULTRASOUND GUIDED AXILLARY BRACHIAL PLEXUS BLOCK

Reed L. 1, Adams L. 1, El-Boghdady K. 1, Al-Shather H. 1, Vorster T. 1, Krone S. 1, 2, Anesthesiology, Queen Victoria Hospital, East Grinstead, United Kingdom.

Background and aims: Regional anesthesia facilitates shorter recovery times and increases patient satisfaction. The literature regarding ultrasound guided axillary brachial plexus block (ABPB) related tourniquet pain (TP) is limited however an incidence of 3-65% is reported. We report on quality of ABPBs by quantifying the incidence of intra-operative surgical site pain (SSP) and TP in a specialist unit. We describe management approaches to these problems, which reduce tolerance of regional anaesthesia.

Methods: Anaesthetists performing awake regional blocks as the sole anaesthetic technique in upper limb surgery were asked to complete a procedural proforma.

Intra-operative SSP and TP were recorded every fifteen minutes. Additional interventions required for intra-operative pain management were noted.

Results: 100 questionnaires were returned. 85 patients underwent ultrasound-guided ABPBs.

Intra-operative pain is summarized in Table 1.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>11</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

TABLE 1. Incidence of intra-operative pain.
Twenty-eight additional interventions were required in 23 patients. Eight patients had secondary blocks due to missed nerves following ABPB.

SSP was managed with local anaesthetic infiltration by surgeons in 10 patients. Two of these also required midazolam and 1 fentanyl.

TP (all after 60 minutes) was managed with alfentanil and midazolam in 2 patients but 8 had the tourniquet deflated early.

These effective interventions meant no conversions to general anaesthesia were needed.

**Conclusions:** The incidence of TP with ABPBs in our specialist hospital is lower than published literature. TP could be further reduced by forearm tourniquets and limiting inflation pressures to 200mmHg instead of 250mmHg.

**ESRA Abstracts**

**Regional Anesthesia and Pain Medicine**

**Volume 39, Number 5, Supplement 1, September-October 2014**

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**ESRA Abstracts**

**Case Reports**

**ESRA1-0185**

**EPIDURAL CATHETER MIGRATION DURING PATIENT CONTROLLED EPIDURAL ANALGESIA**

Donnelly K.1, Patel K.2, Namih M.2, Pittaswamy R.1, Cift I.3 1Department of Anaesthesia & ITU, Queen Elizabeth Hospital, Birmingham, United Kingdom.

**Background and aims:** Epidural catheter migration is a rare, but if unidentified, potentially disastrous complication of epidural analgesia. We report such an event in the case of a patient who required a 'category 2' caesarean section ('urgent operative delivery for maternal or fetal compromise, not immediately life-threatening') for failure to progress in labour.

**Methods:** Earlier insertion of a lumbar epidural had been uneventful and patient-controlled epidural analgesia (PCEA) had been working well without reported ill effect. Prior to bolusing the epidural however, significant sensory and motor block was identified and the catheter was suspected to be intrathecal. On aspirating the epidural catheter, a continuous column of clear straw-coloured fluid was obtained, which tested 1+ on a glucose strip equating to glucose concentration of 2.8 mmol/l, suggestive of cerebrospinal fluid. 0.5ml of 0.5% bupivacaine was given via the intra-thecal catheter to provide regional anaesthesia.

**Results:** The block ascended to T4 bilaterally for cold sensation within five minutes, and the operation was performed without incident. Mother and baby had an uneventful post-operative recovery.

**Conclusions:** This case highlights the importance of vigilance when converting from epidural anaesthesia to anaesthesia. We advocate 1) a mandatory neurological examination, and 2) the careful aspiration of all epidural catheters before, 3) giving a conservative test bolus. The continued education of allied health professionals is essential in the early identification of developing complications.

**ESRA1-0189**

**Case Reports**

**THE RELATIONSHIP BETWEEN POSTSPINAL PUNCTURE HEADACHE AND BREAKAGE OF SPINAL NEEDLE TIP IN CAESAREAN SECTION CASES: A SCANNING STEREOMICROSCOPY STUDY**

Oguzalp H.1, Kaya A.1, Akogul Z.1, Kaynak G.2, Yilmazlar A.1, Kutlay O.1 1Anesthesiology and Intensive Care, Private Medicabil Hospital, Bursa, Turkey.

**Background and aims:** The tips of 27G spinal needles may be easily damaged during spinal needle insertion. There is also a relationship between the tip of the spinal needle and postspinal puncture headache (PSPH). This study aimed to determine whether deformation of the spinal needle tip leads to PSPH.

**Methods:** The needle tips of the 27G, 3.5 inch Whitacre spinal needles used in the routine spinal anaesthesia of 21 Caesarean section cases were inspected by scanning stereomicroscopy.

**Results:** Bone contact occurred in 11 cases during spinal needle insertion and 5 needles were broken at the tip. Three of these 5 patients had PSPH.

No bone contact occurred in 10 patients and none of the needles were broken at the tip. Four patients had PSPH.

All anaesthesia procedures were satisfactory and no patient had any adverse sequelae.

**Conclusions:** Great care must be taken to avoid bone contact of the spinal needle as the needle tip may be broken and provoke PSPH.

**ESRA1-0195**

**Miscellaneous**

**MANAGEMENT OF LOCAL ANAESTHETIC SYSTEMIC TOXICITY (LAST) AT A TERTIARY CENTRE IN UK**

Tong D.1, Tredray A.1, Sinovich G.1 1Anaesthetics, St George’s Hospital NHS Trust, London, United Kingdom.

**Background and aims:** Although uncommon LAST can be potentially life threatening. Therefore anaesthetists should recognise signs and symptoms and initiate management appropriately.

**Methods:** Two questionnaires were designed. First was aimed at anaesthetists on their knowledge of Association of Anaesthetist of Great Britain and Ireland (AAGBI) Safety Guideline on LAST and location of intralipid under stop-watch condition. Second questionnaire was aimed at operating department practitioners (ODP) to test knowledge of location of intralipid in various theatre complexes.

**Results:** 52 anaesthetists took part in first questionnaire. 100% recognised the signs and symptoms of LAST and could initiate immediate management. However, only 44% knew initial dosage and rate of infusion of intralipid, 34% of number of repeat boluses and 30% of maximum cumulative dose. All would refer to AAGBI guideline to find out dosage in emergency. 53% knew the closest location of intralipid. 20 ODPs took part in second questionnaire, only 45% could correctly identify the location of intralipid.

**Conclusions:** All anaesthetists had good knowledge of management of LAST and awareness of AAGBI guideline, but only a proportion knew bolus dosage or infusion rate of intralipid. The patchy knowledge of location of intralipid could be explained by existence of various theatre complexes in our tertiary centre, with each stockpiling intralipid in different locations. To improve patient safety, we reorganised the location of intralipid and standardised it across our centre, and ensured that each regional anaesthetic trolley was stocked with intralipid and a laminated copy of AAGBI guideline for ease of use in case of LAST.

**ESRA1-0196**

**Miscellaneous**

**MSC IN REGIONAL ANAESTHESIA- A STUDENT’S PERSPECTIVE**

Tong D.1 1Anaesthetics, St George’s Hospital NHS Trust, London, United Kingdom.

**Background and aims:** The MSc in Regional Anaesthesia (RA) at University of East Anglia is a three-year course that has been running since September 2012. As one of the first cohort of students that are undertaking the course, I am privileged to offer a unique view of the course and how it has affected my career.

**Methods:** The MSc comprises of 6 core modules in RA. The practical arm consists of direct observed procedural skills (DOPS) at individual students’ base hospital, and OSCE examination at the end of the 2 years. In the third year, we are expected to complete a dissertation.

**Results:** The course is assessed by several means: through problem based learning and online participation of virtual learning environment (VLE), summative assessments at the end of each module and course works ranging from writing up of research proposal to service improvement business plan. So far, I have completed 4 out of 6 modules, and will be starting my dissertation in September 2014.

**Conclusions:** Overall, the course has been thoroughly enjoyable, and allowed me to meet like-minded anaesthetists, had shared learning experience in multiple areas of regional anaesthesia through VLE and kept up to date with latest techniques and technology. It complemented my concurrent clinical experience as Fellow in RA at St George’s Hospital in UK. In particular, Clinical Leadership & Service Delivery Module enabled me to gain invaluable experience in improving the RA service and boosted my preparedness to lead RA service in a hospital at consultant level.
ESRA1-0198

Miscellaneous

REGIONAL ANAESTHETIC TECHNIQUES FOR THE RISK OF MALIGNANT TUMOUR RECURRENT: PRELIMINARY FINDINGS OF A COCHRANE SYSTEMATIC REVIEW AND META-ANALYSIS

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Background and aims: Surgery for malignant tumours leads to significant systemic release of tumour cells. Perioperatively, surgical stress, anaesthetic agents and the administration of opioids can compromise immune function and might promote tumour cell proliferation. In recent years, the potential benefits of regional anaesthesia techniques (RA) on tumour recurrence were intensely discussed. We aimed to comprehensively summarize current evidence.

Methods: The review was conducted using Cochrane Collaboration guidelines for systematic reviews. Methods and analysis plan have been published elsewhere (Cochrane Database of Systematic Reviews, CD008877).

We considered randomized controlled trials (RCTs) or controlled clinical trials in patients undergoing resection of primary malignant tumours. Eligible interventions: general anaesthesia (GA) versus GA combined with one or more RA; GA combined with one or more RA versus one or more RA; GA versus one or more RA. Primary outcomes: overall survival (OS), progression free survival (PFS), time to tumour progression (TTP).

Results: Four studies with 746 participants met inclusion criteria. All compared GA versus GA combined with epidural analgesia. All studies were secondary data analyses of previous RCTs.

Meta-analysis did not show an advantage for either group for the outcomes OS (HR 1.10, CI 95% 0.85-1.30) and PFS (HR 0.88, CI 95% 0.56-1.38). Pooled data for TTP showed a slightly favourable outcome for the GA group compared to the GA plus epidural group (HR 1.50, CI 95% 1.00-2.25).

Conclusions: Currently, there is no high level evidence for the benefit of RA on tumour recurrence. There is an encouraging number of RCTs ongoing whose first results will hopefully be available soon.

ESRA1-0199

Miscellaneous

PATIENT SURVEY ON SEDATION SATISFACTION DURING REGIONAL NERVE BLOCKS

Govindarajan G.1 1Anaesthetics, Broomfield Hospital, Chelmsford, United Kingdom.

Background and aims: It is a common belief that the tolerance of Regional anaesthesia (RA) and satisfaction is better with sedation than without.

Aim is to find out how well the patients who received regional anaesthesia block for hand operation are satisfied during the procedure with or without sedation.

Methods: We used patient satisfaction questionnaire to be filled by the patients before they go to home.

Results: In total 39 adult patients (all received US guided brachial plexus block) took survey.

Among which 15 patients requested for sedation in pre-op visit. During the RA procedure 23 received sedation and 16 did not. We used satisfaction scale of Poor, Less than satisfactory, Satisfactory, Good and Very good for assessment. During the block 32 patients expressed very good satisfaction and 7 said good.

During operation only 13 received sedation and 26 did not. Regarding satisfaction 33 said very good and 6 said good and none of them scored poor during the above-mentioned periods.

Overall satisfaction for anaesthetic service including pre-op information, block, sedation and communication: 34 said ‘very good’ and 5 said ‘good’.

Regarding their future preferences all 39 said they would opt for regional anaesthesia and 21 will request for sedation and 18 will not and only a very few changed their decision about their preference for sedation.

Conclusions: Our patients were very satisfied either with or without sedation during the procedures. Their sedation preference did not change much despite good satisfaction. Therefore sedation service must be individualized and not as a routine.

ESRA1-0201

Case Reports

ROPIVACAINE ANAPHYLAXIS

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Background and aims: Allergic reactions to local anesthetics (LA) are extremely rare, representing less than 1% of all adverse reactions to these drugs. This case describes an anaphylactic reaction after administration of epidural ropivacaine.

Results: An 8 year old boy, with atopic dermatitis, proposed for circumcision in an outpatient setting; without anesthetics or surgical history. After inhalational induction with sevoflurane and placement of laryngeal mask airway, a caudal epidural was performed with 10.5 ml of 0.2% ropivacaine and paracetamol was administered intravenously (IV). About 5 minutes after the blockade, he developed generalized erythema, facial edema, bronchospasm, desaturation, hypotension and tachycardia. Facing the clinical picture of anaphylaxis, we proceeded to tracheal intubation and IV administration of adrenaline, clenmastine, hydrocortisone and inhaled bronchodilators. Blood was collected for determination of total IgE (639 kU/L) and tryptase (15.60 ug/L). There was a progressive improvement on ventilation and oxygenation, regression of erythema and edema, and recovery of the initial hemodynamic status. We proceed with surgery that held without other complications. He was oriented to Immunohallergology consultation. Further study revealed tryptase assay basal 2.64 ug / L, negative latex specific IgE and skin prick tests (SPT), positive SPT for ropivacaine. It was concluded with high probability for hypersensitivity to ropivacaine.

Conclusions: Amide LAs have been preferred as they are associated with fewer allergic reactions. However there are reports of true allergic reactions and documented cross-reactivity between drugs of this group. Anesthesiologists must be able to identify and treat such cases.

ESRA1-0203

Miscellaneous

CORDOTOMY FOR BILATERAL PAIN- INCREASE IN PAIN AFTER UNILATERAL CORDOTOMY AND NEW PAIN AFTER BILATERAL CORDOTOMY-

Nagaro T.1, Higaki N.1, Yorozuya T.1, Kikuchi K.1, Takeuchi K.1 1Anesthesia and Perioperative Medicine, Ehime University Graduate School of Medicine, Toon Ehime, Japan.

Background and aims: New pain, usually at mirror-image positions of the original pain site occurs following unilateral cordotomy in patients suffering from unilateral pain, which may be referred pain from the originally painful region enhanced by cordotomy. In this study, we investigated the pain following cordotomy for bilateral cancer pain and speculated its pathogenesis.

Methods: Retrospective analysis of twenty six patients suffering from cancer pain in the lumbar sacral nerve region on both sides who received unilateral or bilateral percutaneous cordotomy (PCC) from 1981 to 2009 at Ehime University Hospital or associated hospitals. Clinical features and causes of the pain following cordotomy were examined.

Results: Unilateral PCC relieved the pain immediately after PCC in all patients. The pain on the opposite of the relieved pain increased in 21 patients and did not change in five patients. Bilateral PCC was performed in thirteen patients; two patients complained of residual pain, four patients complained of recurved pain having been relieved by unilateral PCC, and the remaining seven patients complained of new pain. The new pain located cephalad to the region rendered hypalgesic or analgesic by PCCs, and had no organic causes on roentgenography, and referral of pain from the originally painful region to the new pain was observed in three patients.

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Conclusions: This study shows that increase in pain following unilateral PCC and new pain following bilateral PCC occurred in most of patients. No organic cause and distinct referred pain suggest that the new pain following bilateral PCC was referred pain from the originally painful region.

ESRA1-0204
Chronic Pain Management
LUMBAR EPIDURAL INJECTION FOR THE MANAGEMENT OF PAIN OF SPINAL ORIGIN IN ADULTS: A SURVEY OF UK PRACTICE
Clarke M.1, Lee J.2. 1Anaesthetics, Worcestershire Royal Hospital, Worcester, United Kingdom.

Background and aims: In 2011, the Faculty of Pain Medicine of the The Royal College of Anaesthetists published recommendations regarding epidural injections in adults. This consensus related to ‘single-shot’ injections at any level of the neuraxis (cervical, thoracic, lumbar and caudal). With lumbar epidurals we recognised that our own practice did not meet all the recommendations. We performed a survey to ascertain the current practice of pain physicians based on aspects of the recommendations.

Methods: The British Pain Society provided addresses of practicing consultants in pain management and a postal questionnaire was sent to each. Microsoft Excel was used to aid data analysis.

Results: We received 83 replies from 207 questionnaires giving a response rate of 40%. Written consent for epidural injections was obtained by 95% (79/83) of respondents. Patients were informed of the ‘off-label’ nature of the epidural steroid by 26.5% (22/83). 65% (54/83) routinely sited a peripheral cannula prior to performing an epidural. 53% (44/83) routinely fasted their patients prior to injection. Fluoroscopy was routinely used by 62.7% (52/83). The use of aseptic precautions is illustrated below. 13.3% (11/83) of respondents were not aware of the recommendations.

FIGURE 1.

Conclusions: The survey demonstrates marked non-compliance with national recommendations. Some dissatisfaction with the evidence-base behind the recommendations was expressed. Further studies to reinforce this evidence may help to improve compliance.

ESRA1-0208
Obstetric
EFFICACY OF LOW DOSE HEAVY BUPIVACAINE WITH FENTANYL IN SPINAL ANAESTHESIA FOR CAESAREAN DELIVERY
Traina F.1, taraina E.2, al fortia E.3, omer M.4, shabash F.5 1Anesthesia and Intensive Care, Misrata Hospital, Misrata, Libya; 2Medicine, Misrata Hospital, Misrata, Libya; 3Obstetric and Gynecology, Misrata Hospital, Misrata, Libya; 4Ophthalmology, Misrata Hospital, Misrata, Libya.

Background and aims: Spinal anaesthesia is preferred anaesthetic technique for elective Caesarean deliveries hypotension remains an important side effect. Our study was designed to compare the efficacy of low dose heavy bupivacaine with fentanyl compares to standard dose in avoiding hypotension during spinal anaesthesia.

Methods: Hundred patients were randomized into two groups. Patients in group A (n=50) were given spinal anaesthesia using 10 mg heavy Bupivacaine with 25 μg fentanyl. Patients in group B (n=50) were given spinal anaesthesia using 7.5 mg heavy Bupivacaine with 25 μg fentanyl free preservative.

Vital signs were monitored as recommended for caesarean sections. We recorded the blood pressure of each patient every two minutes until the baby was delivered and the fetal Apgar score was recorded.

We observed the maximal level of sensory block and duration.

Results: Duration of effective anaesthesia (block to cold sensation above or at T3) was longer in the A group as compared with B group, P (0.05>). When comparing the changes in blood pressure, more patients in the A group experienced hypotension compares with the B group P (0.05> however, Neonatal outcomes were similar in both groups.

Conversion to general anaesthesia occurred only in B group (only one case).

Conclusions: small-dose spinal anaesthesia ( group B ) better preserve maternal hemodynamic stability with equally effective anaesthesia that is of shorter duration, it may be feasible only when the block can be reinforced using a functional epidural catheter.

ESRA1-0214
Chronic Pain Management
COMPARISON OF LANDMARK AND FLUOROSCOPIC TECHNIQUES FOR SACROILIAC JOINT INJECTIONS
Kersan L.1, Govenden D.2, Serpell M.2, Williams L.3. 1Anaesthetics, Victoria Infirmary, Glasgow, United Kingdom; 2Anaesthetics, Stobhill Hospital, Glasgow, United Kingdom; 3Anaesthetics, New Victoria Hospital, Glasgow, United Kingdom.

Background and aims: Accurate intra-articular needle placement without fluoroscopy has been shown to be as low as 12%. Yet in our centre some operators continue to use a landmark technique. We conducted a retrospective study to compare outcome by these two techniques.

It is unclear whether the addition of truncal blocks to the standard analgesic protocols including intrathecal morphine brings any further benefits. We hypothesise that regional anaesthesia techniques aiming specifically for nerves innervating T12/L1 dermatomes could be more effective than previously investigated TAP block.

Methods: Following ethical approval and written informed consent 60 patients were enrolled and randomized to two groups using computer generated numbers.

Group B, standard postoperative analgesia protocol, including spinal morphine (150mcg administered with spinal anaesthetic 2–2.5 ml of 0.5% Bupivacaine), paracetamol, diclofenac 50mg three a day and oxynorm if requested. Additionally bilateral ilioinguinal and iliohypogastric blocks were performed post-operatively using 10mls of 0.5% bupivacaine under ultrasound guidance.

Group S, standard postoperative protocol as described above. An injection of Normal saline done instead of local anaesthetic.

A blinded assessor measured patients VAS pain scores (at rest and on movement) at 6h intervals for the first 48h postoperatively. Oxycodone consumption measured at 6h, 12h, 24h and 48h was also measured along with time to the first analgesic request.

Results: Pain scores and oxycodone consumption were lower in the Block group as in the attached files. Median time to first analgesic requests was also significantly prolonged in the block group (1000min vs. 500min p=0.009)

Conclusions: Iliouinguinal-iliohypogastric nerve blocks were safe and led to easier patient mobilisation following the surgery.

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Methods: We searched for all sacroiliac joint injections on the Glasgow chronic pain database. These were categorized depending on whether or not x-ray was used. The primary outcomes measures were degree of pain relief and duration of pain relief.

Results: A total of 469 cases were identified. Of these, 116 were performed by a landmark technique and 353 were performed by fluoroscopy. A good outcome for degree of pain relief was taken to be over 30% relief. This was achieved in 67% under landmark and 62% under fluoroscopy. Pain relief over 8 weeks was considered to be necessary for successful treatment and was obtained in 22% of landmark techniques and 19% of fluoroscopic techniques.

Conclusions: It is surprising to find that an unguided technique can be equally effective without the benefit of fluoroscopy. It has been shown that peri-articular injection can produce a comparable clinical outcome to intra-articular injection which may account for these findings. Indeed a combined intra- and peri-articular technique may even be better. Exposure to radiation and cost are additional factors to suggest that clinic based treatment may be underestimated.

ESRA1-0218
Miscellaneous
NON-INVASIVE BLOOD HAEMOGLOBIN (SPHb) AND PLETH VARIABILITY INDEX (PVI) DURING BRACHIAL Plexus Block
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Background and aims: Plethysmographic measurements of haemoglobin concentration (SpHb), pleth variability index (PVI) and perfusion index (PI) with the Radical-7 apparatus is becoming popular. Poor precision in SpHb has been found, especially when PI is low. It has been proposed that peripheral haematocrit actually might increase with increasing vessel diameter. We wanted to discern what effect sympathetic block and the thereby induced vasodilation has on SpHb, PVI and PI.

Methods: Twenty patients (aged 17-86 years) receiving brachial plexus blocks for surgery were studied bilaterally with Radical-7 apparatuses. Measurements were taken before the block and then for 20 minutes after the block was completed.

Results: Within 3 minutes after the block the PI was significantly increased, reaching stable values (+188%) after 10 minutes. SpHb increased (+12.3 g/L) and PVI decreased (-54%) significantly but slower (see graphs 1A-B). Measurements in the unblocked arm did not change significantly.

Conclusions: Brachial plexus block altered SpHb, PVI and PI, which shows that regional nervous control of the arm greatly affects plethysmographic measurements obtained by the Radical-7. SpHb increases and PVI decreases after the brachial plexus block. This supports the idea that haematocrit increases with vasodilation.

ESRA1-0227
Chronic Pain Management
ASSESSMENT OF CLINICAL OUTCOMES OF EPIDURAL NEUROPLASTY USING THE RACZ CATHETER AND PREDICTIVE FACTORS OF TREATMENT EFFICACY IN PATIENTS WITH CERVICAL SPINAL PAIN
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Background and aims: Epidural neuroplasty using the Race® catheter has a therapeutic effect in patients with cervical disc herniation and central stenosis who do not respond to epidural injection. Our aim is to evaluate clinical outcomes of cervical epidural neuroplasty, and to demonstrate correlations between predictive factors and unsuccessful results of cervical epidural neuroplasty.

Methods: Outcome measures were obtained using the numeric rating scale (NRS) for total pain, neck pain, arm pain and sleep disturbance, the neck pain and disability scale (NPDS) as well as opioid consumption at preprocedure, 1 month, 3, 6, and 12 months after procedure. Successful epidural neuroplasty was defined as 50% or greater reduction of total pain, and at least 40% reduction in the NPDS. Clinical data and radiologic findings were obtained for evaluation.

Results: Of 169 patients, successful outcomes were observed in 108 patients (65.9%; 95% confidence interval [CI], 56.2%–71.0%) at 1 month following the procedure, in 109 patients (64.5%; 95% CI, 56.8%–71.6%) at 3 months, in 96 patients (56.8%; 95% CI, 49.1%–64.5%) at 6 months, and in 89 patients (52.7%; 95% CI, 44.4%–59.8%) at 12 months. Previous surgery, spondylolisthesis, and ossification of the posterior longitudinal ligament were significantly associated with unsuccessful outcomes as measured by NRS and NPDS (P<0.05).
**ESRA Abstracts**

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**ESRA1-0229**

**Peripheral Nerve Blocks**

**FASCIA ILIACA COMPARTMENT BLOCK FOR POSITIONING HIP FRACTURE PATIENTS FOR SPINAL ANAESTHESIA: A RANDOMIZED TRIAL**

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**Background and aims:** Appropriate pain management may positively affect outcome following hip fractures. Positioning patients for spinal anaesthesia (SA) can be extremely painful. Peripheral nerve blockades are slowly gaining popularity in this setting. This prospective, randomized study compares the efficacy of fascia iliaca compartment block (FICB) to intravenous (IV) fentanyl for positioning hip fracture patients for SA.

**Methods:** Forty-one patients scheduled for hip fracture surgery were randomized to receive a bolus dose of IV fentanyl 1.5 mcg/kg (IVFE group) or an FICB using 40 ml ropivacaine 0.5% (FICB group) five or twenty minutes before positioning for SA respectively. Numeric rating scale (NRS) scores prior to and following the analgesic intervention, time needed and quality of patient position for SA performance, postoperative analgesia in terms of time to first IV morphine dose demand and morphine consumption during the first 24 hours, and patient satisfaction were documented.

**Results:** Compared with the IVFE group, the FICB group showed significantly lower NRS scores in all instances following the analgesic intervention (P < 0.001), shorter spinal performance time (P = 0.001) and better quality of position (P = 0.001). Postoperative morphine consumption was lower (P = 0.026), the time to first dose demand was longer (P = 0.001) and patient satisfaction rates were higher (P = 0.001) in the FICB group.

**Conclusions:** Performing an FICB prior to positioning for SA provides superior performance management than IV fentanyl administration, facilitates SA performance, yields satisfactory postoperative analgesia and wide patient acceptance, hence improving overall quality and efficiency of care.

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**ESRA1-0236**

**Peripheral Nerve Blocks**

**CONTINUOUS FEMORAL BLOCK ANALESIA FOR KNEE ARTHROPLASTY: STIMULATING OR NOT STIMULATING CATHERETERS?**

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**Background and aims:** The use of continuous nerve blocks allows for longer periods of local anesthetic administration and results in excellent postoperative analgesia. Stimulating catheters are positioned maintaining nerve stimulation so the placement should be more accurate. Our objective is to assess if there are differences in analgesia when a stimulating catheter does not stimulate once placed properly.

**Methods:** After Research Ethical Committee approval, we collected data from patients undergoing major knee surgery from November 2009 to December 2013. The additional variables we collected included: catheter depth, catheter stimulation intensity and postoperative pain scores.

**Results:** We recorded 2,289 patients: 1,186 (79.4%) total knee arthroplasty and 473 (20.7%) knee arthroplasty reviews. In 1,450 patients (63.3%) stimulating femoral catheter was used for continuous analgesia. In 215 patients (15.1%) the catheter was placed and no stimulating response was obtained, in this cases no additional adjustment maneuvers were made during placement.

The catheter depth varied from 1-10 cm in 81.7% vs 84.6% for stimulating and non stimulating catheter respectively. Stimulation intensity was 0.01–0.4 milliamper in 80.6% of patients.

**Conclusions:** Cervical epidural neuroplasty may be an effective treatment for pain reduction and functional improvement in patients with cervical spinal pain who did not respond to conservative treatment, and may decrease surgical demand. Previous surgery, spondyloarthrosis, and ossification of the posterior longitudinal ligament are associated with unsuccessful outcomes of epidural neuroplasty.

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**ESRA1-0238**

**Peripheral Nerve Blocks**

**THE EFFECTS OF CATHETER TIP POSITIONING IN OUTPATIENTS CONTINUOUS POLPLITEAL SCIATIC NERVE BLOCK: PRELIMINARY DATA OF A PROSPECTIVE, RANDOMIZED STUDY**

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**Background and aims:** The insensate limb represents an undesired complication for ambulatory patients with continuous sciatic nerve catheter. The aim of this study was to detect the possibly difference in treatment of postoperative pain at home varying the final position of the catheter tip.

**Methods:** We have enrolled 37 patients undergone hallux valgus repair. By using an ultrasound-guide, in the first group the tip of the catheter was placed at the bifurcation of the sciatic nerve between the peroneal and tibial component (group 1: 20 pt), while in the second group the tip was positioned in the popliteal fossa medially to the tibial branch (group 2: 17 pt). A patient controlled electronic pump to deliver a solution of levobupivacaine 0.125% was used in both groups (2 ml/h, bolus 2 ml, lock out 20”).

**Results:** Twenty-four hours after continuous sciatic analgesia 7 patients (35%) in group 1 complained an insensate limb compared with none in group 2. Table 1 shows the mean value NRS in both groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>NRS 24h</th>
<th>NRS 48h</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (mean±SD)</td>
<td>3.9±1.33</td>
<td>3.70±0.82</td>
<td>2.35±0.58</td>
</tr>
<tr>
<td>Group 2 (mean±SD)</td>
<td>2.9±1.05</td>
<td>2.52±0.67</td>
<td>2.84±0.66</td>
</tr>
</tbody>
</table>

**Conclusions:** This preliminary results suggest that placement of the catheter in the popliteal fossa medially to the tibial branch provides similar analgesia than thus achieved with the classic placement between the 2 component of the sciatic nerve, but decreasing the risk of insensate limb in outpatients.

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**ESRA1-0242**

**Case Reports**

**REGIONAL ANAESTHESIA INCLUDING OBTURATOR NERVE BLOCKADE AS AN ALTERNATIVE TO EPIDURAL ANAESTHESIA: IMPLICATIONS FOR MICROVASCULAR SURGERY INVOLVING FREE GRACILIS MUSCLE FLAP**

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**Background and aims:** A 74 year old man presented for tibial ostomyelitis excision and free gracilis muscle flap (FGF) surgery. Epidural anaesthesia and sedation, an anaesthetic technique commonly used in our centre for this type of surgery, was planned.

**Methods:** Unexpectedly, lumbar epidural insertion was complicated by three bloody taps at three levels and abandoned. As the FGF was to be harvested from ipsilateral thigh, an alternative regional anaesthesia option was deemed

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appropriate: ultrasound-guided femoral, sciatic and obturator nerve blocks were performed in combination with general anaesthesia.

Results: When gracilis muscle was being harvested the plastic surgeon expressed concern on finding some bloody serous fluid surrounding the flap pedicle. Fortunately, the arterial supply was unaffected and FGF surgery continued as planned.

The patient was stable throughout. Peripheral regional blocks provided good postoperative analgesia for over 24 hours, with a positive feedback from the patient. The flap was successful and the patient made good overall recovery.

Conclusions: Regional anaesthesia and analgesia, epidurals in particular, are strongly believed to be beneficial for free flap surgery. If epidural anaesthesia is not possible, alternative regional techniques should be applied.

The gracilis muscle, widely used in microvascular surgery, receives sensory innervation from the obturator nerve. As the artery supplying gracilis muscle is close to the point where the block is often performed and arterial trauma can compromise the flap pedicle and outcome, obturator nerve block for FGF surgery should be discussed with the surgeon. Another possible option could have been performing the block under direct vision after the muscle harvesting.

ESRA1-0244
Miscellaneous

A DECISIONAL FLOWCHART FOR INTRAOPERATIVE MONITORING STRATEGY DURING ELECTIVE CAROTID ENDOARTERECTOMY (CEA): THE ROLE OF REGIONAL ANAESTHESIA AND TRANSCRANIAL DOPPLER.

Guzzetti L.1, Bacuzzi A.2, Cantone G.3, Severgnini P.1, Del Romano M.1, Carnelli M.1, Cuffari S.1,2 Anesthesia and Intensive Care, Università degli Studi dell'Insubria, Varese, Italy, 2Anesthesia and Intensive Care, Ospedale di Circolo Fondazione Macchi, Varese, Italy.

Background and aims: While there is a consensus about the way to treat the patients with carotid disease, the best anaesthesiological plane for these procedures is not clear; general anaesthesia or regional anaesthesia each have got advantages or disadvantages. In our opinion the possibility to perform a cervical plexus block in particular superficial or intermediate to avoid the complications related to the deep one, maintaining the patient awake, could improve the quality of intraoperative monitoring during CEA.

Methods: We have done a decisional flowchart about intraoperative monitoring in our hospital in Varese (Italy) in according to recent published studies.

Results: There are two crucial points: the execution of a cervical plexus block and the presence of an adequate cerebral sonography (fig. 1).

FIGURE 1.

Conclusions: A direct visual contact and execution of simple orders could reveal cerebral suffering rapidly and effectively. In literature, the TCD has shown its role in preventing postoperative stroke detecting asymptomatic embolization and it is well correlated with the cerebral suffering signs in the awake patients. The Doppler evaluation has got a moderate PPV but high NPV compared with EEG to detect ischemia during CEA.

ESRA1-0251
Central Nerve Blocks

THE USE OF ULTRASOUND CAN REDUCE COMPLICATIONS OF EPIDURAL ANALGESIA IN OBSTETRIC PATIENTS

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Background and aims: Epidural analgesia used in obstetric patients and labor analgesia is not without complications. Ultrasound neuraxial assessment may improve quality and satisfaction of parturient. The aim of this study is to evaluate whether ultrasound prescanning is able to reduce complications.

Methods: After ethics committee approval, parturients were included into two groups: "Group U" (184 patients) in which epidural was performed researching the landmarks, iliac crests and interspinous spaces; “Group US” in which an ultrasound prescanning was first performed according a transverse and longitudinal paramedian plane (2–5 MHz curved probe). A Tuohy needle was inserted in both groups looking for a feeling of loss of resistance. BMI for each patient was recorded. Number of punctures, needle reorientations and complications were collected.

Results: Our analysis showed that the most important problem was obesity, particularly with regard to higher BMI that was an important risk factor for complications (OR=1.063 [1.018 to 1.123] per point of BMI ≥ 25). Ultrasound demonstrated to reduce risks, complications, failure, number of attempts, needle redirection, accidental puncture of the dura mater, impact against the bony structures and catheter malpositions (OR = 0.278 [0.146 to 0.689]).

Conclusions: Ultrasound allows to evaluate the depth of the epidural space, better locate it reducing failure rate and follow the introduction of the epidural catheter avoiding possible lateralization which is often the cause of unilateral paresthesia and motor weakness of the lower limbs. Remains confirmed the high BMI as a major risk factor that can be significantly reduced through the use of ultrasound.

ESRA1-0256
Central Nerve Blocks

UTILITY OF ULTRASOUND PRE-SCANNING FOR DIFFICULT SPINAL ANESTHESIA IN PATIENTS SUFFERING FROM SCOLIOSIS

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Background and aims: We performed a prospective, observational study using ultrasound neuraxial visualization of the posterior longitudinal ligament (PLL) to predict difficulty for spinal anesthesia in patients with scoliosis.

Methods: After ethics committee approval 38 patients (15 males and 23 females) scheduled for surgery of the lower limbs or caesarean section affected from scoliosis (5°–20°) underwent ultrasound prescanning of the lumbar spine using a 2-5 MHz curved transducer. Bilateral paramedian long axis views were obtained at levels L2-S1. Visualization of the PLL at each interspace was graded with a numerical scale score: 0 (absent), 1 (hazy), or 2 (bright). The score was
related to the number of attempts to puncture performed to achieve the cerebrospinal fluid. A score of less than 9 meant greater difficulty in identifying the subarachnoid space.

**Results:** The success rate and the identification of the subarachnoid space was greater in patients with a score $>9$ (95%; CI 4.1041; p=0.002). In this group there were more patients with higher BMI and obesity (56%). Poor visualization of the PLL predicted difficulty in finding the subarachnoid space. In these patients we found a higher score $>9$ with more than one attempts made to identify the subarachnoid space. The time required to successfully perform the spinal anesthesia was higher for patients with score $<9$.

**Conclusions:** Difficulty to visualize with ultrasound the PLL at multiple intervertebral space will be useful to predict the difficulty or to identify an optimal vertebral interspace.

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**ESRA1-0264**

**Case Reports**

**FROM SURGICAL PLATE ELECTRODE TO DORSAL ROOT GANGLION STIMULATION, 29 YEAR OF EFFECTIVE NEUROPATHIC PAIN RELIEF WITH NEUROMODULATION: A CASE REPORT**

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**Background and aims:** Spinal cord stimulation (SCS) is a widely accepted treatment option for chronic intractable neuropathic pain. However, the level of evidence for its long-term efficacy is still moderate. (1) The objective of this case report is to describe a successful case of long-term SCS for the treatment of neuropathic pain.

**Methods:** A 23-year-old woman with an 11-year history of severe chronic intractable neuropathic postoperative pain at the lower right leg was implanted with a surgical epidural plate electrode in 1985. The SCS resulted in a significant decrease of the patient’s pain. From 2001 to 2012 she reported pain recurrence only at moments of battery discharge and lead displacement. In November 2012 a conventional quadripolar lead was implanted at the left L4 dorsal root ganglion (DRG) with complete pain reduction but with complaints of sporadic involuntary tonic contractions during walking. In October 2013, at the age of 51, the lead was replaced with a novel lead for DRG stimulation (figure 1).

**Results:** DRG stimulation lead at the left L4 DRG.

After a successful trial period with complete pain reduction and disappearance of the involuntary tonic contractions during walking, she received a new implantable stimulator. Since 1985 she reports superior pain relief from various SCS treatment when compared to medical therapy.

**Conclusions:** We describe a case of successful long-term SCS in a patient with chronic intractable neuropathic postoperative pain.

**Reference:**

psychological parameters. Catastrophic thinking and patient’s distress were significantly lower at three month post SCS implantation. Levels of improvement stayed at the same level during observed time.

ESRAI-0273
Case Reports

THORACIC EPIDURAL CAUDAL ECO-GUIDED APPROACH TO PYLOROMYOTOMY: THE BEST OPTION?!

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Background and aims: Hypertrophic pyloric stenosis (HPS) is a common gastrointestinal disorder, tends to arise with non-bilious vomiting in jet, weight loss, dehydration and electrolyte abnormalities.

A pyloromyotomy is the surgical technique of choice. But the risk of gastric regurgitation and aspiration, and postoperative apnea, has led to growing interest in loco-regional approaches. The caudal block has been deemed insufficient for pyloromyotomy, requiring high doses of anesthetic, considered unsafe.

This paper reports a case of successful approach with thoracic epidural anesthesia via caudal approach for catheter placed under direct visualization through ultrasound system.

Methods: Infant male, ASA II, 3.95 kg and diagnosis of HPS. Was proposed for thoracic epidural catheter placed by caudal approach under direct visualization through ultrasound system, for pyloromyotomy.

Results: Proceeded to the placement of the epidural catheter, up to T4. Then made single-shot of 0.2% hyperbaric bupivacaine with direct visualization of the dispersion of the anesthetic having been administered a total of 1.8ml of the same.

Conclusions: Loco-regional techniques have increasingly accepted, showing great efficacy and safety. Anesthesia for thoracic dermatomes from caudal block requires potentially toxic doses of anesthetic, and also implies lumbar and sacral anesthesia. This described approach allows to reduce the dose of anesthetic, minimizing risks, and the possibility of segmental anesthesia. Moreover, when you insert the catheter caudal approach, with greater safety and ease, you avoid the risks, potentially catastrophic, thoracic anesthesia by single shot. With this technique, yet it avoids the potential complications of general anesthesia, with less time of fasting and admission.

ESRAI-0279
Chronic Pain Management

LONG TERM ANALGESIC EFFICACY OF SPINAL CORD STIMULATION (SCS) - TIME RESPONSE RELATIONSHIP

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Background and aims: This prospective audit (ethical approval not needed) was designed to observe the analgesic efficacy over six years following SCS implantation for the management of a variety of chronic pain syndromes in a single centre.

Methods: 30 patients (CRPS 9, FBSS 10, neuropathic pain 7, angina 4) underwent SCS implantation between 2004 and 2008 at university hospital inter-disciplinary pain centre. The statistical difference in pain scores was measured pre-implantation, at 3, 6 months and annual follow up. The pain was recorded on a visual analogue scale (VAS) for pain related to the chronic pain syndrome and on a scale measuring pain relief (between 0 and 100% - maximal improvement) due to SCS input.

Results: There is a significant reduction in VAS pain score (figure 1) following implantation from VAS 8 (SD 1.2) pre-implantation to 5 (SD 1.9) and 4.5 (SD 2.2) at three months and six years post implantation, p<0.000001.
Conclusions: SCS provides significant pain relief for the patients with refractory pain treated according to national guidelines which is demonstrated three months after implantation and is maintained on similar level for six year period of follow ups.

ESRA1-0281
Obstetric
CONVERSION OF SPINAL TO GENERAL ANAESTHESIA FOR CAESAREAN SECTION
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Background and aims: Regional anaesthesia (RA) is recommended for caesarean section (CS). Conversion to general anaesthesia (GA) due to failed RA exposes women to the risks of both techniques.

We aimed to determine the rates and reasons for conversion from spinal anaesthesia (SA) to GA.
Methods: After approval from our Trust audit department we conducted a retrospective audit. All women who had undergone anaesthesia for CS between January 2012 and September 2013 were identified. We analysed the records of those who had required conversion from SA to GA.
Results: Of the 8464 deliveries that took place, 1925 (23%) were performed by C.S. 1563 (81%) under SA, 167 (9%) by epidural top-up and 195 (10%) under GA. 38 women required conversion from SA to GA.

<table>
<thead>
<tr>
<th>Procedural failure</th>
<th>19 (50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No time to establish block</td>
<td>6 (16%)</td>
</tr>
<tr>
<td>Intraoperative pain</td>
<td>5 (13%)</td>
</tr>
<tr>
<td>Maternal request</td>
<td>4 (10.5%)</td>
</tr>
<tr>
<td>Surgical complications</td>
<td>4 (10.5%)</td>
</tr>
</tbody>
</table>

FIGURE 1.

Procedural failure accounted for half of all conversions. Of these, 13 (68%) had a BMI ≥30 Kg/m² with 6 of those having a BMI ≥40 Kg/m².

Conclusions: In the UK, the conversion rate is around 1.5%. Our audit demonstrated a rate of 2.4%.

Procedural failure was the most common indication for conversion to GA. Maternal obesity played a significant role. Ultrasound could prove a useful adjunct for facilitating SA in obese obstetric patients.

Timely communication between multidisciplinary team members could increase the time available for SA and assist the anaesthetist when deciding upon the most appropriate anaesthetic technique.

ESRA1-0283
Obstetric
OPERATING TABLE TILT DURING CAESAREAN SECTION UNDER REGIONAL ANAESTHESIA – A PROSPECTIVE AUDIT
Williams S.1 1Anaesthetics, Queens Hospital Barton, Derby, United Kingdom.
Background and aims: During caesarean section it is recommended to tilt the operating table 15 degrees left lateral to prevent maternal aorto-caval compression and its undesirable sequelae. This audit aimed to assess how frequently 15 degrees of left lateral tilt was maintained until delivery of the fetus and what the most frequently occurring reasons for removing tilt were.

Methods: Following spinal, epidural or combined spinal epidural the parturient was positioned supine and left lateral tilt placed on the operating table. The degree of tilt was measured using a smart phone application. The table was then tilted to 15 degrees unless there were patient safety concerns. If any tilt was subsequently removed the reason was documented and the degree of tilt re-measured unless this was prevented by clinical urgency of the case. This audit was granted local ethical approval before commencement.

Results: During a 1 month period 29 caesarean sections from were audited; 25 of which used spinal anaesthesia, 3 epidural, and 1 CSE. In 11 cases left lateral tilt was reduced before delivery. In 7 cases this was because of surgical request and in 4 cases it was due to anaesthetists request. When tilt was removed the mean angle at re-measurement was 8 degrees. Paternium BMI at pregnancy booking in cases where tilt was removed was over 40 in 8 cases.

Conclusions: Maintaining 15 degrees of left lateral tilt until fetal delivery was not practical for surgeons in 28% of cases and occurred most commonly in morbidly obese parturients.

ESRA1-0287
Case Reports
PERSISTENT SCIATIC AND SAPHENOUS NEUROPATHY AFTER POPPLITEAL-SAPHENOUS NERVE BLOCK WITH PERINEURAL DEXAMETHASONE AND BUPIVACAINE.
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Background and aims: We present a case in which severe post-operative nerve injury occurred after an otherwise uneventful guided popliteal and saphenous nerve block was performed, with a combination of perineural 0.5% bupivacaine and 8 mg dexamethasone.

Methods: A 32 year old 95 kg male presented for repair of a peroneal tendon injury. A solution of local anaesthetic was prepared, consisting of 60 mL of bupivacaine 0.5%, dexamethasone 8 mg, and epinephrine 150 mcg. Using ultrasound guidance, 40 mL of this local anaesthetic solution was deposited around the common fibular and posterior tibial nerves, without evidence of nerve swelling. After surgery, the patient's foot remained insensate until the 4th post-operative day. Nerve conduction studies and needle EMG studies on the 6th post-operative day demonstrated significant axonal injury patterns to these nerves, including the saphenous nerve.

Results: Dexamethasone has become increasingly popular as a standard peripheral neural adjuvant, despite a lack of evidence demonstrating a direct neural site of action. There is no consensus on dosing and route of administration, and there may even be no advantage to its use with respect of quality of recovery. In this case, severe axonal injury occurred in the setting of perineurally administered dexamethasone, and hence cannot be excluded as having potentially contributed to the cause of this neuropathy.

Conclusions: In the absence of dose-response pharmacologic data for peripheral and parenteral dexamethasone administration, and given the multi-factorial nature of post-block peripheral nerve injury, caution is advised against routine perineural administration of dexamethasone.

ESRA1-0303
Miscellaneous
EVALUATION OF CYTOTOXIC EFFECT OF LIDOCAINE IN ORAL CANCER CELL LINES
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Background and aims: Topical application of local anaesthetics has been reported to produce good pain control in patients with head and neck tumours and to inhibit cancer cell proliferation, invasion and migration. The mechanisms underlying these effects are not fully understood, namely in oral cancer. With this work, we intend to evaluate the cytotoxic effect of lidocaine in oral cancer cell lines (OCC), namely in cell viability and proliferation.

Methods: For this purpose, we used two OCC cell lines, the HSC-3 (metastatic) and BICR-10 (in situ) cells, cultured in the presence and absence of different concentrations of lidocaine for 72 hours. Cell proliferation was evaluated by the Alamar Blue assay. Cell death was analyzed by optical microscopy after

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May–Grunwald staining and by flow cytometry using annexin-V and propidium iodide assay. Flow cytometry was also used to analyse cell cycle (using propidium iodide incorporation), caspases levels (apopstat kit) and mitochondrial membrane potential by JC-1 assay.

**Results:** Our results show that lidocaine induced a cytotoxic and antiproliferative effect in a dose, time and cell type-dependent manner. HSC-3 cells seem to be more sensitive to lidocaine effect than BICR-10 cells, as the IC-50 at 48 hours was 4 – 4.5 mM and 5 – 6 mM, respectively. Furthermore, lidocaine induced cell death mainly by apoptosis and apoptosis/necrosis, which may be related with the observed increase in caspases levels and pre-G1 peak in cell cycle and with the mitochondrial membrane potential decrease.

**Conclusions:** Our results suggest that lidocaine may be a new therapeutic adjuvant in oral cancer, namely in metastatic cancer.

**ESRA1-0306 Obstetric**

CONTINUOUS EPIDURAL INFUSION VERSUS PROGRAMMED INTERMITTENT EPIDURAL BOLUS FOR LABOR ANALGESIA: IMPACT ON MATERNAL MOTOR FUNCTION AND SATISFACTION

Freitas J.1, Veiga M.1, Zenha S.1, Vieira M.1, Seifert I.1.1, Anesthesiology, Hospital Central do Funchal, Funchal, Portugal.

**Background and aims:** The degree of pain and the quality of pain relief affects patients satisfaction with the birthing process. The aim of this study was to evaluate the effects on motor function and satisfaction in women who received programmed intermittent epidural bolus (PIEB) or continuous epidural infusion (CEI) for maintenance of labor analgesia.

**Methods:** After study approval by the institutional ethics committee, a prospective study was conducted in women who requested labor analgesia during 4 months. After an initial epidural loading dose of Ropivacaine 0.15% with Sufentanil 0.5μg/ml, patients were randomly assigned to receive PIEB or CEI (Ropivacaine 0.1% plus Sufentanil 0.2μg/ml - 10 ml/h). Rescue bolus of 5 ml was allowed in both groups with the infusion pump. Descriptive analyses of variables were used to summarize data and parametric tests were performed for comparisons. A p<0.05 was considered significantly different.

**Results:** 310 patients were studied (PIEB=139; CEI=171). Motor block was compared with the bithing process. The aim of this study was to evaluate the effects on motor function and satisfaction in women who received programmed intermittent epidural bolus (PIEB) or continuous epidural infusion (CEI) for maintenance of labor analgesia.

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**Results:** 310 patients were studied (PIEB=139; CEI=171). Motor block was reported in 16.1% in the CEI group and in 6.8% in the PIEB group (p<0.038). In the CEI group 6.6% reported nausea and vomiting and 11.4% pruritis vs 1.7% and 5.1% in the PIEB group. Satisfaction mean scores in CEI group were 8.59±0.2 and 8.50±0.3 in PIEB group. No significant differences were found compared with CEI resulted in lower maternal motor block the satisfaction mean scores was similar in both groups.

**Conclusions:** Although maintenance of epidural analgesia with PIEB compared with CEI resulted in lower maternal motor block the satisfaction mean scores was similar in both groups.

**ESRA1-0314 Obstetric**

CHRONIC PAIN MANAGEMENT

Kafafy A.1, Nazal A.2.1 Anaesthetics, Gloucestershire hospitals NHS trust, Gloucester, United Kingdom, 2Anaesthetics, University hospital Birmingham, Birmingham, United Kingdom.

**Background and aims:** Chronic neck pain, a common cause of disability, seems to be the result of several interacting mechanisms. One common type of trauma associated with chronic neck pain is whiplash-associated disorder (WAD) (1).

Although relief may not be permanent, there is strong evidence that radiofrequency denervation is effective in reducing pain in patients with chronic whiplash injury. Moreover, it appears that the procedure can be repeated with a similar probability of success (2).

Here we present a case of Horner syndrome as an unusual complications of Cervical median branch radiofrequency neurotomy.

**Methods:** A 49 years old woman has suffered a whiplash injury in July 2007 after a road traffic accident caused her severe persistent neck pain, she underwent a left C5-C6 and C7 median branch radiofrequency neurotomy in theatres under fluoroscopy guide.

15 minutes after the procedure the patient developed headache, left sided flushed face, dropping of left eye lid with blurred vision, smaller left pupil and tingling in her left arm.

The patients’ clinical signs confirmed left Horner syndrome. The patient's symptoms completely subsided on the second morning.

**Results:** Telephone follow up 8 weeks after the injection, the patient did not report any further side effects.

**Conclusions:** This report documents the unusual occurrence of Horner syndrome following cervical median branch radiofrequency neurotomy. Although Horner syndrome is well recognized following stellate ganglion block, we found no other reports of Horner syndrome following cervical facet joints radiofrequency neurotomy. Physicians involved with radiofrequency denervations should be aware of this potential complication.

**ESRA1-0317 Miscellaneous**

A SURVEY COMPARING ANAESTHETIC CONSENT OF NEUROAXIAL BLOCKS, PERIPHERAL NERVE BLOCKS AND GENERAL ANAESTHETICS BETWEEN TWO REGIONS

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**Background and aims:** Anaesthesia has the potential to expose any patient to a wide variety of risks. Some of these complications are so rare that it is difficult to quantify the likelihood of them occurring. The AAGBI states in its guidance that information should be provided about “rare but serious complications.” The following survey was designed to find out if anaesthetists routinely give information to their patients about rare but serious complications.

**Methods:** A survey was undertaken of anaesthetists working in two regions over three sites: Lister Hospital, Queen Elizabeth II Hospital and the John Radcliffe Hospital. The survey included 4 open questions asking participants which risks they routinely explain to patients when consenting for neuroaxial blocks, peripheral nerve blocks, general anaesthesia and any situations in which the doctors modified their consenting procedure.

**Results:** In total 50 anaesthetists returned survey forms. The commonly mentioned risks for neuroaxial blocks were nerve injury, failed or incomplete block and post-dural puncture headache. The commonly explained risks for peripheral nerve blocks were nerve injury and block failure. In total 23 factors were given as reasons to modify the consenting process. When the results are separated into regions similar risks are explained.

**Conclusions:** In conclusion, our survey shows that many anaesthetists do not mention “rare but serious” risks when consenting for anaesthesia and that this is not affected by region. National guidelines recommend against this practice.

**ESRA1-0327 Obstetric**

FAILURE OF NEUROAXIAL BLOCKADE IN CAESAREAN DELIVERY ANAESTHESIA: RETROSPECTIVE STUDY OF INCIDENCE AND DETERMINANTS OF FAILURE

Pinho C.1, Pereira L.1, Cruz S.1, Freitas J.2, Faría A.1.1 Anaesthesiology, Centro Hospitalar São João, Porto, Portugal, 2Anaesthesiology, Hospital Central do Funchal, Funchal, Portugal.

**Background and aims:** The incidence of caesarean section has increased significantly in recent years. Neuroaxial blockade (NAB) is considered the method of choice in anaesthesia for caesarean section, when compared with general anaesthesia (GA). The aim of this study was to determine the incidence of NAB’s failure in caesarean section and identify the determinants associated.

**Methods:** Retrospective study performed in 1380 pregnant women undergoing elective or urgent caesarean section under NAB (January 2011- December 2012). Women aged above 16 years, ASA I-III, undergoing epidural block (EB), single shot subarachnoid block (ssSAB) and subarachnoid block under sequential technique (SABSt) were included. Caesareans performed under GA as first choice were excluded. Descriptive analyses, t-test and Chi² test were performed.

**Results:** The incidence of NAB’s failure was 5.6% in elective caesarean sections and 14.6% in urgent caesarean sections. In urgent caesarean sections, the percentage of failure of EB was higher when compared with SAB (17.2% vs 7.4%, p < 0.001). Women younger than 31 years had more percentage of NAB’s failure (16% vs 7.7%, p < 0.001), as well as women with gestational age above 40 weeks (13.8% vs 9.2%, p = 0.008). There was a higher percentage of NAB’s failure in pregnant women whose indication for caesarean delivery was breech or fetal distress.
delivery was prolonged labor (15.2% vs 10.7%, p = 0.031). There was no statistical association with other factors evaluated.

Conclusions: The incidence of NAB’s failure was higher in urgent caesareans comparing with elective caesareans. In urgent caesareans, the determinants of NAB’s failure were the EB, young mothers, high gestational age and prolonged labor.

ESRA1-0330
Case Reports

FLUOROSCOPIC-ASSISTED LUMBAR DRAIN PLACEMENT AFTER FAILURE TO IDENTIFY ULTRASOUND ACOUSTIC WINDOW IN A PATIENT WITH UNKNOWN PREVIOUS LUMBAR BACK SURGERY

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Background and aims: We present a case of an elderly woman with unknown previous lumbar back surgery, in whom we were unable to place a surgery requested lumbar drain using landmark or ultrasound assisted techniques. The pre-procedure ultrasound scan was predictive of a low probability of procedure success without the use of fluoroscopy.

Methods: A 71 year-old white female was scheduled for urgent endovascular aneurysm repair and pre-procedure lumbar intrathecal drain placement. After several unsuccessful attempts using landmark techniques, ultrasoundography was utilized. Although the midline could be easily located, it was not possible to find an inter-laminar window in either the midline or paramedian oblique view. Despite this, multiple unsuccessful attempts were made with real-time ultrasound guided needle advancement, eventually resulting in a bloody tap. Fluoroscopy was then used to locate the L4-L5 interspace, and the intrathecal space was successfully accessed and a lumbar drain was placed on the first attempt.

Results: Neuraxial ultrasound has been used to enhance placement of difficult spinal blocks, and can also be used to assist with difficult lumbar drain placement. Placement of a lumbar drain is considered to be an essential element of the surgical procedure, in order to minimize the risks of paraplegia and cord injury. The inability to identify ultrasound generated acoustic windows in the lumbar spine should prompt immediate consideration of fluoroscopic guidance.

Conclusions: Patients requiring lumbar drain placement with poor anatomic landmarks and absence of ultrasound acoustic windows may benefit from the early use of fluoroscopy in order to enhance procedure success and minimize potential complications.

ESRA1-0338
Peripheral Nerve Blocks

THERMOGRAPHIC TEMPERATURE MEASUREMENT IN THE EFFECTIVENESS OF ULTRASOUND-GUIDED TRANSVERSE ABDOMINIS PLANE BLOCK

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Background and aims: Various assessment methods including infrared thermography have been used to assess the effectiveness of peripheral block, especially limb and central neuraxial block. However, the effect of peripheral block on the body trunk is unknown. We designed this study to evaluate the usefulness of thermographic temperature measurement during ultrasound-guided transversus abdominis plane (TAP) block.

Methods: This study was approved by the institutional ethics committee, and informed consent was obtained from each patient. Ten patients undergoing inguinal hernia repair surgery were included. We performed ultrasound-guided TAP block, injected 25 ml of 0.3 % ropivacaine and measured the abdominal skin temperature after surgery with infrared thermography. The temperature of the blocked side was compared with that of the unblocked side. Moreover, temperature measurement with thermography was compared with patient response to a cold test, as a means to assess the success or failure of block.

Results: Compared with the unblocked side, skin temperature of the blocked side was increased by 2.0 ± 0.6 °C (p = 0.00). The positive responses on the cold test were distributed proportionally to the increase in the temperature of the skin.

Conclusions: It was possible to visualize the area of effect by TAP block objectively. Infrared thermography can be used to map skin temperature after ultrasound-guided TAP block.

ESRA1-0339
Peripheral Nerve Blocks

UNPLANNED ADMISSION RATES AND REASONS FOLLOWING DAY CASE SHOULDER SURGERY

Lake K.1, Valentine L.1, Macfarlane A.1 1 Anaesthetics, Glasgow Royal Infirmary, Glasgow, United Kingdom.

Background and aims: Procedural boundaries often change as experience of a technique grows. Accordingly, ambulatory shoulder surgery undertaken in our unit now includes complex surgical (resection/extension cuff repairs, open procedures) and anaesthetic (body mass index [BMI] up to 45) cases. This audit aimed to assess unplanned admissions following ambulatory shoulder surgery.

Methods: Unplanned day-case shoulder surgery admissions over a two-year period were retrospectively and anonymously identified from ward documentation. Age, BMI, surgical procedure and admission reason were noted, along with smoking and respiratory status. Chi squared tests were used to examine for significance.

Results: 338 operations (March 2012 to March 2014) were included. Nearly all patients had a low volume interscalene block (<15mls) plus/minus a general anaesthetic. 38 patients were admitted to the ward and 29 stayed overnight [Table 1].

<table>
<thead>
<tr>
<th>Reason for ward admission</th>
<th>Number of those admitted who stayed overnight</th>
<th>Comments/statistical analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea (6)</td>
<td>3</td>
<td>Risk increased BMI &gt;37 vs BMI &lt;37 (p=0.0075)</td>
</tr>
<tr>
<td>Desaturation (12)</td>
<td>11</td>
<td>Age &gt;60 vs age &lt;60 (p=0.0065)</td>
</tr>
<tr>
<td>‘Extended recovery’ (16)</td>
<td>11</td>
<td>No significant effect Respiratory status, smoking</td>
</tr>
<tr>
<td>Dizziness (1)</td>
<td>1</td>
<td>No significant effect BMI, age, respiratory status, smoking</td>
</tr>
<tr>
<td>Pain (1)</td>
<td>1</td>
<td>No block</td>
</tr>
<tr>
<td>Extended surgery (2)</td>
<td>2</td>
<td>No block</td>
</tr>
<tr>
<td>Totals</td>
<td>38</td>
<td>29</td>
</tr>
<tr>
<td>% of total cases (%)</td>
<td>11.2%</td>
<td>8.6%</td>
</tr>
</tbody>
</table>

Conclusions: Our unplanned admission rate (8.6%) is higher than the 2% standard, likely due to case complexity. Desaturation (significantly linked to age and BMI), but not pain, was the commonest specific reason. Nevertheless the desaturation rate was low (3.5%), despite a clinically successful interscalene block in all patients.

ESRA1-0341
Peripheral Nerve Blocks

TAP BLOCK PLUS ILIOINGUINAL/ILIOHYPOGASTRIC NERVE BLOCK IN PERIOPERATIVE MANAGEMENT OF INGUINAL HERNIA REPAIR

Frassanito L.1, De Carlo C.1, Gonnella G.1, Scaroni M.1, Giuri P.1, Vagnoni S.1, Pitoni S.1, Draisci G.1 1 Anaesthesiology, Università Cattolica del Sacro Cuore, Roma, Italy.

Background and aims: The analgesic benefit of transversus abdominis plane block (TAPB) in peripерoperative management of inguinal hernia repair (IHR) is debated. The aim of this study was to evaluate the analgesic effect of TAP block combined with ilioinguinal/iliohypogastric nerve block (IINB) in patients scheduled for IHR.

Methods: Thirty patients undergoing outpatient IHR were enrolled. Patients were randomly allocated to case group (TAPB plus IINB) or to control group (IINB). The anesthetic procedures were performed under ultrasound guidance. The outcome measures were the incidence of inadequate anesthesia during surgery (requiring systemic sedation and/or infiltration of local anesthetic) and the
pain scores while coughing and at rest after surgery (end of surgery, 2h, 12h and 24h) between the two groups.

Results: Five patients (33%) of the case group vs 10 patients (66%) of the control group (p < 0.05) needed intraoperative sedation. No significant differences in additional local anesthetic volume and VAS score at the end of surgery were found between the two groups. Patients enrolled in the case group reported lower pain scores at the 2h postoperative evaluation (at rest 2.7 vs 6.1, p < 0.05, on coughing 3.1 vs 6.9, p < 0.05), at the 12 h (at rest 2.5 vs 5.8, p < 0.05, on coughing 2.8 vs 5.9, p < 0.05) and at 24 h (at rest 1.9 vs 4.1, p < 0.05, on coughing 2.5 vs 5.2, p < 0.05).

Conclusions: The combination of TAPB with INB is associated with better intrathecal fentanyl and lower post-operative pain scores as compared with control.

References:

ESRA1-0349
Case Reports

INNOVATIVE INJECTABLE WIRELESS MICRO-NEUROSTIMULATOR: A NEW OPPORTUNITY FOR THE TREATMENT OF CHRONIC PAIN: THE FIRST ITALIAN SUBCUTANEOUS IMPLANT
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Background and aims: Neurostimulation is a well-established treatment for chronic intractable pain since 60s. However it is highly inconvenient and invasive, often leaving the patient unable to receive treatment when needed most. The effectiveness of an implanted wireless microstimulator (mettere nome nde) for the treatment of post-herpetic neuropathic pain (PHN) has been tested.

Methods: 40 years old woman with a PHN for 5 years unresponsive to pharmacologic treatments was implanted with a wireless micro-stimulator (Stimwave Technologies Inc. TM). The system is composed of percutaneous microchip leads with wireless technology integrated (1mm x 10 cm). Patient was implanted with two subcutaneous 4 polar leads in the left dorsal paravertebral region. The implant didn’t need tunnelization action and creation of pocket for IPG with optoelectronic coating for a self-sufficient, often leaving the patient unable to receive treatment when needed most.

Results: No complications occurred during surgical procedure. Leads was placed using an eco-guided technique with a local anaesthesia. The surgical incision was only 20 mm. After 1 month of stimulation patient reported a 50% reduction of pain.

Conclusions: This device should be an inexpensive, safe, and convenient solution for patients with chronic pain of different origins.

The innovation holds promise for heightened efficacy while reducing the major risk of safety risks and side-effects compared to existing pain management solutions.

ESRA1-0350
Central Nerve Blocks

DETERMINATION OF THE INITIAL MINIMUM EFFECTIVE DOSE OF 0.5% BUPIVACAINE WITH 20MCG OF FENTANYL FOR AN OPERATIVE FIXATION OF FRACTURED NECK OF FEMUR
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Background and aims: Continuous spinal anaesthesia is evolving as the preferred technique for high risk orthopaedic patients. However, the optimum dose of local anaesthetic combined with intrathecal opiate required to commence emergency hip surgery is unknown.

Methods: We designed a study to determine the initial minimum effective dose of bupivacaine 0.5% with 20mcg of fentanyl required to initiate the operative fixation of fractured neck of femur. Patients randomly allocated to groups with a different dose of local anaesthetic and fentanyl (20mcg, 60mcg, 100mcg) under aseptic conditions. The primary endpoint was the time to first systemic and local anaesthetic requirement. The difference between the groups was determined by comparing the proportion of patients requiring rescue analgesia using the chi-squared test.

Results: A total of 30 patients (15 in each group) were included in the study. The primary endpoint was achieved in all groups with no significant differences in the time to first rescue analgesia between the groups (p > 0.05). The total consumption of analgesics was similar between the groups (p > 0.05).

Conclusions: Continuous spinal anaesthesia is an effective technique for emergency hip surgery. The initial minimum effective dose of bupivacaine 0.5% with 20mcg of fentanyl is 60mcg. A higher dose of fentanyl (100mcg) is required to achieve a statistically significant reduction in the time to first systemic analgesia.

ESRA1-0354
Central Nerve Blocks

COMPARISON BETWEEN MIDAZOLAM AND PROPOFOL SEDATION WITH BIS MONITORING IN GERIATRIC HIP SURGERY UNDER SPINAL ANAESTHESIA
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Background and aims: We aimed to assess the effects of propofol and midazolam sedation on hemodynamics and the cardiovascular system with BIS monitoring, as well as patient and surgeon satisfaction, administered as perfusion after intravenous bolus under spinal anesthesia in geriatric patients.

Methods: A total of 60 geriatric cases were randomly divided into two groups; midazolam (Group M, n=30) and propofol (Group P, n=30). After spinal block, Group M was given 0.01-0.05 mg kg-1 bolus midazolam and then continuous infusion with 0.02-0.1 mg kg-1 hr-1 dose was began. For Group P after 1 mg kg-1 bolus propofol, continuous infusion with 1-3 mg kg-1 hr-1 dose was began. Afterwards the infusion dose was regulated so BIS was held at 65-80%. The patient's systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate, peripheral oxygen saturation, respiration rate, Wilson's sedation score, side effects and recovery period were recorded together with patient and surgeon satisfaction.

Results: The respiratory rate was significantly higher in midazolam group cases after surgery compared to the propofol cases (p < 0.05). There was a significant statistical difference between the groups in terms of sedation score after bolus (p < 0.05). In the groups there was a significant statistical difference between cases in terms of sedation scores after surgery (p < 0.05).

Conclusions: In spinal anesthesia applications for geriatric patients it was shown that propofol and midazolam given by the intravenous perfusion method, in addition to their individual benefits, provide reliable sedation that does not disrupt hemodynamics, cause respiratory depression, and allows patients to be revived and cooperative.

ESRA1-0359
Obstetric

REVIEW OF OUTCOME OF POSTDURAL PUNCTURE HEADACHE AND ACCIDENTAL DURAL PUNCTURES OVER 3 YEARS IN A TERTIARY MATERNITY UNIT
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Background and aims: The aim of the audit was to establish the incidence of postdural puncture headache (PDPH) in our unit during 2010-2012, factors increasing the risk of PDPH, outcome of recognised accidental dural puncture (ADP) and spinal catheters.

Methods: Review of obstetrics charts completed over 3 years, identification of cases with PDPH and recognised ADP with review of the interventions, outcome and follow-up data.

Results: A total of 83 cases with PDPH identified over a 3 year period, during which 21,040 deliveries occurred. 5787 epidural blocks were performed, 3122 spinals for caesarean delivery, 360 combined spinal-epidural (CSE) blocks. PDPH after an epidural developed in 55 women (0.93%), 11 parturients after spinal for caesarean delivery (0.35%), 15 cases followed spinals for other obstetric procedures, two after CSE (0.55%). Thirty cases of ADP followed by epidural were noted: 12 (40%) did not develop PDPH, and 18 (60%) required an EBP. Spinal catheters sited in 19 cases of recognised ADP: 10 had no subsequent PDPH (53%), 3 cases developed PDPH, which settled with conservative treatment (13%) and 6 cases required an EBP (32%).
Conclusions: The incidence of PDPH post epidurals in our unit is 0.95% and that following spinal 0.35%, which is not dissimilar to the accepted average. Only 55% of recognised ADP developed PDPH. The risk of requiring EBP is lower after spinal catheter rather than after epidural reside in case of recognised ADP (32% vs 60%).

ESRA1-0363
Miscellaneous
INVIOLVEMENT OF REACTIVE OXYGEN SPECIES IN THE SHEDDING OF PROCOAGULANT PARTICLES FROM MONOCYTES EXPOSED TO BUPIVACAINE: CAUSE OR BARE RESULTS?
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Anesthesiology & Pain Medicine, Kohnodai Hospital National Center for Global Health and Medicine, Chikawa, Japan, 2Anesthesiology, Saitama Medical University Hospital, Irumagun, Japan, 3Anesthesiology, Center Hospital National Center for Global Health and Medicine, Tokyo, Japan.
Background and aims: Bupivacaine is one of the safest anesthetics for use of neuraxial anesthesia. However, its local injection has been reported to occasionally provoke calcification of skeletal muscles. We hypothesized that the generation of reactive oxygen species (ROS) from monocytes/macrophages to promote coagulant activity plays an important role in the cytotoxicity.
Methods: Cell suspension of human monocytes cells THP-1 was incubated for 30 min with Hoechst 33342 that stains nuclei in intact cells. The suspension was further attached to bupivacaine (1 mg/ml) and an oxidant indicator hydrochline (HE, 1 μM) for pre-selected time period with or without supernoxide dismutase (SOD), catalase, or deferoxamine, which scavenges superoxide, H2O2, or hydroxyl radical, respectively. The suspension was subjected to flow cytometry.
Results: Bupivacaine time-dependently (~90 min) increased HE-related fluorescence intensity (FI) in THP-1 cells and in Hoechst(+) particles shed from parental THP-1 cells. These particles were significantly smaller than the parental cells, possessing procoagulant activity and the characteristics of apoptotic bodies. HE-related FI from Hoechst(+) particles was significantly higher than that from parental cells. Number of Hoechst(+) particles shed from parental THP-1 cells was increased by bupivacaine. SOD and catalase but not deferoxamine significantly decreased the number and the HE-related FI in Hoechst(+) particles and parental cells.
Conclusions: Bupivacaine increased the shedding of procoagulant particles in which the level of ROS were higher than that in parental monocytes. It is suggested that several ROS as the end-products by the exposure of monocytes to bupivacaine partly caused the cytotoxicity to promote procoagulant activity of monocytes.

ESRA1-0364
Chronic Pain Management
PERCUTANEOUS TRANSFORAMINAL BALLOON FORAMINOPLASTY USING DILATING WORKING CANNULA IN PATIENTS WITH LUMBAR FORAMINAL STENOSIS
Kang H., Lee S., Moon S.
Interventional Radiology, Dongrae Wooridul Spine Hospital, Busan, Korea, 2Neurosurgery, Wooridul Spine Hospital, Seoul, Korea, 3Clinical Research Division, Dongrae Wooridul Spine Hospital, Busan, Korea.
Background and aims: Recently percutaneous transformal balloon foraminoplasty (PTBF) has been tried to treat lumbar foraminal stenosis (LFS) but placing a catheter tip at the accurate site was still a problem due to the flexibility of the catheter. The objective of this study was to improve the success rate and evaluate the effectiveness of PTBF.
Methods: A 61-year-old male patient had undergone two lumbar microdiscectomy but he complained of persistent pain in the left buttock and a tingling sensation with motor weakness. He was diagnosed as left foraminal stenosis combined with foraminal disc herniation at the L-4-5 level.
The other case is a 51-year-old female complained of low back and radiating pain on right side. She had spinal canal stenosis and right foraminal stenosis at the L-4-5 level. We decided to perform PTBFs using dilating working cannula in these cases.
Under the fluoroscopic guidance, an 18-gauge needle was introduced and a thin guidewire was inserted. The needle was then removed and serial 1-2-3-mm dilating cannulas were inserted. A balloon catheter was advanced through the working sheath and contrast media was injected to confirm a perineural filling defect. The catheter was introduced at the narrowed site and then dilated the balloon. Finally local anesthetic, normal saline, hyaluronidase and steroid was injected.
Results: The positioning of the balloon catheter was easily done and the foraminoectomy with dilated balloon was well performed. The symptoms of two patients were much improved and motor weakness was gradually recovered.
Conclusions: PTBF using diluting working cannula is useful and effective treatment for LFS.

ESRA1-0365
Chronic Pain Management
PERCUTANEOUS RADIOFREQUENCY ANNULOPLASTY TARGETING THE ANNULAR FISSURES FOR DISCOGENIC LOW BACK PAIN
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Background and aims: Discogenic low back pain (DLBP) can be caused by disorders internal disc disruption, degenerative disc disease, contained disc herniation, or damage of annulus fibrosus. A provocative discography has been used as a reliable method for the accurate diagnosis of DLBP. The purpose of this study is to describe effectiveness of percutaneous radiofrequency annuloplasty (PRA) targeting the annular fissures (AF) using post-discogram-CT image to treat DLBP.
Methods: 40 patients who suffered DLBP underwent PRA from January 2008 to December 2013 and were followed up for a mean period of 5.9 months. Outcomes were assessed using the visual analog scale (VAS) for back pain.
In all patients, DLBPs were confirmed by provocative discography based on the pathology of MR findings. After discography, computed tomography (CT) was checked immediately to confirm the AF. These post-discogram-CT images gave the information about targeted point of PRA.
Under the fluoroscopic guidance, 18-gauge spinal needle was inserted toward the annular fissures and a serial dilating obturators were inserted. Through the 4-mm working sheath, direct simple decompression using forceps and radiofrequency ablation were performed.
Results: The mean back pain VAS improved from 6.7 to 1.8 (range, 4–9 to 0–4). 38 patients reported a significant or some improvement in back pain despite the difference of degree. No pain relieved in 2 patients. There were no serious complications observed.
Conclusions: PRA targeting the annular fissures provides favorable outcomes for the patients with DLBP.

ESRA1-0368
Postoperative Pain Management
THE CHANGE OF PLASMA LEVOBUPIVACAINE CONCENTRATION AFTER SECOND ABDOMINAL BLOCK
Nakajima K., Saito S.
Anesthesiology, Gifu University, Miebashi-cho, Japan.
Background and aims: Rectus sheath block (RSB) and transverse abdominal plane (TAP) block are becoming the most common technique in lower abdominal surgery. Sometimes, the operation will last longer than expected, thus exceeding the local anesthetic effect of the block and necessitating a second block for postoperative pain. In this study, we examined the plasma concentration of LEV after the second block because it has not been previously reported.
Methods: Fourteen adult patients undergoing elective lower abdominal laparoscopic surgery were recruited and received bilateral ultrasound-guided RSB or TAP blocks before the operation (150 mg of LEV). Arterial blood was collected every 15 min for the first hour, then every 30 min for the following hours until the patient was returned to the ward. After the operation, they received another block (RSB+TAP or TAP+RSB) with 100 mg LEV.
Results: Mean time between blocks was 182.7 minutes. In the RSB+TAP group, the mean peak total LEV concentration occurred 20 min post-injection and was higher than TAP+RSB group. In the RSB+TAP group, the mean peak total LEV concentration was 1565.1 mcg/ml. In the TAP+RSB group, the mean peak total LEV concentration was 2377.3 mcg/ml. No complications were observed in any patients.
Conclusions: The second block 182.7 minutes after the first block with 100 mg levobupivacaine is safe although approaching the upper limits. We should be scrupulously careful concerning the dose of LEV and the time between the first and second blocks.
ESRA1-0372
Postoperative Pain Management

IS THERE ANY ANALGESIC BENEFIT FROM PREOPERATIVE VS. POSTOPERATIVE ADMINISTRATION OF ETORICOXIB IN TOTAL KNEE ARTHROPLASTY?
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Background and aims: Evaluation of efficacy of pre-emptive analgesia with Etoricoxib after TKA.

Methods: After Ethics Committee Approval we performed a prospective randomised study in 161 patients ASA I-II scheduled for primary TKA, divided in 3 groups: group A (Etoricoxib 120 mg orally one hour before surgery), group B (Etoricoxib 120 mg at the end of surgery) and group C placebo. Surgery has been performed under spinal anaesthesia with Bupivacaine 0.5% and sedation with Propofol.

All groups received postoperative analgesia when SVA > 3, with IV Perfalgan in fixed doses 1 g every 8 h and morphine (loading dose 0.1 mg/kg and titration until SVA < 3, followed by SC administration of 1/2 of total loading dose on demand for the following 48 h).

Efficacy was evaluated by the time interval from end of surgery until the first analgesic dose, the total amount of morphine in the first 24 and 48 h post-operative, the side effects and necessary amount of adjuvant medication.

Results: Although both groups A and B were significantly different from group C, there are no significant differences between groups A and B regarding the time interval until first rescue analgesic dose or morphine consumption within the first 24 h postoperatively. The morphine consumption at 48 h was significantly lower in group A vs. B.

Conclusions: Etoricoxib administrated pre-operatively has no pre-emptive analgesic effect within the fist postoperative 24 hours.

ESRA1-0377
Miscellaneous

DEXMEDETOMIDINE-FENTANYL VERSUS PETHIDINE-PROMETHAZINE FOR CONSCIOUS SEDATION AND ANALGESIA DURING OOCYTE RETREIVAL FOR IN VITRO FERTILISATION
Singh S.1, Dhaliwal L.K.1, Jain K.2, Gainer S.1. Obstetrics and Gynaecology, Postgraduate Institute of Medical Education and Research, Chandigarh, India, 2Anaesthesia and Intensive Care, Postgraduate Institute of Medical Education and Research, Chandigarh, India.

Background and aims: The intent of our study was to compare the effects of dexmedetomidine and fentanyl on perioperative sedation, pain score, hemodynamics, patient's satisfaction, readiness to discharge and safety on fertilization.

Methods: A total of 100 women between 25-40 years of age scheduled for oocyte retrieval were randomized. Pethidine 1 mg/kg and promethazine 0.5 mg/kg were given in group 1 (n=50). A loading dose of dexmedetomidine 1 microgram/kg and fentanyl 1 microgram/kg was given in group 2 (n=50). Patients not maintaining Ramsay sedation score(RSS) of ≥2 or Visual analogue scale(VAS) of <4 were given additional doses defined as rescue analgesia. Blood pressure, heart rate, RSS, VAS and patient's satisfaction score were assessed. Discharge criteria was assessed by aldrete score. Effects on embryo quality and fertilization rates were noted.

Results: Dexmedetomidine group had shown a fall in blood pressure and heart rate which was not statistically significant. Patients had lower vas score in dexmedetomidine group and the need of rescue analgesia was lesser. Satisfaction scores were higher in dexmedetomidine group. No difference on fertilization rates was seen.

Conclusions: Dexmedetomidine provides efficient hemodynamic stability, higher Ramsay sedation scores, lower VAS scores, higher satisfaction scores. It can be safely used as sedoanalgesic agent in oocyte retrieval.

ESRA1-0378
Miscellaneous

MONITORING USE DURING ULTRASOUND GUIDED REGIONAL ANAESTHESIA BY DELEGATES AT THE WESSEX SOCIETY OF ULTRASOUND REGIONAL ANAESTHESIA (WSURA) MEETING DECEMBER 2013
Holmwood X.VL.1, Shields O.K.1, Labo S.1. Department of Anaesthesia, Queen Alexandra Hospital, Portsmouth, United Kingdom.

Background and aims: A survey of monitoring during ultrasound guided regional anaesthesia (UGRA) at Queen Alexandra Hospital revealed that 10% do not always use a pulse oximeter and 30% do not use an ECG despite Association of Anaesthetists of Great Britain and Ireland (AAGBI) recommendations for minimum monitoring standards. 37% of respondents did not perform UGRA regularly.

Methods: To ascertain if this truly represented ultrasound regional anaesthetists all WSURA Annual Meeting delegates completed the same survey.

Results: 46 respondents: 59% were consultants, 65% of respondents had more than 1 session involving UGRA per week.

FIGURE 1.
86.96% believed using monitoring would not affect the incidence of local anaesthetic (LA) toxicity, 79.1% believed it would not affect the incidence of nerve damage and 65.22% believed monitoring would not affect overall safety. 28.26% believed monitoring would increase time taken. 76 % get the ODP to inject LA.

Conclusions: While intuitively ultrasound should reduce complications in peripheral nerve blocks, prospective studies have yet to support this. Our survey demonstrates some anaesthetists do not use full monitoring despite AAGBI recommendations. We postulate that anaesthetists feel safer injecting LA under ultrasound, combined with the improved safety profile of modern drugs and the reduced volumes necessary for UGRA. Although ultrasound allows structures to be visualised and LA doses to be reduced, its role in preventing complications – particularly neurological damage - is less clear. We suggest it is time to introduce guidance specific to blocks performed with ultrasound to highlight that ultrasound alone does not confer ‘immunity’ to the other complications of regional blocks.

ESRA1-0379
Pediatric

PARAVERTEBRAL BLOCKS WITH CLONIDINE IN PAEDIATRIC RENAL SURGERY
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Background and aims: To assess the effectiveness of paravertebral blocks containing levobupivacaine and clonidine in children undergoing renal surgery.

FIGURE 1.

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| E191 |
Prior to clonidine, ketamine was a popular adjunct but withdrawn due to neurotoxicity concerns. Methods: 34 patients aged 4 months to 16 years underwent laparoscopic/open nephrectomy/pyeloplasty in our institution over a 3 year period. All received unilateral paravertebral blocks post induction of anaesthesia by conventional techniques.

Laparoscopic cases had injections at T9/10 and L1/2. Open cases at T9/T10. Total 0.25% levobupivacaine 1ml/kg and clonidine 2mcg/kg (1mcg/kg under 6 months). Regular paracetamol and NSAID were given. Postoperatively, regular pain scores (FLACC or self reported) and the need for rescue codeine were recorded. Results: 21% of patients required no opioid analgesia at any point. We collected retrospective data to analyze the number of procedures of regional anesthesia and analgesia were performed

After institutional approval, one hundred and fifty patients scheduled for laparoscopic gynecological surgery under general anesthesia were randomly allocated to have either TFPB or TAPB. After induction of general anesthesia with propofol, fentanyl, and rocuronium, either TFPB or TAPB was administered bilaterally using 60ml of 0.25% ropivacaine under ultrasound guidance. Heart rate (HR) and systolic blood pressure (sBP) were measured and recorded 1) before induction of anaesthesia, 2) before skin incision, 3) after skin incision, 4) after peritoneal insufflation, 5) after termination of peritoneal insufflation, 6) after skin closure, and 7) after emergence from general anesthesia.

**TABLE 1.**

<table>
<thead>
<tr>
<th>HR (bpm)</th>
<th>TFPB</th>
<th>TAPB</th>
</tr>
</thead>
<tbody>
<tr>
<td>84±15</td>
<td>94±12</td>
<td>114±17</td>
</tr>
<tr>
<td>59±7</td>
<td>78±17</td>
<td>143±19</td>
</tr>
<tr>
<td>91±10</td>
<td>57±7</td>
<td>101±17</td>
</tr>
<tr>
<td>96±11</td>
<td>64±13</td>
<td>122±15</td>
</tr>
<tr>
<td>sBP (mmHg)</td>
<td>TFPB</td>
<td>TAPB</td>
</tr>
<tr>
<td>132±15</td>
<td>93±10</td>
<td>106±14</td>
</tr>
<tr>
<td>91±15</td>
<td>145±25</td>
<td>101±17</td>
</tr>
<tr>
<td>122±18</td>
<td></td>
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</tr>
</tbody>
</table>

Values are mean±SD. There were no significant differences in HR and sBP at any points of measurement between the two groups.

Results: Conclusions: Hemodynamic changes during laparoscopic gynecological surgery under general anesthesia supplemented with TFPB were comparable to those supplemented with TAPB.

**ESRA1-0382**

**Pediatric**

**THE ROLE OF ULTRASOUND IN PERIPHERAL NERVE BLOCKS AND ITS EFFECT ON THE CHOICE OF A REGIONAL ANESTHESIA TECHNIQUE IN CHILDREN**

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Background and aims: Analysis of regional anesthesia and analgesia methods in a 18 month period of using ultrasound, compared to a 18 month period prior to the use of ultrasound.

Methods: We collected retrospective data to analyze the number of procedures of regional anesthesia and analgesia in two periods. Group ‘A’ is the 18 month period of using ultrasound in daily practice. Group ‘B’ is the 18 month period prior to the introduction of ultrasound. Methods of regional anesthesia and analgesia were divided into neuroaxial (subarachnoidal, epidural, caudal) and peripheral blocks (trunck, upper limbs and lower limbs). Ultrasound was used when performing procedures of peripheral regional anesthesia and analgesia.

Results: 644 procedures of regional anesthesia and analgesia were performed in group A. Where, 155 procedures for neuroaxial blocks and 489 procedures for peripheral blocks, where 138 of those with ultrasound assistance. In group B, 519 procedures of regional anesthesia and analgesia. Where, 213 procedures for neuroaxial blocks and 306 for peripheral.

Conclusions: In group A was a significant increase in a number of total procedures of regional anesthesia and analgesia (23.8%). The number of procedures of neuroaxial anesthesia and analgesia decreased (27.2%), due to caudal blocks. The number of procedures of peripheral blocks has increased significantly (59.4%), specially procedures on upper and lower extremities. We have also registered (1) increased number of surgical procedures without general anesthesia, (2) more safety during performance of blocks, and (3) better quality of postoperative analgesia.

**ESRA1-0383**

**Pediatric**

**PARAVERTERBAL BLOCKS FOR PAEDIATRIC RENAL SURGERY: MOVING ON FROM KETAMINE**

Nassa Z.1, Fee P.1, Harban F.1 1Dept. of Anaesthesia, Birmingham Children’s Hospital, Birmingham, United Kingdom.

Background and aims: Paravertebral blocks have an established role in paediatric renal surgery. Injections of 0.25% levobupivacaine with clonidine have gained popularity since the withdrawal of ketamine. We aim to
demonstrate clonidine has equi-analgesic properties when compared to its predecessor.

Methods: 54 consecutive patients underwent renal surgery in our institution between 2009-2013. After induction of anaesthesia all patients received a paravertebral block at T9/V10 and for laparoscopic surgery a second injection at L1/2. Total dose 0.25% levobupivacaine 1ml/kg. Between 2009-2010, 20 patients underwent surgery and received injections containing 1ml/kg 0.25% levobupivacaine and 0.75mg/kg preservative free ketamine. Between 2011-2013, a further 34 patients had surgery and received injections containing 2mcg/kg clonidine instead of ketamine. All received regular paracetamol, NSAID and codeine as rescue analgesia. Post operative pain scores were recorded as were times to first dose of codeine.

Results: Patients ranged in age from 3 months to 16 years. 35% of ketamine patients required no opioid analgesia versus 21% in the clonidine study. With clonidine, 90% of all reported pain was mild and median time to rescue codeine was longer, 8 hours vs 7 hours. 85% of blocks offered analgesia for ≥ 6 hours. Our data demonstrated a shift in paediatric surgical practice. Between 2009-2010, approximately 75% of cases were laparoscopic by 2011-2013 open surgery was more common.

Conclusions: Paravertebral blocks with levobupivacaine and clonidine offer prolonged analgesia following renal surgery. Pain scores were in an acceptable range for approximately 90% of the time despite the trend for more invasive surgical techniques.
Conclusions: The addition of background infusion to PCEA demand bolus doses increased local anaesthetic consumption and reduced breakthrough pain without affecting maternal satisfaction and neonatal outcomes.

ESRA1-0390
Central Nerve Blocks

MAJOR COMPLICATIONS FOLLOWING POSTOPERATIVE ANALGESIA WITH THORACIC EPIDURALS. MYTH OR REALITY? A LARGE DUAL CENTER REVIEW STUDY

Sarridou D.1, Walker C.P.R.1, Wright I.G.1, Cox F.1, Mitchell J.B.1,2. 1Harefield Hospital, The Royal Brompton and Harefield NHS Foundation Trust, London, United Kingdom.

Background and aims: Thoracic epidurals are the principal mode of postoperative analgesia for major thoracic surgeries in this large 2-site unit. Cases are predominantly thoracotomy for resection of lung malignancies and lung transplantation. A broad range of insertion techniques exists amongst the anaesthetists but application of robust safety standards and the minimisation of potential complications results in a safe and good practice.

Methods: We reviewed the case notes of 1145 patients who underwent major thoracic surgery and concurrent placement of thoracic epidural catheters for postoperative analgesia from the last two years.

1100 patients had thoracotomy mostly for lung cancer resection and 45 were lung transplant recipients (the majority clavicular incisions for bilateral sequential implantation). Potential major complications were categorised in three groups: epidural haematoma, infection or neurological deficit (transient or permanent). Data were extracted using our documentation programmes in conjunction with the internal electronic reporting of incidents system (Datix®).

Results: Of the total patients included in this review there were no major complications as described above. One of the lung transplant patients developed a subcutaneous infection which was treated with antibiotics. Nineteen cases of minor related complications including accidental epidural like dislodgement/disconnection, skin burn from hot packs, skin blistering, as well as cases of inappropriate strong opioid co-administration (N=6) were investigated and treated.

Conclusions: Thoracic epidural remains the gold standard for postoperative pain management for lung resection and lung transplantation. Data extracted from a large series of at risk patients demonstrate the safety and efficiency of this technique.

ESRA1-0391
Chronic Pain Management

CHRONIC PAIN TREATMENT WITH PREGABALIN IN END STAGE RESPIRATORY FAILURE PATIENTS AWAITING LUNG TRANSPLANT FROM VENO-VENOUS ECMO SUPPORT

Sarridou D.G.1, Walker C.P.R.1, Wright I.G.1, Sabashnikov A.1, Cox F.1, Mitchell J.B.1,2. 1Harefield Hospital, The Royal Brompton and Harefield NHS Foundation Trust, London, United Kingdom.

Background and aims: Patients requiring veno-venous ECMO as a bridge to lung transplant have prolonged ITU stay which may last months. Reduced mobility is unavoidable to ensure adequate flow in ECMO lines and reduce the risk of dislodgement. Neuropathic pain and polyneuropathy are common in this unique group of patients. Many complain of severe anxiety and depressed mood with disrupted sleep patterns. Pregabalin is licensed for chronic neuropathic pain and generalized anxiety disorder (GAD).

Methods: Nine patients on v-v ECMO awaiting lung transplant aged 17 to 54 years old. Median ITU stay was 45±27 days (one 2± 8 weeks ). All awake in ITU, 5 had tracheostomies and required ventilatory support. Patients received morphine PCA and one required a continuous morphine infusion. Pregabalin 50 mg BD was initiated in all patients and the dose escalated to 75 to 100 mg BD as needed. Patients were asked to evaluate their pain daily using VAS scale from 0–10 and asked how many hours of undisturbed sleep had. A simple four scale anxiety evaluation inventory was used. The presence of side effects (dizziness, drowsiness, blurred vision) was recorded.

Results: All patients (100%) reported significant analgesic effect after the start of the treatment. Mean VAS scores were reduced from 6±2 to 3±1. Duration of good quality sleep increased from 5±1.7/24 hours before pregabalin to 8±2/24 hours. All of the patients except two reported reduced anxiety of at least 2±1 scale improvement.

Conclusions: Pregabalin is an effective analgesic with accompanying anxiolytic activity in these patients with increased analgesic requirements and exacerbated psychological and emotional stress.

ESRA1-0392
Miscellaneous

ENHANCED RECOVERY PROTOCOL AFTER ARTHROPLASTY REDUCES BLOOD TRANSFUSION RATES

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Background and aims: Our hospital performs over 2000 primary hip and knee arthroplasties a year. Since 2010 an enhanced recovery programme (ER) has been adopted to increase early mobilisation rates and reduce length of stay. Our aim was to measure the impact of this programme on blood transfusion rates.

Methods: ER programme is a standardised approach to anaesthesia and surgery using neuraxial blocks, avoidance of intravenous opiates and use of local infiltration analgesia. We used 150ml 0.2%Ropivacaine with 1:100,000 adrenaline for peritreal injection. IV Tranexamic acid 1gm and hypotensive anaesthesia maintaining mean BP between 50-60mmHg were used to reduce blood loss.

Data from patients undergoing arthroplasties after introduction of ER programme (2010–2013) was compared to the three years before (2007–2010). The criteria for transfusion remained the same for both groups.

Results: Table 1 shows the mean number of patients transfused and the rates of transfusion over the three year periods.

<table>
<thead>
<tr>
<th></th>
<th>Before ER</th>
<th>After ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>THR</td>
<td>2730</td>
<td>3244</td>
</tr>
<tr>
<td>Total no of units transfused</td>
<td>814</td>
<td>592</td>
</tr>
<tr>
<td>Transfusion rate</td>
<td>29.8%</td>
<td>18.2%</td>
</tr>
<tr>
<td>TKR</td>
<td>3228</td>
<td>3489</td>
</tr>
<tr>
<td>Total no of units transfused</td>
<td>266</td>
<td>215</td>
</tr>
<tr>
<td>Transfusion rate</td>
<td>8.2%</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

Conclusions: The results have shown that adoption of an enhanced recovery programme reduced transfusion requirements by 39% in THR and 26% in TKR. It is likely that the reduction in transfusion requirements was due to reduced perioperative blood loss. Both hypotensive anaesthesia and tranexamic acid has been shown to independently reduce perioperative blood loss. Local vasoconstrictive effect of the adrenaline may also have played an important part.

ESRA1-0393
Central Nerve Blocks

THE EFFECTS OF PATIENTS’ RESTING POSITION ON POSTDURAL PUNCTURE HEADACHE AFTER SADDLE BLOCK FOR PERIANAL SURGERY

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Background and aims: The postdural puncture headache (PDPH) is still a disturbing problem for patients undergoing saddle block for perianal surgery. Although some possible mechanisms are suggested, the exact pathophysiology of PDPH is unclear. This study aims to suggest a way to prevent PDPH.

Methods: After ethics committee approval and patients’ informed consents, a prospective, randomized study was conducted on 200 ASA I-III (aged 18–82 yr) patients scheduled for elective perianal day surgery. Quincke tip spinal needles (25 G) and bupivacaine heavy 5 mg were used to perform saddle block by at least two years residents and specialist through the lumbar 3–4–5 at the sitting position of the patients. All patients were informed about PDPH and asked to do resting, hydration with and without caffeine fluids and 3–4 g paracetamol, postoperatively. Randomization was done
according to the resting position on bed: patients at slightly trendelenburg or head down and/or legs up at home (Group P: Position) and patients with supine only with a pillow for head optional (Group C: Control) for 2-3 days.

Results: Two in 120 pts (1.6%) in group P and 7 in 80 pts (8.7%) in group C encountered with PDPH (p < 0.05). One patient required epidural blood patch of 15 mL, in Group P after 1.6 days of treatment.

Conclusions: Postoperative resting position after spinal anesthesia may help to decrease the incidence of PDPH. It might be related to cerebrospinal fluid kinetics. Further studies with larger series of patients are necessary to evaluate these.

ESRAI-0395
Peripheral Nerve Blocks

FASCIA ILIACA BLOCK AND ITS EFFICIENCY IN PAIN MANAGEMENT OF PROXIMAL FEMORAL FRACTURES/SURGERIES - SYSTEMATIC REVIEW

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Background and aims: Pain management plays a key role in patients with proximal femoral fracture. Fascia iliaca block is considered to be effective tool with impact on later pain killers’ usage. This systematic review was collected to determine the efficiency of the fascia iliaca block in providing analgesia to patients with proximal femoral fractures (or post surgeries).

Methods: Systematic review of papers published in last 20 years. EMBASE and PubMed were searched. 95 articles identified from which 22 included in the study for relevance with the topic. A standardised appraisal of the methodological quality of the studies was performed.

Results: More than half of the patients benefit from performing fascia iliaca block in terms of later usage of opioids. Decrease in opioids use had a very positive effect on patients’ outcome and minimized the side effects.

Conclusions: Fascia iliaca block could play a very important role in first-line pain control and can be very effective later as it decreases usage of opioids. Lower opioids use should help us to avoid the side effects of opioids what is big advantage in elderly people.

ESRAI-0397
Chronic Pain Management

PIRIFORMIS MUSCLE INJECTION ULTRASOUND-GUIDED
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Background and aims: Piriformis syndrome is a common cause of buttocck and posterior leg pain. Recently has been described the US guided technique for piriformis muscle injections. We study the efficacy and efficiency of the above technique.

Methods: We studied 14 patients 4 male and 10 female aged from 50 to 65 years old with a diagnosis of piriformis syndrome. The patients received 3ml of 0.5 ropivacaine combined with 3mg betamethasone sodium phosphate using an ultrasound technique to identify the piriformis muscle. We studied numeric pain score and hip function immediately, 2 weeks and 3 months post procedure.

Results: The pain score was 5.87±2.11 before the procedure. 2.33±1.51 immediately after 2.88±1.64 two weeks later and 3.01±2.34 three months later. There was improvement 80-90% of hip function in all patients immediately after the procedure which lasted to 3 months. There were no adverse events due to the injection. Two patients had minor leg weakness for 8 hours.

Conclusions: US guided technique for piriforms muscle injection is a safe and efficient technique according to our study.

ESRAI-0399
Peripheral Nerve Blocks

DURATION OF ULTRASOUND-GUIDED SUPRACLAVICULAR NERVE BLOCK IN DIABETIC PATIENTS

Azain 1, Višković Filipić N., Milosevic M., Tonulic Brusich K.1 Department of anesthesiology and intensive care, University Hospital Merkur Zagreb, Zagreb, Croatia, 2 Institute for Public Health “Dr. Anđija Stampar” Zagreb, University of Zagreb, zagreb, Croatia.

Background and aims: There is increasing incidence of diabetes mellitus (DM) patients requiring anesthesia for upper arm surgery and peripheral blocks are preferable in their perioperative management. However, there is only one clinical study of Gebhard et al. conducted among DM patients for supravacular nerve block (SCB). Our study is an effort to understand if there exist differences in DM and non-DM patients in dose requirements.

Methods: After obtaining IRB approval, medical records of all patients who had undergone SCB for surgical anesthesia at University Hospital Merkur between May 2009 and March 2013 were reviewed. Demographic data, co-morbidities and block performance data: type and volume of local anesthetic (LA) were collected.

Results: A total of 120 SCB procedures were performed: 76.6% (n=92) for bone osteosynthesis and 23.3% (n=28) for soft tissue surgery. Significant differences were noted in ASA status (DM had higher ASA score, P <0.001) and in coronary artery disease (CAD) prevalence (P=0.036). Multivariate linear regression model analysed duration of SCB using two significantly relevant predictor variables: use of Lidocain + Chirocaine mixture (beta=-0.276, P=0.005) and DM (beta=0.243, P=0.017). DM patients had longer block duration, as well as those who received “pure” Chirocaine.

Conclusions: Our study emphasizes that DM patients have longer block duration implicating that their nerve fiber as more susceptible to LA. Relationship between the dose, volume, and concentration of LA remains unclear. Our suggestion is to use ultrasound to avoid nerve damage and to use smaller volume of LA, preferably those with shorter duration.

ESRAI-0400
Pediatric

ULTRASOUND-GUIDED LATERAL INFRACLAVICULAR BRACHIAL PlexUS BLOCK IN CHILDREN, A PRELIMINARY REPORT

Ponichter M.1 Anaesthesia and Intensive Care, Karolinska Institute, Stockholm, Sweden.

Background and aims: Lateral infraclavicular brachial plexus block (LIC-block) is an accepted but less popular technique in paediatric anaesthesia (PRAN 2012). This is a preliminary report of our experience with LIC-block in children. The aim of the study was to assess the feasibility of the LIC-block: its quality, time-efficiency, technical problems, and complications.

Methods: A case series of thirteen ASA 1-2 children, 1-8 years old, undergoing elective hand surgery in GA. The lateral coracoid parasagittal in-plane technique was used. After the visualisation of pectoral muscles, subclavian artery and vein, the pleura was also identified to avoid its in-plane technique was used. After the visualisation of pectoral muscles, subclavian artery and vein, the pleura was also identified to avoid its injury. With the needle tip just posterior to the artery, 0.5 ml/kg of 0.25% levobupivacaine without additives was injected to encircle the artery. The evaluated parameters were block quality (response to surgery and tourniquet inflation, opioid use, postoperative pain), anaesthesia-related complications, time to perform the block, and time to extubation after surgery.

Results: The block success rate was 100% in all patients, with no need for opioid supplementation. Median duration of the block was 14 hours (range 10-19). The PONV incidence was 0%. There was one case of vascular puncture, otherwise no complications occurred. The median time to perform the block was 5 minutes (range 4-9), median time to extubation after surgery was 12 minutes (range 7-14).

Conclusions: In paediatric patients, the LIC-block seems to be a highly reliable, safe, and time-efficient technique. It provides a smooth anaesthesia, has a
low potential for complications and decreases the incidence of postoperative pain, nausea and vomiting.

ESRA1-0404
Peripheral Nerve Blocks

ULTRASOUND-GUIDED PERIBULBAR BLOCK: EFFICACY OF A RETRO-OCULAR COMPLETE SPREAD

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Background and aims: Peribulbar block (PB) is the most common type of anaesthesia for cataract surgery (1).

The aim of this study was to evaluate by ultrasound imaging the intracranal spread of local anesthetic (LA) on the retro-ocular compartment during PB (2) and compare different types of spread.

Methods: 52 patients scheduled for cataract surgery were included in our prospective and observational study. After standard monitoring, the lower temporal puncture was performed. Once the needle was in place, a linear ultrasound transducer was placed over the eyelid and the mixture of LA was administered. After block an external compression with the Horan balloon was done.

Demographic characteristics, spread and volume of the LA were recorded. Akinesia, analgesia and complications were also noted.

Results: The mean age was 75,27 ± (SD 8,03) and BMI was 28,63 ± (SD 5,28). 32 patients (61%) initially showed great pain decrease 24hours, 7days and 4weeks after PMTG. It was also found a decrease in oral carbamazepine for every patient (100%). Recurrence of the symptoms appeared in 3 patients (9´3%) one year after PMTG.

Conclusions: Differences between CEI and PIEB for maintenance of epidural analgesia were not found, regarding the duration of labor, type of delivery and APGAR score at 1st and 5th minutes.

ESRA1-0428
Chronic Pain Management

PERCUTANEOUS MICRO-COMPRESSION OF THE GASSERIAN GANGLION FOR TRIGEMINAL NEURALGIA

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Background and aims: Adequate management of trigeminal neuralgia (TN) continues being a challenge for doctors. Percutaneous micro-compression of the trigeminal ganglion (PMTG), using a variant of the technique of Mullan and Lichtor, is a minimally invasive procedure for the treatment of TN.

The aim of this work is to evaluate the effectiveness of PMTG in a group of TN sufferers in our center.

Methods: 32 patients received PMTG as a 2nd line treatment during one year in our hospital. The average age of our population was 55years-old. The duration of the symptoms ranged from 5 to 20 years (median 10years). PMTG took place under general anaesthesia, compression was maintained during 1-2minutes and surgery time usually was less than 30minutes. Pain symptoms, concomitant medication and side effects were documented shortly after and 12months after the procedure.

Results: 32 patients (100%) initially showed great pain decrease 24hours, 7days and 4weeks after PMTG. It was also found a decrease in oral carbamazepine for every patient (100%). Recurrence of the symptoms appeared in 3 patients (9´3%) one year after PMTG.

Conclusions: We showed that percutaneous micro-compression of the trigeminal ganglion is a safe and effective neurosurgical procedure that could provide long time symptomatic relief for trigeminal neuralgia.
Background and aims: Pain, emergence and side effects of anaesthesia are amongst the prime drivers of time spent in recovery post-operatively, however, regional anaesthesia may attenuate these. We examined time in recovery for patients having day case orthopaedic procedures to see if receiving regional anaesthesia has a tangible effect.

Methods: Orthopaedic theatre lists over six months were prospectively reviewed and day cases identified. Those under 18 years old; poor english comprehension or psychiatric issues were excluded. Consent was gained from patients on admission. Anaesthetic technique and time spent in recovery were recorded.

Results: 714 patients were eligible with 633 followed up, recruitment rate 88.6%. Average age was 45 years (range 18–87). 244 (38.5%) received regional anaesthesia with or without general anaesthesia whilst 389 (61.5%) received general anaesthesia and subcutaneous/periarticular local anaesthetic infiltration. Median time in recovery reduced from 50 minutes in those not receiving regional anaesthesia to 30 minutes in those who did. Only 25% who received regional anaesthesia stayed over 50 minutes whereas 75% of the general anaesthesia group did.

Conclusions: Regional anaesthesia reduced time spent in the recovery unit. We believe this is through improved analgesia and reduction in anaesthetic/analgesic side effects.

ESRA1-0443
Obstetric

UMBILICAL ARTERY AND VEIN ACID-BASE STATUS IN DIFFERENT TYPES OF ANAESTHESIA AT VAGINAL DELIVERY AND CAESAREAN SECTION

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Background and aims: To study fetal acid–base status and its implications under different modes of anaesthesia for vaginal delivery and caesarean sections.

Methods: We performed an observational cohort study of all women delivery during 2013 in our Hospital. In total 3034 consecutive women vaginal delivery (n=2359) or undergoing elective or emergency cesarean section (n=675).

The women were divided into 4 groups according to the type of anesthesia administered; no anesthesia (NA n= 850), epidural anesthesia (EA n=1773), spinal anesthesia (SA n=437) and general anesthesia (GA n=19). Fetal acid–base status was assessed from umbilical cord blood (both artery and vein). Apgar scores at 5min and at 10min, admissions to neonatal intensive care units (NICUs) were noted.

Results: Apgar scores 5min were higher in no anesthesia, spinal anaesthesia and epidural anaesthesia group (p<0.001). There was no difference in Apgar scores at 10min. General anaesthesia was associated with a higher incidence of fetal acidemia, both in the umbilical artery and vein (p<0.001). No anaesthesia and spinal anaesthesia was associated with the highest pH in umbilical artery blood (p<0.001). There was no difference in admissions to NICU.

Conclusions: This study provided evidence of the advantages of spinal anaesthesia over epidural and general anaesthesia in caesarean section.

ESRA1-0449
Case Reports

BACTERIAL MENINGITIS AFTER SPINAL ANESTHESIA

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Background and aims: Post spinal anesthesia bacterial meningitis is a rare but serious complication of neuraxial anesthesia. Its rarity makes incidence, relative risk and efficacy of preventive measures hard to establish using high quality evidence.

Source of infection is not always clear but may be related to contamination of the needle or punction site by oral cavity commensals; migration of skin bacteria through needle or catheter insertion sites; or hematogenous spread from concurrent bacteremia.

Pathogens more frequently isolated in cerebrospinal fluid cultures are Streptococcus species, most of them belonging to viridans group (specially Streptococcus salivarius), commonly found in our upper air passages.

Methods: Case report and review of the literature. We report a case of meningitis following haemorrhoidectomy performed under spinal anesthesia.

Results: Most cases are caused by contamination of the puncture site by oral cavity commensals; migration of skin bacteria through needle or catheter insertion sites; or hematogenous spread from concurrent bacteremia.

FIGURE 1. Median time in recovery reduced from 50 minutes in those not receiving regional anaesthesia to 30 minutes in those who did. Only 25% who received regional anaesthesia stayed over 50 minutes whereas 75% of the general anaesthesia group did.

Conclusions: Regional anaesthesia reduced time spent in the recovery unit. We believe this is through improved analgesia and reduction in anaesthetic analgesic side effects.
benign when treated promptly. There are few prospective trials and most case reports do not provide complete information about infection control practices.

**Conclusions:** Infectious complications associated with neuraxial anesthesia are exceedingly rare events but may significantly increase morbidity, mortality as well as medical costs. An early diagnosis and effective treatment is essential. Prevention is important in order to decrease the incidence of this event. Several guidelines have emphasized the importance of strict aseptic technique while performing regional anesthesia.

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**ESRA1-0453**

**Obstetric**

**CHANGES IN OBSTETRIC ANAESTHESIA PRACTICE: A NATIONAL QUESTIONNAIRE SURVEY FROM LITHUANIA**

Karbonskienė A. 1, Jankus V. 1, Rimaitis K. 1 1 Clinic of Anaesthesiology, Lithuanian University of Health Sciences, Kaunas, Lithuania.

**Background and aims:** Organization of obstetric care in Lithuania has undergone substantial changes in recent years. Obstetric units having less than 300 deliveries per year were closed aiming at better experience of staff and utilization of resources. Our goal was to evaluate changes in obstetric anesthesia practice in a view of changing organization.

**Methods:** Standard questionnaires on obstetric anesthesia were mailed to all dept. of anaesthesia of hospitals providing obstetric care in January, 2014. Results were compared with those of similar postal survey performed in 2004.

**Results:** In 2013 there were 32 hospitals providing obstetric care in Lithuania (49 – in 2003). Responses were received from 20 dept. of anaesthesia, responding hospitals had cared for 79.7% of deliveries in the country (32 and 69.9% in 2003). Epidural analgesia (EA) for labour was available all facilities and was provided in 16,9% (min.-max.0-35,6%) of cases in 2013. In 2003 EA was available in 67,7% of units, but it was provided only in 8,8% (min.-max.0-39,8%) of cases. Mean annual Sectio caesarea (SC) rate was 26% (min.-max.17,4-28,6%) in 2013 and 16,9% (min.-max.5-27,5%) in 2003. In 2013 regional anesthesia was used in 95,8% of scheduled and 93,3% of emergency SCs. In 2003 regional anesthesia was used in 38% of scheduled and 9% of emergency SCs. General anesthesia with tracheal intubation and controlled ventilation was the only option of general anesthesia for SC in responding hospitals both in 2013 and 2003.

**Conclusions:** Obstetric anesthesia practice in Lithuania has undergone dramatic change with substantial shift from general to regional anesthesia in recent decade.

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**ESRA1-0454**

**Central Nerve Blocks**

**INFLUENCE OF DEXAMETHASONE ADMINISTRATION IN SPINAL ANAESTHESIA FOR FEMUR FRACTURE**

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**Background and aims:** The aim of this research is to establish the influence of intrathecal dexamethasone administration in spinal anesthesia with levobupivacaine on postoperative pain, consciousness and values of cortisol levels for patients with femur fracture.

**Methods:** The study is planned as a prospective, interventional, randomized clinical trial. A total of 60 patients ASA2 and ASA3 status, scheduled for surgical procedures will be sorted into two groups and undergo surgery in spinal anesthesia with 12,5mg of levobupivacaine (SA) and with or without 8mg of dexamethasone (DS). The primary outcome measure is the occurrence of postoperative disturbance of consciousness and plasma cortisol levels. As secondary outcome measure, we are following pain intensity, blood glucose levels and recovery. Cortisol and glucose are analyzed in five measurements. Peripheral venous blood samples are collected before anesthesia, one hour after surgery, third, fifth and on the tenth day after surgery. Postoperative delirium is defined by using Confusion Assessment Method (CAM) criteria. Visual analogue scale (VAS) is used to record pain severity among patients.

**Results:** We collected data for 16 patients so far. As expected, cortisol plasma levels (preoperative mean values 715 nmol/L and postoperative 210 nmol/L) were significantly lower in all patients having spinal anesthesia with levobupivacaine and dexamethasone in comparison to patients in spinal anesthesia with only local anesthetic/preoperative mean values 807 nmol/L and postoperative 713 nmol/L). According to CAM criteria postoperative cognitive disturbances were seen in 5 patients after spinal anesthesia with only local anesthetic.

**Conclusions:** The addition of dexamethasone to the local anesthetic significantly prolongs the duration of sensory block and decreases opioid requirements and postoperative cognitive disturbances.

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**ESRA1-0460**

**Chronic Pain Management**

**ULTRASOUND-GUIDED INFRAORBITAL NERVE BLOCK FOR ISOLATED INFRAORBITAL NEURALGIA**

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**Background and aims:** Trigeminal neuralgia treatment should be individualized according to symptoms and signs of each patient. Here we present a patient with isolated infraorbital neuralgia successfully managed with ultrasound-guided infraorbital nerve block.

**Methods:** A 48 years-old male patient diagnosed with trigeminal neuralgia and treated with carbamazepine was considered for intractable and resistant pain. His pain was throbbing and stabbing and isolated to the area of right nasal wing, nasal part of the tip of the nose and right canine and first premolar teeth. The pain was triggered with eating and then expanded to the right lower eye lid. The patient had severe alldynia even with the water. The patient was otherwise healthy and had no trauma history. Initially, diagnostic ultrasound-guided infraorbital nerve block with %1 lidocaine was performed. During this block, 13-MHz ultrasound probe was placed at the inferior orbital rim and transverse sono-scan was performed until a hypoechoic break was observed. The foramen were checked for vascular structures. Needle was introduced with in-plane approach and the spread of local anesthetic was observed.

**Results:** Since the patient had pain relief, we repeated the block with 15mg lidocaine and 1.5mg dexamethasone (total 1.5mL) one week later. After 3 weeks of painless state, the pain returned only at the teeth while eating and alldynia was mild. The treatment was repeated for the second time and the patient was painless for 7 weeks until this report was written.

**Conclusions:** We suggest that ultrasound-guided infraorbital nerve block with lidocaine and dexamethasone may be an option for treatment of isolated infraorbital neuralgia.
areas: circumstances surrounding the ADP, the support after the ADP and the trainee's experience after the ADP.

**Results:** 165 out of 175 respondents had at least one ADP during their training, with the highest incidence (36%) occurring at ST3 level (1st year registrar), on the night shift (41%). 82% of the trainees discussed their ADP experience with a colleague. However, only 77% approached the obstetric anaesthesiologists. After 21% of ADP, a supervised epidural insertion was arranged, with 32 out of 36 trainees finding this useful. At the next unsupervised epidural insertion, only 22 (of the 165) trainees felt confident.

**Conclusions:** This survey revealed that only a minority of trainees had a supervised epidural insertion after the ADP, but where this was done, it was a positive experience. As a recognised complication of epidural insertion, trainee's moral and performance may be improved by more informal and formal training post ADP.

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**ESRA1-0472**

**Miscellaneous**

**INTRAOPERATIVE HYPOTENSION – THE INFLUENCE OF DIFFERENT TYPES OF ANESTHESIA IN URGENT ORTHOPEDIC SURGERY**

Maia D.\(^1\), Pereira N.\(^2\), Rebelo H.\(^3\), \(^1\)Anesthesia. Centro Hospitalar de Vila Nova de Gaia/Espinho, Vila Nova de Gaia, Portugal.

**Background and aims:** Hypotension following anesthesia induction is well documented, and one of the biggest challenges for the anesthesiologist is to choose the anesthetic technique which ensures better intraoperative hemodynamic stability.

The aim of this study is to measure the prevalence of intraoperative hypotension following induction of general anesthesia (GA) or spinal anesthesia (SA), in patients submitted to urgent correction of proximal-third femoral fracture.

**Methods:** Prospective, observational, clinical study, in Gaia/Espinho EPE Hospital Center, from 1st July 2012 to 30th June 2013. The study included all patients who were admitted to the Emergency Department with proximal femoral fracture and were submitted to corrective surgery under GA or SA (intrathecal single shot). Intraoperative registration of hemodynamic parameters was obtained from PICIS® program. Hypotension was defined as ≥20% decrease from pre-induction mean arterial pressure.

Statistical analysis was performed with PASW®, using the chi-square test and the Student’s t test for independent samples (significance level of 0.05).

**Results:** Of the 223 patients included in the study, 22.4% (N=50) were submitted to GA, and the remaining 173 to SA. Of the 50 patients submitted to GA, 66% had an episode of hypotension vs. 46.2% of patients undergoing surgery under SA.

Using the chi-square test we concluded (95% confidence interval), that there is no causal relationship between intraoperative hypotension and the type of anesthesia (p>0.014), i.e. there is more risk of hypotension in patients under GA.

**Conclusions:** Patients with proximal-third femoral fracture, submitted to corrective surgery, have more risk of hypotension when anesthetized with GA than those undergoing SA (intrathecal single shot).

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**ESRA1-0484**

**Case Reports**

**COMBINED PECTORAL AND CUTANEOUS BRANCHES OF INTERCOSTALS NERVES BLOCKS IN A HIGH RISK PATIENT FOR MASTECTOMY**

Ortiz de la Tabla R.\(^1\), Martínez Navas A.\(^1\), Gómez Reja P.\(^1\), Sánchez Martín I.\(^1\), Sánchez Brotons M.J.\(^1\), Echevarría Moreno M.\(^1\), \(^1\)Anesthesiology department, Valme Hospital, Seville, Spain.

**Background and aims:** Ultrasound guided ‘pecs’ block and cutaneous branches of intercostals nerve blocks were recently introduced techniques that may be useful in breast surgery, and that may provide an alternative to paravertebral blocks.

**Methods:** We present the case of a patient 80 years old, 50 kg of weight, ASA IV diagnosed with breast cancer infiltrante and scheduled for a mastectomy. She includes as medical history severe aortic stenosis with repeated episodes of congestive heart failure.

After monitoring of the patient, we place the ultrasound probe below the outer third of the clavicle, transverse to the axis of the body, identifying pectoralis major and minor muscles, the thoraco- acromial artery, before introducing the needle in- plane from medial to lateral and 15 ml ropivacaine 0.5% was administered between the muscles next to the artery.

Then, the ultrasound probe was placed in the ipsilateral axillary midline lesion at the level of the sixth intercostal space in longitudinal position. A Tuohy needle is inserted in plane with respect to a flow transducer head and injected ropivacaine 0.5% 15 ml, between the external intercostal muscles and the serratus anterior muscle, advancing the needle into the intercostal spaces above and confirming the correct diffusion of the anesthetic at these levels.

**Results:** Ten minutes after the surgery that lasted 80 minutes without incident and without sedation of the patient.

**Conclusions:** Combined pectoral and cutaneous branches of intercostals nerves blocks have been effective and safe anesthetic technique in breast surgery, resulting in decreased systemic peri-operative analgesic requirements, and improved patient satisfaction.

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**ESRA1-0488**

**Postoperative Pain Management**

**LONG TERM EVALUATION OF THE EFFECT OF MULTIMODAL ANALGESIA ON NEUROPATHIC PAIN AFTER BREAST THERAPY FOR CANCER**

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**Background and aims:** Our objective was to evaluate the effect of multimodal analgesia (MA) on neuropathic pain, Nitric oxide (NO) and interleukin-1 beta (IL1-b) following surgery for breast cancer.

**Methods:** After taking ethical committee approval and patients’ consent, this randomized study was conducted on 50 women scheduled for conservative breast surgery under the effect of general anesthesia. Women enrolled into two groups; to receive perioperative ultrasound guided thoracic paravertebral block (US/TPVB) (group I) or MA in form of perioperative US/TPVB and oral pregabalin daily for 6 months, (group II).

Neuropathic pain was assessed by pain questionnaire for a month and NP scale at 1, 3, 6 and 9 months postoperatively. NO and IL-1b were measured before operation, 1, 3, 6 & 9 months postoperatively.

**Results:** Neuropathic pain started few days postoperatively, in both groups. Its onset, sites, duration and precipitating factors were similar in the studied groups. Multimodal analgesia showed significant influence on sensitivity, hot pain and unpleasantness at 1 month postoperatively. It reduced itchy, dull and sharp pain at 3 months postoperatively. It lowered most items of NP except sharp and deep pain at 6 months after operation. At 9 months, hot and superficial pain was still less in patient receiving MA. NO decreased significantly 1 and 3 months postoperatively, while IL-1b was significantly lower through different times, in group II. IL-1b correlated well with NP intensity and unpleasantness.

**Conclusions:** Breast surgery for cancer was associated with NP that continued for 9 months postoperatively. Multimodal analgesia influenced NP positively.
Methods: This prospective, randomized and single-blind study evaluated postoperative pain scores and requirements of rescue analgesics after remifentanil-desflurane anesthesia in patients with thyroidectomy. Sixty-two patients undergoing thyroidectomy under general anesthesia were randomly allocated into two groups. All patients were anaesthetised with desflurane and high-dose remifentanil. Remifentanil was infused at the rate of 0.3 μg/kg/min until the end of surgery in patients of the control group (group A) whereas remifentanil was tapered gradually from 0.3 to 0.1 μg/kg/min until the end of surgery for at least 30 minutes in patients with group B. Pain scores (0-100 numerical rating scale, NRS), rescue analgesic requirements and adverse events were assessed at 30 min, 2 h, 6 h, 12 h, and 24 h after operation.

Results: There was a significant decrease in pain scores at 30 min (20 [0-80] vs. 50 [0-100], P = 0.002) and 2 h (30 [10-60] vs. 40 [20-80], P = 0.018) after surgery in group B compared with group A. In addition, rescue analgesics are less required in group B than in group A postoperatively (2 [1-3] vs. 3 [2-3], P = 0.039). There were no significant differences in adverse events between the two groups.

Conclusions: Tapering of remifentanil at the end of surgery decreased postoperative pain scores immediately after thyroidectomy with desflurane and high-dose remifentanil anesthesia.

**ESRA1-0515**

**Miscellaneous**

**MAXIMIZING EFFICIENCY: REGIONAL ANESTHESIA BLOCKROOM THROUGHPUT SIMULATION**

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Background and aims: Our Acute Pain Medicine Service (APM) is fortunate to have a designated Block Room (BR). This study is aimed at analyzing the process of admitting a patient to the BR and streamlining care to improve efficiency.

Methods: We received IRB approval for a retrospective review of pre-existing BR case logs, which contain the surgery scheduled, block performed, and specific times including patient arrival in the BR, block start, block end, etc. This time sensitive data allowed us to build a preliminary computerized model of patient throughput through the BR.

Results: By averaging the effect of different time and personnel variables in terms of efficiency measures (Figure 1), our virtual model of daily BR activities runs independently as a Markov Chain simulation. Controlling starting variables allows us to predict whether scheduled blocks will be performed on time.

**FIGURE 1.**

**Conclusions:** Once complete, we hope to use this model in reverse simulation to better predict patient’s estimated arrival times, stagger case starts, and anticipate staffing based on the number and complexity of scheduled cases. We hope to minimize surgical delays and patient anxiety, and create a streamlined infrastructure of BR operations to enable other institutions to implement more robust APM services.

**ESRA1-0519**

**Miscellaneous**

**THE CHANGE OF PULSE TRANSIT TIME IN LOWER EXTREMITY AFTER LUMBAR SYMPATHETIC GAGLION BLOCK: AN EARLY INDICATOR OF SUCCESSFUL BLOCK**

Kim Y.1, Suh J.1, Leem J.1, Shin J.1, Joo E.1 1Department of Anesthesiology and Pain Medicine, Asan Medical Center University of Ulsan College of Medicine, Seoul, Korea.

Background and aims: A lumbar sympathetic ganglion block (LSGB) is a procedure that is used for treatment of sympathetic mediated pain of lower extremities. This sympathetic block leads to vascular relaxation. Pulse transit time (PTT) is the length of time for which the pulse wave travels between two arterial points and it can be used as an index to reflect the increase in blood flow. This study aimed to investigate the change of PTT after LSGB and therefore to evaluate the usefulness of PTT as an indicator for successful LSGB.

Methods: Data were used from 16 patients who were performed LSGB due to the sympathetically mediated neuropathic pain. PTT was measured at baseline, 5, 10, and 20 minutes after the injection of drug. LSGB was confirmed to be successful if there is increase of temperature of ipsilateral foot was more than 2 degrees Celsius at 20 minutes after the injection of drug (dT20 > 2 degrees Celsius).

Results: The LSGBs were successful in 9 cases (56%) and unsuccessful in 7 cases (44%). The ratio of change of PTT at 5 minutes after drug injection to baseline (dPTT5/PTT0) showed positive correlation with the change of temperature at 20 minutes after drug injection (correlation coefficient 0.783, p-value = 0.01). In comparison between success and failure group, dPTT5/PTT0 of success group was 68±23.8% and that of failure group was 32.9±1.0%, and they are significantly different (p-value < 0.01).

Conclusions: The measurement of PTT at 5 minutes after drug injection can be used as an early indicator for successful LSGB.

**ESRA1-0525**

**Chronic Pain Management**

**EVALUATION OF CHRONIC POSTMASTECTOMY PAIN IN PATIENTS RECEIVING ULTRASOUND GUIDED THORACIC PARAVERTEBRAL BLOCK WITH ORAL MEXILETINE OR CLONIDINE**

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Background and aims: Was to evaluate the effect of thoracic paravertebral block (TPVB) alone or with either oral mexiletine or clonidine on patient satisfaction with medical care and postoperative pain, chronic post mastectomy pain (CPMP), and plasma level of nitrite/nitrate (NOx) and IL-6.

Methods: After approval of the Ethical Committee, and obtaining a written consent from every patient involved in the study, a 48 women scheduled for modified radical mastectomy under general anes thesis with ultrasound guided TPVB enrolled into three groups; group I received only TPVB, group (II) received pre and postoperative 200 mg oral mexiletine for one month and group (III) received pre and postoperative 0.2 mg oral clonidine for one month. CPMP was evaluated using brief pain inventory short form 1&3months postoperatively. NOx and IL-6 were measured before operation, 1&3months postoperatively. Their relationship with CPMP was assessed.

Results: Acute noiceptive pain was less in mexiletine and clonidine groups compared to control group. TPVB with oral mexiletine reduced the intensity of CPMP as well as the pain interference with daily activities. NOx did not correlate with development of CPMP however IL-6 showed a high correlation.

Conclusions: Breast surgery for cancer was associated with high incidence of neuropathic pain. TPVB with either oral mexiletine or clonidine significantly reduced acute noiceptive pain. TPVB with mexiletine reduced the intensity of CPMP as well as the pain interference with daily activity.

**ESRA1-0527**

**Abstracts Withdrawn**

**THE EFFECT OF SHOULDER ROTATION ON THE DIMENSION OF THE ACOUSTIC TARGET WINDOW FOR PARAMEDIANTHORACIC EPIDURAL ACCESS IN THE LATERAL DECUBITUS POSITION**

Kim H.1, Byon H.1 1Anesthesiology and Pain Medicine, Kangdong Sacred Heart Hospital Hallym University, Seoul, Korea, 2Anesthesiology and Pain Medicine, Yonsei University College of Medicine, Seoul, Korea.
Background and aims: Shoulder rotation has been reported to increase the posterior longitudinal ligament (PLL) as a measure of the acoustic target window for paramedian thoracic epidural access in sitting subjects. There are limited data on the effect of shoulder rotation for paramedian thoracic epidural access in the lateral decubitus position. The aim of this study was to define whether shoulder rotation increases the length of the PLL in the lateral decubitus position.

Methods: Ten adult male volunteers were positioned in the right lateral decubitus and flexion position on a horizontal operating table. Ultrasoundography was performed using the right longitudinal paramedian plane to obtain optimal ultrasound view for the PLL. The length of the right PLL was measured at the T7/8 and T9/10 interspaces before and after a 30° rightward shoulder rotation.

Results: The mean ± SD of age (yrs), height (cm) and weight (kg) were 31.7 ± 3.3, 174.6 ± 3.3 and 74.3 ± 8.2, respectively. The mean ± SD of the PLL increased significantly from 8.0 ± 1.7 mm to 9.3 ± 1.9 mm (P < 0.01) at the T7/8 interspace and from 9.6 ± 1.5 mm to 10.5 ± 1.5 mm (P < 0.05) at the T9/10 interspace, respectively before and after shoulder rotation.

Conclusions: Shoulder rotation significantly increases the dimension of the acoustic target window for paramedian thoracic epidural access in the lateral decubitus position.

ESRA1-0531
Chronic Pain Management

RETROSPECTIVE ANALYSIS ON THE CLINICAL SIGNIFICANCE OF LIGAMENTUM FLAVUM IN LUMBAR SPINAL STENOSIS PATIENTS
Cheong Y.S.,1 Kong Y.G.,1 Shin J.W.,1 Leem J.G.,1 Suh J.H.1,2,3 Department of Anesthesiology & Pain Medicine, Asan Medical Center, Seoul, Korea.

Background and aims: The MRI is frequently used to diagnose the lumbar spinal stenosis but the findings of MRI are not always compatible with the symptom of stenosis. We hypothesized that the ligamentum flavum area measured on MRI might be related to the symptom of the lumbar spinal stenosis.

Methods: We retrospectively reviewed patients who visited our pain clinic from 2009 to 2011. The inclusion criteria were: 1) Clinical symptom should be compatible with spinal stenosis, 2) MRI image within 6 months, 3) The medical record including visual analog scale (VAS) and Oswestry Disability Index (ODI) was present. The patients were excluded if the patient has history of lumbar spinal surgery, history of spinal intervention or injection within 6 months, and other disease which could give an effect on the pain severity.

Data including VAS, ODI, the walking component of ODI (ODIW) and subjective walking distance were collected. The area of spinal canal (SCA), durac sac (DSA) and ligamentum flavum (LFA) at the most stenotic intervertebral level on MRI were also measured.

Results: 67 patients were enrolled. By correlation analysis, no clinical variables had the correlation with VAS. ODI showed the correlation with SCA and DSA. The subjective walking distance showed the correlation with DSA. LFA showed the correlation only with ODI.

Conclusions: LFA did not show the correlation with VAS and walking distance. Only ODI score showed the statistically significant correlation with LFA. We interpreted that the thickening of ligamentum flavum might be related to the chronicity which might aggravate the quality of life.

ESRA1-0533
Central Nerve Blocks

ULTRASOUND GUIDED CERVICAL PLEXUS BLOCK FOR CAROTID ENDARTERECTOMY: DESCRIPTION OF A NOVEL TECHNIQUE AND OUR EXPERIENCE
Khanna S.1, Kumar S.1, Das J.1, Verna S.1, Mehta Y.1, 1Anesthesiology, Medanta The Medicity, Gurgaon, India.

Background and aims: Regional block of the cervical plexus for carotid endarterectomy can be achieved with reasonable success rate with the landmark technique with or without the use of nerve locator. However, we realised that the adequacy and precision of the block with lower volume of drug may be achieved if the plexus is blocked under ultrasound guidance. Moreover ultrasound can help in precise and safe deposition of local anaesthetic drug into the carotid sheath to block the nerves essential for carotid surgery.

Methods: We used this technique in 25 patients between July 2010 and February 2014. A 5–10 MHz ultrasound probe was used to block the superficial cervical plexus and carotid sheath with Bupivacaine. Additional local anaesthetic (Lignocaine 2%) was administered by the surgeon in 1 ml aliquot to supplement the block whenever the patient reported discomfort.

Results: A mean of 85.6 mg of Bupivacaine was used.

FIGURE 1.

FIGURE 2.
ultrasound view for the PLL. The length of the right PLL was measured at the T7/8 and T9/10 interspaces before and after a 30° rightward shoulder rotation.

**Results:** The mean ± SD of age (yrs), height (cm) and weight (kg) were 31.7 ± 3.3, 174.6 ± 3.3 and 74.3 ± 8.2 respectively. The mean ± SD of the PLL increased significantly from 8.0 ± 1.7 mm to 9.3 ± 1.9 mm (P<0.01) at the 7/8 interspace and from 9.6 ± 1.5 mm to 10.5 ± 1.5 mm (P<0.05) at the 9/10 interspace, respectively before and after shoulder rotation.

**Conclusions:** Shoulder rotation significantly increases the dimension of the acoustic target window for paramedian thoracic epidural access in the lateral decubitus position.

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**ESRA1-0550 Peripheral Nerve Blocks**

**CLOSE, BUT NO CIGAR! WHY ARE ULTRASOUND-GUIDED UPPER EXTREMITY NERVE BLOCKS NOT COMPLETELY EFFECTIVE?**

**Jensen K.** 1, Børglum J., 1 Anaesthesiology and Intensive Care, Copenhagen University Hospital: Bispebjerg, Copenhagen, Denmark.

**Background and aims:** Large cohort studies and systematic reviews of upper extremity nerve blocks consistently disclose failure rates higher than 7% [1]. No single intervention, including the use of expert practitioners, confirmation by electrostimulation, massive local anaesthetic volumes or multiple-injection techniques seem to reduce this critical value. The aim of this presentation is to challenge our understanding of this topic.

**Methods:** Selective literature review on nerve block success rates.

**Results:** Several potential causes of nerve block failure may be identified [Table 1]. While most of these causes have been investigated at length, we are only now beginning to understand the extent that anatomical variations contribute to block failure [2]. In addition, our paradigm that each nerve has designated areas of innervation may be challenged; in a study on LA-induced autonomic skin responses, block of the median and ulnar nerves caused vasodilatation in the area innervated by the radial nerve, while block of the radial nerve did not [3]. Also, axillary nerve block with additional single peripheral nerve blocks do not reach 100% success rates [4]. Finally, chronic pain and multiple causes of pain induces changes in the peripheral and central sensory systems which may affect nerve block success [5].

<table>
<thead>
<tr>
<th>Potential causes of nerve block failure</th>
<th>Been there, done that</th>
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<tbody>
<tr>
<td>Inexperienced practitioners</td>
<td>Yes</td>
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<tr>
<td>Inability to identify the correct nerves</td>
<td>Yes</td>
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<tr>
<td>Needle-to-nerve proximity not achieved</td>
<td>Yes</td>
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<tr>
<td>Dissipation of LA away from nerves</td>
<td>Yes</td>
</tr>
<tr>
<td>Insufficient LA volume used</td>
<td>Yes</td>
</tr>
<tr>
<td>Insufficient latency time until effect</td>
<td>Yes</td>
</tr>
<tr>
<td>Unidentified obstacles in neurovascular sheath or adventitia</td>
<td>Yes</td>
</tr>
<tr>
<td>Anatomical variations in nerve course and innervation areas</td>
<td>No</td>
</tr>
<tr>
<td>Pathology causing pain is not located in an exact location</td>
<td>No</td>
</tr>
<tr>
<td>Pain impulses do no travel via a unique and consistent neural root</td>
<td>No</td>
</tr>
<tr>
<td>LA does not totally abolish sensory function</td>
<td>No</td>
</tr>
<tr>
<td>Pathological changes in central or peripheral sensory perception</td>
<td>No</td>
</tr>
</tbody>
</table>

**FIGURE 1.**

**Conclusions:** Our paradigm of consistent relationships between local anaesthetics, peripheral nerve innervation and pain perception may be challenged and may help explain why we are unable to reach 100% success rates in ultrasound-guided nerve block analgesia. However, many potential causes of failure still need scientific investigation.

**References**


**ESRA1-0551 Peripheral Nerve Blocks**

**RECLAIMING THE SUPRACLAVICULAR NERVE BLOCK FOR UPPER EXTREMITY SURGERY: A RANDOMIZED, DOUBLE-BLIND STUDY COMPARING ULTRASOUND-GUIDED SUPRACLAVICULAR, INFRACLAVICULAR AND AXILLARY NERVE BLOCKS**

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**Background and aims:** Brachial plexus blocks for elbow, forearm or hand surgery are commonly used and well documented. However, failure rates, needle passes and procedure times vary considerably between studies: supraclavicular 0-37%, 1-3 passes, 1-10 mins; infraclavicular 0-23%; 1-3 passes, 2-13 mins; axillary 0-40%, 1-6 passes, 3-12 mins. We wanted to asses pros and cons for each block type in a clinical setting.

**Methods:** After IRB approval, 120 patients participated in a randomized, double-blind comparison of ultrasound-guided supraclavicular [n=40], infraclavicular [n=40] and axillary [n=40] blocks for upper extremity surgery. Linear transducer, short-axis, in-plane, multiple-injection technique with 20 ml of ropivacaine 0.75% was used for all blocks. Block characteristics, procedural pain, readiness for surgery and clinical failure (adjuvant block or general anaesthesia necessary 40 minutes after block placement) were investigated.

**Results:** Main results are presented in Table 1. While the infraclavicular block had less needle passes and injections, performance time and procedural pain was similar between all groups. The supraclavicular block had most easily recognizable structures, had shortest onset time and few clinical failures. The axillary block was clearly inferior on all these counts. No complications were observed.

**FIGURE 1.**

**Conclusions:** The supraclavicular and infraclavicular blocks seem to be most clinically proficient for elbow, forearm or hand surgery. Patient demeanor and ad hoc ultrasonic visibility may help decide on specific block choices.

**ESRA1-0557 Chronic Pain Management**

**SUCCESSFUL TREATMENT OF NEUROPATHIC PAIN IN THE LOWER LEG WITH DRG SIMULATION FOLLOWING FAILED SCS**

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Background and aims: Spinal Cord Stimulation (SCS) is a recognised and well-studied treatment for management of pain associated with Chronic Regional Pain Syndrome (CRPS). Dorsal Root Ganglion (DRG) stimulation is a new approach to placing the electrodes where a low frequency current is passed through the leads placed within the intertransverse foramen surrounding the dorsal root ganglion. We describe a case of successful management of CRPS pain with DRG stimulation after failure with standard SCS.

Methods: A 49-year-old Caucasian labourer sustained an occupational soft tissue injury to the right ankle more than three years ago. Following failed trial of multiple conservative treatments including nerve blocks, physiotherapy, hydrotherapy and anti-neuropathic medications; he received a trial of percutaneous SCS with satisfactory results. This was followed by surgical placement of paddle leads, which failed to maintain the same quality of stimulation. Revision of these leads to a different spinal level also failed to deliver pain relief. This is despite use of multiple independent current control.

Following referral to our unit, the interdisciplinary care team advised DRG stimulation trial. This avoided the need to remove existing surgical paddle leads given the potential for morbidity. Leads were placed from within the epidual space in the L4 and L5 intertransverse foramen.

Results: The patient underwent an uneventful two-stage insertion of DRG stimulator device with full coverage of the area resulting in satisfactory pain relief and improved function.

Conclusions: DRG stimulation can still be successful after failed conventional SCS and is a useful salvage technique after failed standard SCS.

ESRA1-0566
Obstetric

PERIOPERATIVE USE AND SAFETY OF COLLOIDS IN PATIENTS UNDERGOING HYSTERECTOMIES
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Background and aims: In the perioperative period colloids are used to obtain circulatory stabilization. Distinction is made between natural (Albumin) and artificial colloids (e.g., Hydroxyethyl Starch, HES). Recently, HES has come under scrutiny after several trials suggested it to be associated with increased risk of mortality and acute renal injury in critically ill patients. While both major trials and large-scale observational data are lacking, the debate continues regarding the safety of perioperative HES use. Using a large national database we aimed to study the use and safety of HES vs Albumin in elective surgery.

Methods: After IIRB approval, data on patients undergoing hysterectomies were accessed from the Premier Perspective database (Premier Inc., 2006-2012). Use of HES and Albumin was determined for the day of surgery and the day after surgery creating four groups: HES use only (HES), Albumin use only (ALB), HES/Albumin both used (COMB), no HES or Albumin used (NONE). Primary outcomes of interest were acute renal failure, need for blood transfusion, 30-day mortality, costs of hospitalization (CH0), and length of stay (LOS). These were assessed in the four intervention groups, overall, and by patient subgroups based on intensive care unit admission, advanced age (75+ years), and cardiovascular compromise.

Results: Our analysis included 520,476 patients from 515 hospitals. HES was used in 2.9%, Albumin in 0.9% and both were used in 0.2% of the cases, respectively. Mean age for the HES group was 59.9 (SD 13.2) vs 56.4 (SD15.1) for ALB, 59.0 (SD 15.0) for COMB, and 47.2 (SD 11.6) years for the NONE group. A similar pattern was found for the primary outcomes: acute renal failure 1.8% vs 4.9%, 9.7% and 0.3%; blood transfusion 12.0% vs 25.6%, 29.1% and 2.6%; 30-day mortality 0.4% vs 1.0%, 2.5% and 0.05% (all P<0.001). COH and LOHS were $13,417 vs $26,249, $33,837 and $7,579; 4.1 days versus 8.1 days, 10.8 and 2.0 days, respectively. Patterns did not change when analyzing the patient subgroups.

Conclusions: While there have been safety concerns on HES use in critically ill patients, in this ongoing analysis we were able to show that patients receiving various types of colloids differed significantly in characteristics and more importantly in complication rates. Ongoing regression analysis is targeted to determine the independent impact of HES and Albumin on perioperative outcomes in this elective surgical population.

ESRA1-0574
Peripheral Nerve Blocks

EVALUATION OF ANALGESIC EFFECT OF PECTORAL BLOCK IN PATIENTS UNDERGOING BREAST CANCER SURGERY
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Background and aims: In this study, we aimed to investigate the effect of pectoral block (PEC I) on pain control and postoperative morphine consumption in patients who underwent unilateral breast cancer surgery.

Methods: After obtaining ethical committee permission and informed patient consent a total of 50 ASA I-III patients, aged 18-65 years, undergoing
unilateral breast cancer surgery under general anesthesia were included into the study. All patients were randomized by using scaled envelope technique into two groups, no regional block was administered in control group (n=25), pectoral block was performed in pectoral group (n=25). In pectoral group, block was performed in the preoperative block area after standard monitoring and iv sedation with midazolam. Pectoral block was performed under ultrasound guidance as described by Blanco (1). Twenty ml of bupivacaine 0.5 % was administered between pectoralis minor muscle and pectoral major muscles. Standard general anesthesia was induced (thiopental 4-6 mg, fentanyl 2 μg/kg, vecuronium 0.6mg/kg) and maintained using desflurane in N2O/O2 with a ratio of 2:1 was administered to all patients. The depth of anesthesia was monitored with bispectral index (BIS) technique. The desflurane was adjusted to maintain a BIS level between 40-60. At the end of surgery all patients received tenoxicam 20 mg and ondansetron 4 mg iv. Patient controlled analgesia (PCA) was applied by using morphine in both groups for postoperative analgesia. Postoperative pain was assessed by the VAS for pain. VAS values, total analgesic consumption, additional analgesic requirement and incidence of nausea and vomiting were recorded at 1, 6, 12, and 24 h postoperatively. Paracetamol was administered for rescue analgesia in case of VAS>3.

Results: Postoperative morphine consumption at 1., 6., 12. and 24. h were significantly lower in the pectoral group (p<0.05). Postoperative opioid consumption at 24 hours was significantly lower in the pectoral group (9.5± vs 17±10 mg) compared to control group (p<0.05). Desflurane consumption at 45, 60 and 75th minutes were lower in the pectoral group (p<0.05).

Conclusions: In conclusion we found that pectoral block was effective in reducing analgesic requirements and desflurane consumption in patients undergoing breast surgery.

ESRA1-0582
Central Nerve Blocks

EARLY DATA IN INFLUENCE OF DEXAMETHASONE ADMINISTRATION IN SPINAL ANESTHESIA FOR FEMUR FRACTURE

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Background and aims: The aim of this research is to establish the influence of intrathecal dexamethasone administration in spinal anesthesia with levobupivacaine on postoperative pain, consciousness and values of cortisol levels for patients with femur fracture.

Methods: The study is planned as a prospective, interventional, randomized clinical trial. A total of 60 patients ASA2 and ASA3 status, scheduled for surgical procedures will be sorted into two groups and undergo surgery in spinal anesthesia with 12.5mg of levobupivacaine (SA) group and with addition 8mg of dexamethasone (DSA) group. The primary outcome measure is the occurrence of postoperative disturbance of consciousness and plasma cortisol levels. As a secondary outcome measure, we are following pain intensity, blood glucose levels and recovery. Cortisol and glucose are analyzed in five measurements. Perioperative venous blood samples are collected before anesthesia, one hour after surgery, third, fifth and on the tenth day after surgery. Postoperative delirium is defined by using Confusion Assessment Method (CAM) criteria. Visual analogue scale (VAS) is used to record pain severity among patients.

Results: We collected data for 16 patients so far. Postoperative cortisol plasma levels in 8 patients in DSA group were significantly lower (210(184-262)nmol/L in comparison to 8 patients in SA group with postoperative cortisol plasma levels 713(354-794)nmol/L. The duration of analgesia in DSA group was 428±72.57 minutes and in SA group 212±34.76 minutes. According to CAM criteria postoperative cognitive disturbances were seen in 5(31%) patients in SA group.

Conclusions: The addition of dexamethasone to the local anesthetic significantly prolongs the duration of sensory block and decreases opioid requirements and postoperative cognitive disturbances.

ESRA1-0585
Case Reports

CARDIOPULMONARY ARREST AFTER BRACHIAL PLEXUS BLOCK FOR SHOULDER SURGERY – SECOND TRY AT REGIONAL ANESTHESIA AND PERIOPERATIVE MANAGEMENT

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Background and aims: Interscalene brachial plexus block (ISBPB) is the preferred anesthetic option for shoulder surgery in the sitting position, at our institution, due to its advantages when compared with general anesthesia. However, the combination of the sitting position, regional anesthesia, awake patient and surgical procedure, may result in vasovagal reactions, that can evolve to syncope and cardiopulmonary arrest (CPA).

The authors describe a case report, describing the perioperative management and special precautions in a patient the second time round for a similar procedure following a recent cardiopulmonary arrest.

Methods: Male, 56 years, ASA physical score II, for a shoulder prosthesis. Anesthetic history: CPA of undetermined cause during shoulder arthroscopy after neurostimulator assisted ISBPB. Cardiac evaluation showed no increased risk of CPA in perioperative setting. Combined anesthesia with ISBPB (75 mg Mepivacaine 1.5% and 50 mg Ropivacaine 0.5%) using neurostimulator assistance and general anesthesia was administered. An external pacemaker was in place in demand mode before any procedure was made. Also, the procedure went through in dorsal decubitus position.

Results: No perioperative complication occurred.

Conclusions: In this case, the anesthetic technique and the assistance of neurostimography (due to its several advantages when compared with neurostimulator), the position of the patient during the procedure, and the external pacemaker placement were the main precautions, to ensure a safe procedure, during all the perioperative period.

ESRA1-0586
Postoperative Pain Management

LEVOBUPIVACAINE INFUSION VIA WOUND CATHETER VERSUS BILATERAL TRANSVERSUS ABDOMINIS PLANE (TAP) CATHETERS FOR PAIN RELIEF AFTER CESAREAN SECTION: A PROSPECTIVE RANDOMIZED ASSASSESSOR-BLIND TRIAL

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Background and aims: Local anesthetic (LA) infusion via wound or TAP catheters has been used for pain relief after cesarean section (CS). However, evidence is lacking regarding the superiority of one catheter infusion to the other. The aim of this study is to compare between bilateral TAP catheters & wound catheter infusion regarding the analgesic efficacy after CS.

Methods: Fifty ASA I-II patients, scheduled for elective CS, were randomly assigned to receive LA infusion either through wound catheter (group W) or bilateral TAP catheters (group T). All patients received spinal anesthesia using 10mg of heavy bupivacaine & 15microgram fentanyl. In group W, the catheter was inserted by surgeon below fascia with initial bolus of 20ml Levobupivacaine 0.25%, followed by continuous infusion of levobupivacaine 0.125% at a rate of 10ml/h. While in group T, the two catheters were inserted under ultrasound guidance in the posterior TAP after wound closure with initial bolus of 10ml Levobupivacaine 0.25%, followed by continuous infusion of Levobupivacaine 0.125% at a rate of 5ml/h via each catheter. A standard postoperative regimen of paracetamol 1g every 6h & intravenous fentanyl PCA was followed. The primary outcome was the 24h fentanyl consumption. Other outcomes included pain score, maternal satisfaction, performance time & side effects.

Results: No significant difference was detected between both groups regarding the 24h fentanyl consumption (1104ug ± 455 in group T vs. 1186ug ± 387 in group W, P=0.56), or pain scores. No signs of LA toxicity or local complications were observed. Maternal satisfaction was high in both groups. Performance time was significantly longer in group T (14min ±3.4 vs. 2.2min ± 1, p<0.0001).

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No difference was found in HR and MAP to the baseline in both IV ASA I

Subcutaneous infiltration of cocaine dates back to 1880 and is nearly

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11, rescue analgesia of 30 mg. kg acetaminophen was

Thoracic epidural is a very useful tool for postoperative pain control

A 42 year old male patient with morbid obesity (BMI: 47.7 kg/m²)

A search was carried out in the main medical databases (PubMed,

In 1901 appears the first reference to caudal anaesthesia and in 1921 the first

Background and aims: Since the discovery of the local anaesthetic effect of the cocaine, regional anaesthesia has evolved rapidly and sustained, diversifying techniques and improving in healthcare quality and patient’s safety. The objective of the present work is to reflect the chronological evolution of this anaesthetic modality.

Methods: A search was carried out in the main medical databases (PubMed, TripDatabase, Embase, SCJ) with the mesh terms: anaesthesia, regional, epidural, flow, local, spinal, nerve block. The most significant milestones were noted down in the order of their first publication in one of these databases.

Results: Subcutaneous infiltration of cocaine dates back to 1880 and at nearly the same time, the first case of peribulbar block and the first medullary cocainization, forerunner of the subsequent spinal anaesthetics. In 1901 appears the first reference to caudal anaesthesia and in 1921 the first reference to epidural anaesthesia.

The first nerve stimulator is reported in 1912 and the neurostimulation needles we know today, in 1921.

The first ultrasound-guided nerve block is published in 1978.

The latest publications of 2014 emphasize the importance of "triple monitoring" by adding to the neurostimulation and the ultrasound, the measurement of pressure as the needle moves forward.

Conclusions: Regional anaesthesia has three centuries of history. Originally, it was considered an assistant of general anaesthesia, but today it is increasingly being used as a unique anaesthetic technique that evolves to improve patient’s safety.

Up-to-date knowledge on regional anaesthesia is essential for the anaesthesiologist’s daily work.

Conclusions:

LA infusion via bilateral TAP catheters or wound catheter provided safe, effective & comparable analgesia after CS with high maternal satisfaction; however, TAP catheters required longer time to be inserted.

Background and aims: Bariatric surgery is a challenge for anesthesiologist. Morbid obese patients with co-morbidities presents for laparoscopic surgery need to be planned well. We share our anesthesia experience of once opioid-dependent patient for sleeve gastrectomy.

Methods: A 42 year old male patient with morbid obesity (BMI: 47.7 kg/m²) had undergone sleeve gastrectomy. He had a history of opioid-addiction and naloxone pellet is placed 3 months ago for treatment. He has had also obstructive-sleep-apnea-syndrome. Opioid free anesthesia was planned.

After premedication with midazolam patient has taken in sitting position. A curved ultrasound probe has used for examining the neuroaxial structures and midline. Eight thoracal level is labeled and epidural space is found at 1 cm at 3rd attempt. The catheter left 4 cm inside the epidural space and sutured to the skin. After taking to head-up position and preoxygenation of patient general anesthesia was initiated with propofol and rocuronium. He has intubated with videolarengescope. Desflurane and remifentanil has used for maintenance and bupivacaine for epidural anesthesia. Laparoscopic sleeve gastrectomy has performed in reverse-trandelenburg position. The operation time was 137 minutes. Recovery was uneventful. Patient controlled analgesia device was used for postoperative pain treatment.

Results: Thoracal epidural is a very useful tool for postoperative pain control for laparoscopic sleeve gastrectomy.

Conclusions: Regional anesthesia should be a part of pain control especially for opioid dependent patients. Difficulties of finding anatomical landmarks in morbid obese patients can be overcome with the use of ultrasound.

Conclusions:

Background and aims:Ultrasound-guided TAP block is an effective technique in providing analgesia for abdominal surgery. This study was design to demonstrate the efficacy of US guided TAP block and to compare it to caudal block in unilateral pediatric hernia repair.

Methods: 40 ASA I–II aged between 1–6 years scheduled for elective unilateral open herniotomy. All patients received general anesthesia (GA) by induction with sevoflurane, after laryngeal mask insertion, anesthesia was maintained with sevoflurane in 60% O2. Patients were then randomized to (group I) US-guided TAP block (n = 20) using 0.5 ml/kg 0.25% bupivacaine (n = 20), surgery was allowed to start 15 mins after giving the block. Standard monitoring was applied. If HR &/or MAP increased by 15% relative to the baseline, fentanyl 1ug/kg was administered. The total amount of fentanyl was recorded. Failure of caudal or TAP blocks was defined as increase in HR or MAP more than 20% of pre-incision value. After surgery, patients remained for 4 h in the recovery room. The sites of injection of the TAP block or caudal area were inspected to detect complications such as hematoma. Postoperative analgesia was evaluated by the children and infants postoperative pain scale (CHIPS). An anesthesiologist, who was not part of the study team, evaluated the need for rescue analgesia in the intraoperative and post-operative period and recovery nurse collected the data. If the CHIPS score was > 11, rescue analgesia of 30 mg. kg acetaminophen was administered.

Results: No difference was found in HR and MAP to the baseline in both groups. Also the amount of intraoperative fentanyl was not different in both groups. CHIPS was less in caudal group however, the difference was not statistically significant.

Conclusions: US-guided TAP block is as effective as caudal block in providing immediate postoperative analgesia in inguinal hernia repair.
ESRAS-0011
Postoperative Pain Management
WHICH METHOD IS THE MOST EFFECTIVE FOR REDUCING POST-THYROIDECTOMY PAIN: BILATERAL SUPERFICIAL CERVICAL BLOCK OR WOUND INFILTRATION? A PROSPECTIVE RANDOMIZED, DOUBLE-BLIND STUDY
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Background and aims: Thyroid surgery is a common operation, and pain is a significant problem in this operation. The aim of our study was to compare the postoperative analgesic efficacy of local anesthetic wound infiltration and bilateral superficial cervical block by measuring the 24-hour postoperative morphine requirements and postoperative pain intensity scores after thyroidectomy.
Methods: This study included 60 patients who were scheduled for a thyroidectomy. The patients were divided into two groups. Bilateral superficial cervical block with 20 ml 0.25% bupivacaine and wound infiltration with 0.9% 20 ml NaCl was performed in Group A, while bilateral superficial cervical block with 20 ml 0.9% NaCl and wound infiltration with 0.25% 20 ml bupivacaine was performed in Group B after skin closure. Postoperative pain was evaluated by Visual Analog Score. All patients were given diclofenac sodium at 12-hour intervals. If the patient’s pain score was > 5 mg of morphine was given. The occurrence of nausea, vomiting and side effects was recorded.
Results: The number of patients requiring morphine for 24 hours after surgery and the total postoperative morphine consumption for 24 hours were significantly lower in Group B compared to the same values in Group A (p=0.028 and p=0.01 respectively). The first analgesic requirement time was significantly longer in Group B than it was in Group A (1168±553.40 min vs 812±684.23 min, p=0.031). The postoperative VAS pain scores in Group B were significantly lower than they were in Group A at PACU admission (p=0.046), discharge from PACU (p=0.041), postoperative 8 (p=0.001), 12 (p=0.025) hours.
Conclusions: We conclude that local anesthetic wound infiltration was more effective than bilateral superficial cervical block in reducing post-thyroidectomy pain.

ESRAS-0013
Peripheral Nerve Blocks
CONTINUOUS SPINAL ANESTHESIA VERSUS ULTRASOUND-GUIDED COMBINED PSEOSA COMPARTMENT-SACIAL NERVE BLOCK FOR HIP REPLACEMENT SURGERY IN ELDERLY HIGH-RISK PATIENTS: A PROSPECTIVE RANDOMISED STUDY
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Background and aims: The study aim was to compare the hemodynamic effects of combined psoas compartment-sciatic nerve block (PCS NB) with continuous spinal anesthesia (CSA) in elderly high-risk patients undergoing hip replacement surgery.
Methods: Seventy patients over the age of 60 years with ASA III or IV physical status were randomly allocated to two groups: In the PCSNB group, ultrasound-guided psoas compartment block was performed with Winnie’s technique using 30 mL of anesthetic solution (lidocaine 1% + epidraine 1:200,000 + bupivacaine 0.25%) and iliac crest block was performed using the same local anesthetic solution (5 mL). All patients in the PCSNB group needed continuing infusion of propofol at the speed of 2 mg/kg/h during operation. In the CSA group, CSA was performed in the L3-L4 interspaced with the patient in lateral decubitus position using 0.5 mL of isobaric bupivacaine 0.5%.
Results: The PCSNB group had significantly higher mean arterial blood pressure values at the start of surgery and 5, 10 and 20 minutes of surgery compared to the CSA group (P = 0.038, P = 0.029, P = 0.012, P = 0.009 respectively). There were no significant differences between groups in terms of heart rate and peripheral oxygen saturation values during surgery and the postoperative period (P > 0.05). Arterial hypotension required ephedrine treatment was observed in 13 patients in the CSA group and 4 patients in the PCSNB group (P = 0.012).
Conclusions: CSA and PCSNB produce satisfactory quality of anesthesia in elderly high-risk patients with fewer hemodynamic changes in PCSNB cases compared with CSA cases.

ESRAS-0014
Obstetric
THE EFFECTS OF ANESTHETIC TECHNIQUE ON MATERNAL AND CORD BLOOD BRAIN DERIVED NEUROTROPHIC FACTOR LEVELS
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Background and aims: The aim of this prospective study was to compare the effects of anesthesia techniques on cord blood and maternal peripheral blood BDNF and malondialdehyde (MDA) levels in patients undergoing elective caesarean section.
Methods: Eighty patients with term pregnancy who underwent elective cesarean section were included in this study. Two groups were formed: General anesthesia was induced with propofol 2 mg/kg in general anesthesia group. In spinal anesthesia group, hyperbaric bupivacaine 0.5%, 9 mg (1.8 mL). Maternal blood samples for BDNF and MDA levels were taken immediately after positioning the patient on the operating table (T1), before clamping the umbilical cord (T2) and 24 hours after the first sample was obtained (T3). During delivery, cord blood was drawn from the umbilical artery (T4).
Results: Maternal BDNF levels at T2 time point were higher in general anesthesia group compared to spinal anesthesia group (2884.94 ± 610.82 pg/ml, 2418.51 ± 456.10 pg/ml; respectively) (P < 0.001). Cord blood BDNF levels were higher in general anesthesia group (1852.15 ± 453.61 pg/ml) compared with spinal anesthesia group (1465.07 ± 487.50 pg/ml). In comparisons within the group; maternal serum BDNF levels were significantly lower in the blood sample collected at T2 time point compared to the blood sample collected at T2 time point (2557.72 ± 517.17 pg/ml) in spinal anesthesia group (P = 0.001). In general anesthesia group, maternal serum BDNF levels were significantly higher in the blood sample collected at T2 time point compared to the blood samples collected at T2 (2563.99 ± 560.77 pg/ml) and T3 (2413.89 ± 593.51 pg/ml) time points (P = 0.017, P = 0.002; respectively).
Conclusions: The anaesthetic technique may have an influence on maternal peripheral and cord blood BDNF levels.

ESRAS-0016
Miscellaneous
SIMULATION OF EMERGENCIES IN REGIONAL ANAESTHESIA: A SAFER WAY TO LEARN HARD LESSONS?
Lambert I.1, Dada A.2, Shah M.1, Anaesthetics, Medway NHS Foundation Trust, Kent, United Kingdom.
Background and aims: Critical incidents occurring in Regional Anaesthesia that result in morbidity or mortality are investigated extensively and often result in protocol driven care pathways suggested as solutions. However the real measure of how effective these pathways are requires testing in the clinical environment, under safe conditions. Simulation training is ideally placed to accomplish this.

Methods: We developed three simulation scenarios based on critical events occurring in Regional Anaesthesia, all had previously occurred within our hospital (wrong site block, epidural haematoma, local anaesthetic toxicity). Anaesthesia residents were observed managing these emergencies in a simulation suite. A thorough debriefing session was undertaken after each scenario where the relevant knowledge, non-technical and crisis resource management skills were discussed.

Results: All trainees rated the session and debriefing as being useful and clinically relevant (90% as 5/5). More pertinently all trainees felt better equipped to recognise or manage an emergency occurring in regional anaesthesia. Each trainee described a single take home message from each scenario that was relevant and sensible in guiding their practice. As part of the preparation a local issue surrounding the availability of lipid emulsion for local anaesthetic toxicity was identified and resolved.

Conclusions: Simulation based learning offers departments the opportunity to learn at all levels in a non-threatening, multi-disciplinary environment, often learning lessons from previous adverse events. It enables learning to be tailored to an individual institution and promotes active discussion and reflective practice amongst participants. The integrity of local safety guidelines can be tested as a key part of clinical governance measures.

ESRA-0019
Postoperative Pain Management

POST-OPERATIVE PAIN MANAGEMENT OF MAJOR ABDOMINAL SURGERY WITH CONTINUOUS WOUND INFUSION: THE (REVOLUTION?)

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1Anaesthetics, Santa Maria Hospital, Lisboa, Portugal.

Background and aims: Pain control on major abdominal surgery is a challenge. Optimizing postoperative analgesia improves clinical outcomes and patient satisfaction, reducing morbidity and mortality. The aim of the study is to evaluate the efficacy of pain control with continuous wound infusion (CWI) catheter, after open major abdominal surgery.

Methods: Twenty-two patients were randomly selected to CWI. Patients received standard post-operative management protocol with Paracetamol and underwent CWI analgesia for 48 hours with preperitoneal 10 ml/h perfusion. Efficacy criteria were based on pain at rest (verbal response scale 0-10).

Results: The proportion of patients successfully controlled for their postoperative pain management is 81.8% (p<0.003). On the uncontrolled pain group (18.2%) VRS was less than 6/10.

Conclusions: Continuous wound infusion (CWI) is one promising technique that offers the potential to reduce postoperative opioid requirement and their side effects and increase postoperative patient mobility, with minimal failure. CWI is as effective as other common methods for pain management after major abdominal surgery with minimal iatrogenic risks, but further comparison studies are required.

ESRA-0020
Case Reports

DEEP INFERIOR EPIGASTRIC PERFORATOR (DIEP) FLAP SURGERY – REACHING PERFECTION. CASE REPORT

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Background: The DIEP flap is at the apex of the tissue reconstruction pyramid, being very demanding in terms of anesthetic/surgical practice. This type of flap has the advantage of maintaining the patency of the abdominal wall, however the likelihood of ischemia of the flap is high and very dependent on the perioperative management.

Case Report: 37 year old female on 4th year post mastectomy with controlled hypertension, proposed to DIEP flap surgery. Hematocrit was 40%. Underwent TIVA (propofol; Remifentanil). Besides the classic monitoring, invasive BP, BIS, urine output, esophageal and peripheral temperature were also monitored. Intraoperatively, the balance of depth of anesthesia and normotension was...
strict (BIS 30–40; SBP > 100 mmHg). Core temperature during surgery was 35–36 °C. Surgery lasted for 12 hours. Post operative hematocrit 35%. Postoperative analgesia was achieved with i.v. morphine.

**Discussion:** This case enhances the necessity of close perioperative care on DIEP surgery. Preoperatively, it is important to maintain hematocrit 30-35% and a regional block is recommended. Intraoperatively, the main key is to preserve high cardiac output, normotension and low vascular resistance. Strict control of temperature (core-peripheral < 1 °C) and urine output > 2 ml/kg/h is vital. At the end of the surgery a continuous wound infusion (CWI) catheter should be placed subcutaneously. Latest conclusions on continuous CIV of ropivacaine are shown to improve microvascularization and also anti-inflammatory and bacteriostatic properties. Postoperatively, a multimodal strategy for analgesia should be applied and the continuous wound infusion plays a role on this parameter also.

ESRA1-0021

**Obstetric**

**INADVERTENT DURAL PUNCTURES DURING OBSTETRIC EPIDURALS: HOW FREQUENT, HOW MANY HEADACHES, HOW MANY UNDERGO EPIDURAL BLOOD PATCHES...AND WHO’S RESPONSIBLE FOR THEM? A 3 MONTH SNAPSHOT**

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**Background and aims:** Rates of inadvertent dural puncture (IDP) during epidural placements is variably reported at 1.2 - 1.6%. A high incidence of headaches is reported following IDPs, up to 86% in one study.

A service evaluation was conducted to elucidate the incidence in our institute and characterise them with respect to personnel involved, follow up and interventions.

**Methods:** A database query by “complication” was conducted retrospectively to cover a three month period. Each case was analysed by two anaesthetists to highlight the utility of a continuous interscalene block in pediatric patients.

**Results:** There were 7 IDPs out of 361 epidurals performed (1.9%). 5 during labour analgesia, and one each during instrumental and LSCS (CSEs). All IDPs were done by trainees, 5 at ST3 and one each at ST5 and ST6. 6 patients were deemed to have PDPH (85.7%) on follow up, and 2 underwent EBP (33%). All IDPs had intrathecal catheters sited.

**Conclusions:** IDP and PDPH rates are comparable to reported rates. The majority did not require EBP, which may be in part due to universal intrathecal catheter placement.

The majority of IDPs were due to trainees and during labour analgesia – this may be a reflection of the anaesthetic working patterns.

ESRA1-0023

**Pediatric**

**ULTRASOUND-GUIDED CONTINUOUS INTERSCALENE BRACHIAL PLEXUS BLOCK IN AN AILLARY LIPOBLASTOMA SURGERY FOR PEDIATRIC PATIENT: A CASE REPORT**

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**Background and aims:** Regional anesthesia in pediatric patients is clearly extended but not the use of continuous nerve blocks. The aim of this case is to highlight the utility of a continuous interscalene block in pediatric patients.

**Methods:** We show the case of a 3-year-old patient, 14 kg weight, with a lipoblastoma axillary recurrence who underwent for a lumpectomy. Premedication with midazolam orally. In the operating room was preceded by balanced anesthesia: fentanyl 3 μg/kg, propofol 4 mg/kg and rocuronium 0.6 mg/kg. At hammerock position, under sterile ultrasound-guided technique, the interscalene brachial plexus was located at 2 cm of skin, administering 3 ml of 0.25% bupivacaine plus 1%lidocaine with a catheter-over-needle kit ContiplexC18 (Braun). The duration of tumor resection: 140 minutes. No incidents occurred and the patient remained stable without need of rescue analgesia. After surgery, we checked the catheter position, proceeding to extubation and transferring the patient to the postanesthesia care unit. There, we started a PCA-continuous infusion of 1.5%ropivacaine 0.1 ml/kg with 0.05 ml/kg bolus dose (45 minutes lockout interval). No complications associated with the plexus block technique. In the days following the surgery, the patient maintained good pain control without any bolus doses or another rescue analgesia. The perfusion was progressively decreased, removing the catheter and discharging the patient from the hospital 3 days after the operation.

**Results:** We show the advantages of regional block with continuous infusion, guided by ultrasound. Minor complications related to the technique, better quality of analgesia, reduction opioid consumption and shorter hospital stay.

**Conclusions:** We must value the realization of continuous plexus brachial blocks in pediatric patients in our anesthetic plan.

ESRA1-0024

**Pediatric**

**DEXMETOMIDINE AS A SOLE AGENT IN CAUDAL ANESTHESIA IN PEDIATRIC PATIENTS UNDERGOING SURGICAL AND UROLOGICAL PROCEDURES IN COMPARISON WITH BUPIVACAINE**

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**Background and aims:** Dexmedetomidine was used as an adjuvant to bupivacaine in caudal anesthesia in many studies. Can it be used alone? efficacy? possible undesirable effects will be studied in this study.

**Methods:** 40 patients were recruited for this study aging from 40 days to 7 years. They were divided into two groups:

- **group A:** 20 patients were given 2.5 mg/kg bupivacaine diluted to a volume of 0.75 ml/kg.
- **group B:** 20 patients were given 0.75 mcg/kg dexmedetomidine diluted to a volume of 0.75 ml/kg.

- dilution in normal saline. Preoperative blood sugar, heart rate, random blood sugar (expected to rise as a stress response) were measured and monitored on incision, 1, 2 hours and 4 hours post incision. Objective pain score was observed 2 and 4 hours after incision. Incisions were mid and lower abdominal.

**Results:** In group A: there was a significant increase in random blood sugar after 2 hours of incision (P value: 0.000). Objective pain score after 2 hours of incision ranged from 0–3 with median of 2 and after 4 hours it ranged from 1–3 with median of 2.

In group B: there was a less significant increase in random blood sugar after 2 hours of incision (P value: 0,043). Objective pain score after 2 hours of incision ranged from 0–3 with median of 2 and after 4 hours it remained the same.

**Conclusions:** Dexmedetomidine when given caudally it has an analgesic action that overweights and lasts for a longer duration than bupivacaine and avoids the possible complications of Bupivacaine.

ESRA1-0025

**Case Reports**

**CONTINUOUS SPINAL ANESTHESIA COMBINED WITH PERIPHERAL NERVE BLOCK IN A PATIENT WITH ISCHEMIC CARDIOMYOPATHY: A CASE REPORT**

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**Background and aims:** Emergency orthopedic interventions are common in elderly patients with multiple comorbidities. General anesthesia (GA) is a high risk technique in these patients usually with pulmonary and heart disease, so the regional anesthesia (RA) may become an alternative for the anesthesiologist in these cases.

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Methods: 76 year old male requiring emergency surgery for placement of partial hip prosthesis after subcapital fracture. Personal history of hypertension, bronchial asthma, dyslipidemia, ischemic cardiomyopathy, that has precised the introduction of eight stents since 2005, and paroxysmal atrial fibrillation. Classified as ASA IV E and Class III Lee's Revised Cardiac Risk Index. During the stay in traumatology department the patient suffered several episodes of chest pain and atrial fibrillation that reversed with amiodarone and nitroglycerin. The echocardiography showed left ventricular dilatation with reduced ejec- tion fraction and moderate aortic stenosis.

Results: A continuous subarachnoid block, L3-L4 level, with injection of hyperbaric bupivacaine 0.5% (1.5 ml) was performed to avoid hypotension and arrhythmia during the intervention; and an ultrasound-guided femoral block to control postoperative pain. No additional bolus was needed. There was no hemodynamic variation during surgery that ended after two hours without adverse events. In postoperative care unit progressed uneventfully and the pain was controlled.

Conclusions: Continuous spinal anesthesia injecting low doses of local anesthetic by intradural catherer appears to be a safe and appropriate anesthetic tech- nique in leg surgery for aged patients with high cardiac risk. The addition of a femoral nerve block for postoperative pain control is effective to avoid tachy- cardia in the postoperative care unit.

ESRA1-0037 Obstetric
RESPONSE TIMES FOR PROVISION OF LABOUR EPIDURAL ANALGESIA - REAUDIT
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Background and aims: Following a request for labour epidural analgesia (EA) an anaesthetist should attend within 30 minutes or 1 hour, in exceptional circumstances.

Methods: Prospective audit including mothers receiving EA, during 12/11/12 - 31/01/13. We looked at times EA was requested, anaesthetist informed, EA completed, reasons for delays. Expected standard: >80% of women should be attended within 30 minutes, >90% within 1 hour. 50 sheets were collected, all information anonymized. Approved by hospital’s Audit Committee.

Results: In 51% of cases women were attended within 30 min, in 18% >60 min. The overall mean time between EA request and anaesthetic attendance was 39 min. It took on average 15 min for the anaesthetist to be informed about the request. In 4% of forms the time of 1st top-up was not noted. Overall it took 62 min from EA being requested to being completed. In 30% where there was a delay, an anaesthetist was unavailable, 13% midwife (MW) was unavailable, >90% within 60 min.

Conclusions: Currently we are not compliant with OAA/AAGBI recom- mendations and a standard of >80% of women being attended within 30 min and >90% within 60 min is not achieved. Documentation is poor and must be improved. Worryingly in 60% where delay in EA was shown it was due to an anaesthetist or MW being unavailable as well as lack of communication. We should document the time when we are informed about EA, our attendance and completion, and reasons for delay. Informative posters and sessions for MW and anaesthetists will be held. Re-audit is being completed, results not available yet.
like to bring the mental nerve field block under renewed attention, as illustrated by two very old frail patients, to achieve broader application of this simple nerve block.

Methods: Two very old male patients (84 and 91 years) both present with an ulcerative lesion at the lower lip for which surgical removal was scheduled. Because of their considerable comorbidities and increased frailty, bilateral blockade of the mental nerve was considered superior to general anesthesia. As an additional advantage for patient A, who had a pneumonectomy in his medical history, the procedure could safely be performed in beach-chair position to prevent atelectasis and optimize the ventilation-perfusion ratio of the single lung. The mental nerve blockades were performed in a blind fashion, using the mental foramen of the mandible and vertical plane of the ipsilateral papil as anatomic landmarks. A 5 ml syringe with a 23-gauge needle attached, was inserted to leave 2 ml of lidocaine 2% with adrenaline 1:100,000 submucosal for each side.

Results: Both patients underwent the surgical procedure uneventfully under a mental nerve block only and were discharged from the hospital on the same day.

Conclusions: A mental nerve block is an easy to perform regional anesthetic technique for lower lip surgery. Especially, this might be advantageous in older, frail patients.

ESRAI-0039
Central Nerve Blocks

PHENYLEPHRINE AS ADJUVANT FOR PROXYMETACaine OR BUPIVACAINE HAS A SIGNIFICANT SPINAL ACTION IN INTENSIFYING AND PROLONGING ANESTHESIA IN RATS

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Background and aims: Phenylephrine was added to spinal local anesthetic solutions to extend the duration of action. Here we examined whether phenylephrine potentiates the effect of spinal anesthesia with proxymetacaine and bupivacaine, two potent local anesthetics.

Methods: The experimental procedures were approved via the Institutional Animal Care and Use Committee our University and were conducted according to IASP ethical guidelines. After rats receiving spinal anesthesia with proxymetacaine or bupivacaine co-injected with phenylephrine, the neurobehavioral evaluation (motor function and nociception) was tested.

Results: Intrathecal injection of proxymetacaine and bupivacaine at a dose of 3 μmol/kg elicited a spinal blockade (100% blockade) in motor function and nociception. Co-administration of proxymetacaine (3 μmol/kg) or bupivacaine (3 μmol/kg) with phenylephrine (0.1%) produced greater spinal anesthesia than proxymetacaine (3 μmol/kg) alone or bupivacaine (3 μmol/kg) alone, respectively.

Conclusions: Our preclinical data demonstrated that proxymetacaine or bupivacaine elicited spinal anesthesia. When combined with phenylephrine, either proxymetacaine or bupivacaine produced a better effect of spinal anesthesia. The authors declare that they have no conflict of interests.

ESRAI-0040
Postoperative Pain Management

DOES PREEMPTIVE GABAPENTIN AFFECT EPIDURAL DOSES AFTER KNEE SURGERY?

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Background and aims: In this study we administered 1200 mg of gabapentin preemptively to patients undergoing total knee arthroplasty who received postoperative epidural analgesia and record level and duration of neural blockade, effect on epidural local anesthetic consumption.

Methods: Forty patients undergoing total knee arthroplasty with combined spinal epidural anesthesia divided into 2 groups. First group (Group G, n = 20) received 1200 mg gabapentin, second group (Group K, n = 20) received placebo tablets 1 hour before surgery. Epidural catheter placed after administration of marcaine 12.5 mg via intrathecal route to all patients. Patient controlled analgesia (PCA) device attached to epidural catheter and arranged as 5 ml of 0.1% 2.5 marcaine as infusion, 0.05 ml/kg bolus with 30 min lock time.

Intraoperative hemodynamic parameters, postoperative time passed for sensory block level to regress T12 level, restoring and activity visual analogue scales (VAS) at 4th- 8th-12th and 24th hours, cumulative marcaine consumption, additional analgesic requirements and patients’ satisfaction assessed and recorded.

Results: Hemodynamic parameters were similar in both groups. Postoperative time passed for sensory block level to regress T12 level in Group G was significantly longer, cumulative marcaine consumption and additional analgesic requirements were significantly lower compared to Group K. There was no significant difference in resting activity VAS values in both groups. Patient satisfaction was significantly higher in Group G.

Conclusions: We found that preemptive oral gabapentin decreases local anesthetic consumption and increases patient satisfaction in total knee arthroplasty surgery under spinal anesthesia with postoperative epidural local anesthetic analgesia. Gabapentin’s effects on duration of regional anesthesia consumption of local anesthetics should be further investigated.

ESRAI-0041
Case Reports

SUBCOSTAL TRANSVERSE ABDOMINIS PLANE BLOCK AS EFFECTIVE ANALGESIA FOR PERCUTANEOUS CHOLECYSTOSTOMY IN CRITICALLY ILL PATIENT

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Background and aims: Percutaneous cholecystostomy (PC) is a temporizing measure in critically ill patients with cholecystitis. In addition it also provides a potential route for stone dissolution or extraction. This technique is usually undertaken by the interventional radiologist under ultrasound and fluoroscopic guidance and the gallbladder accessed via a trocar needle-catheter or the Seldinger technique. Majority of these patients are at high risk for general anesthesia and PC can be performed under sedation with the puncture site infiltrated with local anesthetic.

We present a case of a patient in septic shock secondary to emphysematous cholecystitis in which a subcostal transversus abdominis plane (TAP) block was given for analgesia. We aimed to avoid unnecessary sedation or opioids for this patient during the procedure in view of her limited physiological status.

Methods: An ultrasound-guided subcostal TAP block was performed under aseptic conditions. A Sonopex Pajunk 20 gauge(G) 50 millimeter(mm) needle was used and a total of 20 millilitres(ml) of 0.5% ropivacaine was given. Good spread of local anesthetic was observed during the procedure.

Results: Transhepatic access of the gallbladder was achieved and after serial dilatations, an 8 French(F) catheter was inserted. 30 micrograms(mcg) of intravenous fentanyl was given in titrated boluses during gallbladder distension to cover the visceral pain. No other sedative agents were given. Patient remained hemodynamically stable throughout the procedure.

Conclusions: Subcostal TAP block can be considered as an alternative to local infiltration for PC as it provides superior analgesia during and after the procedure especially in critically ill patients.

ALTERNATIVE FORM OF POSTOPERATIVE ANALGESIA FOR LIVER RESECTION USING A COMBINED TRANSVERSE ABDOMINIS PLANE AND RECTUS SHEATH BLOCKS UNDER DIRECT VISION: A CASE REPORT

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Background and aims: Open liver resections involve large abdominal incisions, resulting in significant postoperative pain. Current methods of analgesia include thoracic epidural analgesia (TEA), intravenous morphine infusion, patient controlled analgesia (PCA), wound infiltration with local anesthetic. There is evidence for superior analgesia with the use of TEA in upper abdominal incisions. However patients presenting for liver resection range from healthy to sicker patients with liver dysfunction and coagulopathy which caution the use of TEA due to increased risk of epidural hematoma. Even in healthy patients, studies show changes in coagulation pathways postoperatively. These patients
are also more susceptible to opioid side effects. Local infiltration alone with local anaesthetic may not provide adequate analgesia.

In this case report, we aim to provide alternative analgesia in a living donor for liver transplant, using a combined transversus abdominis plane (TAP) and rectus sheath block.

Methods: Combined TAP and rectus sheath block was done for a healthy living liver donor under direct vision towards the end of the operation before closure of the muscle layers. 40 millilitres(ml) of 0.25% ropivacaine was given. PCA morphine was provided postoperatively for visceral pain.

Results: Total morphine usage on postoperative day(POD) 1 and pain scores were lower compared to patients given PCA morphine alone. She was weaned off PCA by POD2. Postoperative laboratory tests showed mild derangements in liver function and coagulation.

Conclusions: Combined TAP and rectus sheath block provided an alternative analgesia for liver resection and helps to reduce risk of epidural hematoma. This provides a basis for possible further studies comparing this method with TEA.

ESRA1-0044
Case Reports

INVERTED INSERTION OF SPINAL CORD STIMULATION EPIDURAL LEAD FOR TREATMENT OF NEUROPATHIC PAIN IN A PATIENT WITH A SEVERE DEFORMITY OF THORACOLUMBAR SPINE

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Background and aims: Spinal cord stimulation (SCS) has grown rapidly over past decades and thousands of devices are implanted each year mostly for failed back surgery syndrome. We report a case of successful treatment of chronic neuropathic pain following a spine injury with an inverted insertion of SCS lead.

Methods: A 56 – years old male presented with three – years history of neuropathic pain following a severe wedge L4 fracture five years ago. Patient was in a Frankel’s grade C and had strongly denied the suggested operational treatment. He was treated conservatively and experienced a rehabilitation programme, but gradually developed a sustained neuropathic pain not relieving by standard methods. Neuroradiological investigation revealed a severe thoracolumbar cyphotic deformity but not an intraspinal syrinx. He underwent a placement of one 16 – electrode epidural paddle lead. Because of the severe regional deformity, access was gained by an inverted manner via a laminotomy at the T10 – T11 interspace with the final lead caudally positioned at T11 and T12 and connected to a Restore Ultra rechargeable generator.

Results: After implantation, the neurostimulator was programmed by an inversion of standard electrodes numbering. There were no postoperative complications and patient reported greater than 60% improvement of the pain being gradually able to decrease oral medications. Next weeks, he reported other positive outcomes including the ability to return to some social activities with improved family relationships.

Conclusions: SCS may be a therapeutic alternative for patients with an intractable neuropathic pain following spine injury that exhausts conservative treatments. Surgical experience is useful when technical difficulties are present.

ESRA1-0047
Obstetric

DO LABILE EPIDURAL INFUSION RATES SUPERIOR FOR LABOUR ANALGESIA?

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Background and aims: There are different regimes for epidural drug administration in relief of labor pain. We wanted to test effects of labile epidural infusion rate on drug requirement and mother satisfaction.

Methods: After university ethic committee approval we divided parturients into 3 groups randomly. For spinal analgesia, levobupivacaine plane 2.5 mg and fentanyl 25 μg in 2 ml volume were administered in subarachnoid space. For maintenance, 0.1% levobupivacaine + 2 μg/ml fentanyl solution was administered epidurally in three different regimens:

Group B (Bolus): 5 ml bolus, 15 minutes locked time without continue infusion.

Group IB (Basal Infusion + Bolus): 5 ml/h basal infusion, 5 ml bolus, 20 minutes locked time.

Group LIR (Labile Infusion Rate): Infusion rate was zero during the first hour. PCA device settings were bolus 5 ml, locked time 15 minutes, maximum dose 20 ml/h. Infusion rate was increased 5 ml/h per additional bolus dose during the previous hour. Maximum basal infusion rate was limited at 15 ml/h. If pregnant never required bolus dose previous hour, basal infusion rate was decreased 5 ml/h for next hour.

We compared drug consumption, mother satisfaction and complications.

Results: In Group B, hourly local anesthetic requirement was lower than in others (B < LIR < IB). Total drug consumptions were similar between groups. Mother satisfaction was highest at Group LIR.

Conclusions: We suggest that labile epidural infusion rate depend on patient analgesic requirement doesn’t increase drug consumption and has beneficial effects on mother satisfaction.

ESRA1-0048
Peripheral Nerve Blocks

AN AMBULATORY CONTINUOUS PERIPHERAL NERVE BLOCK SERVICE FOR MAJOR SHOULDER SURGERY IN A DISTRICT GENERAL HOSPITAL

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Background and aims: Continuous peripheral nerve blocks (CPNB) facilitate early hospital discharge after shoulder surgery by providing superior analgesia to opioids and single shot peripheral nerve blocks.(1)

The objective was to create an ambulatory CPNB catheter service allowing major shoulder surgery to be carried out as day-case procedures, without impacting on quality of analgesia and safety.(2) This would also reduce demand for inpatient beds and operative cancellations.

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Methods: A need for the CPNB was identified. A Policy to help educate nursing staff, anaesthetic and surgical teams was written. A patient information leaflet and post CPNB follow up pathway was created. Pre-assessment services identified suitable patients for CPNB.

The Braun Contiplex system was chosen for ultrasound guided catheter insertion. Patients then received general anaesthesia. An elastomeric infusion system (3) with Ropivicaine 0.2% at 5 ml/hour was used post-operatively. Oral analgesics and patient information leaflet were given before discharge. The pain team performed follow up and confirmed catheter removal.

Results: 26 major shoulder operations were performed with CPNB. 60% of cases were discharged as day-cases. 40% were planned inpatients, of these 20% were discharged at 24 hours. 100% of hemi-artroplasties, shoulder reconstructions, rotator cuff repairs and sub-acromial decompressions were done as day-cases. Patient satisfaction was rated excellent or good by 91%, all choosing to have further CPNB should they require further shoulder surgery.

Conclusions: Implementing our CPNB service for patients undergoing major shoulder surgery allowed all suitable patients to be performed as day-cases. Patient benefits included adequate analgesia, no hospital readmissions and improved satisfaction scores.

ESRA1-0050
Miscellaneous

DOES A PATHWAY CENTRED ON REGIONAL ANAESTHESIA IMPROVE OUTCOMES IN PATIENTS UNDERGOING PRIMARY TOTAL KNEE ARTHROPLASTY?

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Background and aims: Total knee arthroplasty (TKA) is effective treatment for end-stage osteoarthritis. Enhanced recovery protocols are increasingly used to improve patient outcomes post-operatively.

Methods: We undertook a pilot project to enhance patient recovery by prospectively studying 54 patients undergoing primary TKA of whom 19 underwent protocol (P) and 35 standard (non-protocol-NP) care. Protocol care included pre-emptive oral analgesia, oral carbohydrate loading, spinal anaesthesia, intra-operative peri-articular ropivacaine infiltration. Post-operatively regular non- opioid analgesics were continued supplemented as required by rescue opiates.

Non-protocol care comprised pre-existing standard institutional practice of spinal anaesthesia +/- femoral nerve block followed by regular oral analgesia and morphine PCA (patient controlled analgesia).

Results: There were no significant baseline differences between groups in terms of the following characteristics [average ±SD]: age (67.8 ± 9.1 vs 68.8 ± 10 years.), weight (90.9 ± 18.5 vs 91.2 ± 18.1 kg), height (166.7 ± 7.8 vs 165.6 ± 8.7 cm), BMI (31.4, IQR 29.4-40.6 vs 32.3, IQR 30.1-36.8 kg.m-2).

Conclusions: Protocol patients mobilised significantly earlier than NP pts (Fig. 1). Protocol (P) patients also had significantly lower 24 and 48 hour opioid consumption (Fig. 2). There were no statistically significant differences in rest or movement VAS (visual analogue scale) pain scores at 6, 12, 24, 32, or 48 hours between groups. There was no significant difference in length of stay (LOS) between groups (but average LOS in protocol patients was one day less).

Conclusions: Protocolised care emphasising regional anaesthesia and multimodal non-opioid analgesia results in earlier patient mobilisation and reduces opiate consumption post TKA. Based on these findings our hospital has implemented this enhanced recovery protocol.

ESRA1-0051
Peripheral Nerve Blocks

REGIONAL ANAESTHESIA DOCUMENTATION AUDIT IN A BRITISH TERTIARY REFERRAL HOSPITAL

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Background and aims: Regional anaesthesia (RA) is widely used in the United Kingdom (UK), however no standard format of documentation exists. Documentation of RA is important for providing optimal patient care, team communication and a supportive medico-legal document. RA accounts for half the anaesthetic legal claims in the UK, and incomplete documentation is one of the leading causes for losing these claims. The aim of this study was to evaluate current RA documentation at a large, tertiary teaching hospital.

Methods: 19 standards of documentation in RA were identified, based on the Royal College of Anaesthetists, the Association of Anaesthetists of Great Britain and Ireland, and the European Board of Anaesthesiology guidelines. 55 patients who underwent RA from March to September 2013 were randomly selected. The rates of recording of 19 standards were examined for those 55 patients. The target for each standard was 100%.

Results: Poor documentation was found across all regional anaesthetic records. Consent and Name of Operator achieved 100% recording across all 55 records. However, all other standards were found to be under-recorded. The poorest documentation rates were found in Grade of operator (4%), Time of block (27%) and Needle gauge (5%). The average recording rate in the regional anaesthetic chart was 63%.

Conclusions: Detailed documentation in anaesthetics has been continuously advocated by several organisations. Our study shows a weak rate of documentation in anaesthetic charts. There is a need to implement interventions that increase documentation rates in order to optimise patient care.
Horner Syndrome Following Bolus Low Dose Epidural Analgesia for Labor: Report of Three Cases and Brief Literature Review

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Background and aims: Although benign and transient, Horner syndrome may be distressing for the patient and confusing on diagnostic approach. In this study, three cases of Horner syndrome following bolus low dose epidural infusion for labor and vaginal delivery are presented along with a brief literature review.

Methods: Searches of Pubmed, Medline and Embase identified 11 cases of Horner syndrome following low dose epidural infusion for labor and vaginal delivery over the past 16 years. Age, BMI, position during injection, Horner side, local anesthetic solutions, time to symptoms and outcome of the patients are illustrated in Table 1.

Results: Similarly to previously presented cases, it seems that the nonoccurrence of Horner syndrome after reduced epidural doses, suggests a dose-related phenomenon. Stopping epidural infusion may not be necessary; however, dose modification and close attendance is highly suggested.

Conclusions: Non-reproducibility of the Horner syndrome in such circumstances makes it almost impossible for a study to be accomplished and the true mechanism of this complication might not have been yet discovered. Anesthesiologists, gynecologists and labor attending health care personnel should be aware of this rare complication in order to reassure the patient and guide their practice according to the patient safety and satisfaction.

Figure 1.

Results: EDA in labour has increased tenfold in ten years, from 2.9% in 1998 to 29.9% in 2008. Up to this year it increased further (49.6% in 2013–3302 EDA for 6657 deliveries). Data indicate that there was no increase of the incidence of vacuum or forceps use nor with the caesarean section (CS) rate. Permanently yearly increase of use of epidural labor analgesia did not correlate with constant incidence of instrumentation (2.4%–3.2%) or the incidence of CS (9.2%-10.1%). Similar conclusion was established as we compared mode of delivery with the use of sole epidural and combined spinal-epidural analgesia. CS rate with no previous labor analgesia is 36%, in patients with sole epidural or spinal-epidural was 10 and 12%.

Conclusions: Tasks that await us are popularisation of neuraxial analgesia and anaesthesia in obstetric practice, improving technical recourses and changing preferences toward novel techniques. For providing adequate labor analgesia, decrease of anesthetists workload is important as well.

 Dexmedetomidine as Coadyuvant in Axillary Blockades in an Clinical Controlled Trial

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Background and aims: To determine the effectiveness and safety of using dexmedetomidine as an adjunct to management of axillary blocks in patients scheduled for upper extremity surgery.

Methods: A prospective, comparative, longitudinal, experimental, double-blind, randomized study in patients who were operated upper extremity study was conducted. Patients on admission were randomized into two groups: 1 (control) patients scheduled for surgery of the upper limbs, the technique with local anaesthetic alone, and group 2 (experimental) in which I hold adding dexmedetomidine was conducted to same local anaesthetic.

Results: A significant difference (p = .000) was observed in the latency between the groups. The average time for group 1 was 22.87 ± 0.39 minutes (95% CI: 22.1, 23.6) and Group 2, 16.92 ± 0.36 minutes (95% CI: 16.2, 17.62). In Group 1 significantly increased consumption (p = .000) opioid with 120 ± 44.1 mcg against 22.7 ± 33.5mcg in Group 2 was observed. Significant differences (p = .000) between the groups with respect to time of use NSAIDs postoperatively, with an average of 4.38 ± 0.21 hours (95% CI: 3.97, 4.79) was observed in Group 1 and 6.63 ± 1.9 hrs (95% CI: 6.25, 7.02) in Group 2.

Conclusions: Adding dexmedetomidine to the local anaesthetic for axillary level peripheral blockade is effective and safe, reducing latency and blocking opioid consumption intraoperatively and increasing the time interval of the first dose of analgesic postoperatively. Adding that use does not compromise the patient’s hemodynamics.

Preoperative Glycosylated Hemoglobin as Feedback for Metabolic Control during the Perioperative Period on Patients with Type II Diabetes

Urias Romo de vivar E.1, Urias E.1  1. Anesthesiology, Centro de investigación y docencia en ciencias de la salud, Culiacán, Mexico.

Background and aims: The primary objective was to assess the prevalence of metabolic control in diabetic patients who underwent elective surgery. Methods: An observational, descriptive, prospective, cross-sectional study was performed in diabetic patients attending pre-anesthetic assessment scheduled for elective surgery. In the period of September 2012 to September 2013, 4476 patients attended the pre-anesthetic consultation of the Culiacan Civil Hospital, scheduled for elective surgery. 522 of these patients had diabetes mellitus, of which 451 had a fasting glucose less than 180 mg/dL. Of these patients, 5 were excluded because of Diabetes Mellitus Type I and 11 for presenting Gestational Diabetes. 25 patients were eliminated. The final sample for this study was 410 patients. Basal glucose was measured prior to the pre-anesthetic consultation.
where patient data were documented and subsequently measurement of HbA1c was conducted before entering the operating room.

**Results:** Of the 410 patients included in the study, the prevalence of metabolic dyscontrol was 55.6% (228 patients who had HbA1c >7%) and only 182 patients (44.4%) had an HbA1c <7%. Age was the only variable related to metabolic dyscontrol (p=0.048).

**Conclusions:** There is a high prevalence (55.6% patients with HbA1c >7%) of glycemic dyscontrol in patients undergoing surgical procedures at this institution. The only significant variable related to metabolic dyscontrol was age. Presumably marked difference between the values of fasting glucose and HbA1c may be due to a lack of culture of health in patients attending to our institution. Conducting more studies with greater methodological validity on this issue is required.

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**ESRA1-0062**

Postoperative Pain Management

**COMPARISON OF POSTOPERATIVE ANALGESIA BETWEEN CONTINUOUS INTERSCALENE BLOCK AND CONTINUOUS INTRARTICULAR INJECTION IN ENDOSCOPIC SHOULDER JOINT SURGERY**

**Nishiyama T.1**  Fujiwara Y.1 1Anesthesiology, Shinagawa Shishokai Hospital, Tokyo, Japan.

**Background and aims:** We hypothesized that intra-articular injection of local anesthetic is as effective as interscalene block on postoperative pain and has a benefit of no sensory and motor block in the arm in endoscopic shoulder joint surgery. The present study was performed to compare these two methods.

**Methods:** After the approval of the ethics committee and informed consent, 90 patients for endoscopic shoulder surgery were equally divided into the control, interscalene, or intra-articular groups. Interscalene block was performed with a single shot in the control and intra-articular groups. In the interscalene group, a catheter was inserted 5 cm. For the block, 1% lidocaine 15 ml with 0.25% bupivacaine 15 ml was injected in all groups. After surgery, both the interscalene and intra-articular groups received 0.25% bupivacaine 2 ml/h for 48 hours. Visual analogue scale (VAS), time to first rescue analgesic (intramuscular pentazocine 15 mg), and frequency of analgesic were compared among the groups.

**Results:** VAS scores at 4 to 48 hours were significantly lower in the interscalene and intra-articular groups than in the control group. Time to first analgesic was significantly shorter and number of analgesics in 48 hours is significantly larger in the control group. Interscalene and intra-articular groups had no differences in these measured variables. Sensory and motor blocks in the arm significantly prolonged in the interscalene group.

**Conclusions:** Continuous intra-articular bupivacaine was as effective as continuous interscalene block on postoperative pain in endoscopic shoulder joint surgery with decreasing sensory and motor blocks.

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**ESRA1-0065**

Central Nerve Blocks

**EFFECT OF NORMAL SALINE BICARBONATE ON REVERSING EPIDURAL ANESTHESIA EITHER WITH BUPIVACINE OR BUPIVACINE AND NALBUPHINE IN PATIENTS UNDERGOING ORTHOPEDIC SURGERY**

**Attia J.1, Mohamed A.1, Badr Y.1** 1Anesthesiology and I.C.U. Faculty of medicine, Minia, Egypt.

**Background and aims:** Orthopedic procedures are among the commonest surgery in the elderly age as the metabolic bone diseases are almost common among these ages. On the other hand, those patients are carrying the risk of deep venous thrombosis (DVT) development, so the need of early ambulation to decrease this risk is essential.

The aim of this study was to evaluate whether washout of the local anesthetic with 0.9% normal saline with bicarbonate through the epidural catheter could provide early ambulation throughout the faster recovery of the motor block.

**Methods:** After approval of the local ethics committee of El-Minia university hospital, sixty adult patients were included in this study, divided in three groups. Groups I: epidural injection of bupivacaine was carried out without wash, this group served as control group. Group II: in which epidural injection of bupivacaine followed by wash. Groups III: epidural injection of both bupivacaine and nalbuphine followed by wash.

**Results:** As regard the motor and sensory recovery, they were significantly faster in both group II and III as compared with group I. In group I sensory recovery was insignificantly faster than the motor recovery. In group II motor recovery was insignificant faster than sensory recovery. In group III motor recovery was significantly faster than the sensory recovery.

**Conclusions:** These results suggested that early ambulation with an adequate postoperative analgesia were reported in patient receiving epidural injection of both bupivacaine and nalbuphine and reversed if effect by saline bicarbonate wash. this allowed early ambulation of patient with suspicion decrease risk of DVT.

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**ESRA1-0067**

Case Reports

**TEMPORARY NEUROMODULATION IN POSTHERPTIC NEURALGIA**

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**Background and aims:** Postherpetic neuralgia (PHN) is chronic, persistent painful condition. The patients of PHN usually have been treated with anticonvulsants, antidepressants, opioids, and interventional therapy as epidural block. But some patients need neuromodulation as spinal cord stimulation. Our study was about 5 cases of temporary neuromodulation.

**Methods:** 5 patients of PHN were treated with medication, epidural block, and temporary neuromodulation. The segment of all patients was thoracic level. Three patients were inserted with temporary spinal cord stimulator (SCS) lead, two patients were inserted with peripheral nerve stimulator (PNS) lead. Temporary SCS lead was inserted at epidural space via interospinous space, and PNS lead was inserted at intercostal space. All patients were stimulated with leads for 2 days - 2 weeks.

**Results:** Visual analogue scale (VAS) scores of three temporary SCS patients were decreased from mean 8.67 to mean 3.5. VAS scores of two temporary PNS were decreased from mean 6.25 to mean 2.

**Conclusions:** Temporary neuromodulation is possible as an alternative therapy for PHN.

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**ESRA1-0071**

Central Nerve Blocks

**DO LOW DOSE SPINALS MEAN LESS ANALGESIC EFFECT IN PATIENTS UNDERGOING FRACTURED NECK OF FEMUR REPAIR?**

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**Background and aims:** The AAGBI fractured neck of femur (NoF) guideline endorses low dose spinals (<10 mg bupivacaine) to reduce perioperative hypotension. Adjunctive intrathecal fentanyl is also recommended, to reduce respiratory and cognitive dysfunction. We aimed to survey the effect of neuroaxial dosing on post-operative opiate requirements.

**Methods:** The anaesthetic and drug charts of fracture NoF patients admitted at two hospitals between March-July 2013 were retrospectively surveyed. Opiate consumption during the immediate 48-hour postoperative period was recorded. Opiate consumption was calculated in oral morphine equivalent (OME), where 1 mg of oral morphine equated to: 10 mg codeine, 5 mg tramadol and 0.5 mg oxycodone orally, and 0.5 mg SC/IV/IM morphine.

**Results:** 48 patients underwent neuroaxial blockade as their sole anaesthetic technique. The intrathecal doses were not recorded in two patients; one patient was palliated immediately postoperatively. These patients were excluded. With respect to intrathecal bupivacaine dosing the OME was (Fig. 1):

<table>
<thead>
<tr>
<th>Bupivacaine (mg)</th>
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<tr>
<td>&lt;10 mg</td>
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**FIGURE 1.** Non-cumulative oral morphine equivalent dose consumed with respect to bupivacaine dose.

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Conclusions: Our survey found no post-operative opiate sparing effect with larger doses of bupivacaine or diamorphine. Higher doses may cause unwanted effects such as hypotension, respiratory and cognitive depression. Interestingly fentanyl was only used in two patients.

ESRA1-0072
Miscellaneous

MAGNESIUM SULPHATE VERSUS NITROGLYCERIN FOR HYPOTENSIVE ANESTHESIA DURING FUNCTIONAL ENDOSCOPIC SINUS SURGERY

Abdelhussein A.1,2
1Abdelhussein A.1,2 Anesthesiology and ICU, Faculty of medicine, Minia, Egypt.

Background and aims: To evaluate the effects of magnesium sulphate versus nitroglycerin as hypotensive agents on hemodynamic variables, amount of blood loss and quality of surgical field during Functional endoscopic sinus surgery (FESS) under general anesthesia.

Methods: Forty patients were divided into two groups. group (I), Magnesium sulphate was administrated intravenously as a bolus dose of 40 mg/kg before induction of general anesthesia, followed by continuous i.v. infusion (15 mg/kg/hour) intraoperatively. group (II), Nitroglycerin was administrated in a dose of 1 μg/kg/minute during induction of anesthesia till achieved a target mean arterial blood pressure (MAP) followed by a continuous i.v. infusion (1 μg/kg/minute) intraoperatively. Hemodynamic variables and O2 saturation were recorded at baseline preoperatively, after induction, 1 and 5 min after intubation and every 5 min intraoperatively till the end of operation. The surgical field score was assessed (0–5) and intraoperative blood loss was estimated.

Results: Heart rate in nitroglycerin group was significantly higher than its corresponding reading in MgSo4 group at 5 min. intraoperatively and insignificant at all time points. There were no statistical differences between the both groups in systolic and diastolic blood pressures, MAP and O2 saturation. The surgical field score was better in nitroglycerin group in comparison to magnesium group without statistical difference. There were no statistical differences between both groups in recovery time. The blood loss with nitroglycerin group was less than in magnesium group without statistically difference.

Conclusions: Continuous intravenous infusion of nitroglycerin (1 μg/kg/minute) or magnesium sulphate (15 mg/kg/hour) provides a satisfactory controlled hypotension and optimal operative conditions in patients undergoing FESS under general anesthesia.

ESRA1-0075
Miscellaneous

QUESTIONNAIRE BASED EVALUATION OF “PAIN AND PALLIATIVE CARE” EDUCATIONAL PROGRAMME FOR FINAL YEAR MEDICAL STUDENTS, INDIA

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Background and aims: In India, pain management and palliative care is still not included in the medical curriculum and so students receiving the basic degree to practice medicine have little or no knowledge of managing pain or imparting palliative care. This results in unnecessary pain and suffering with expensive treatments continuing until the very end.

To address this problem we started a ‘Pain and Palliative Care’ education programme of one day duration for final year medical students.

Objectives of the course:
- To sensitize and provide basic knowledge of pain and palliative care
- Assess the knowledge gained at the end of program by providing a pre and post questionnaire

Methods: A total of 63 students filled the questionnaire before the start of programme and 52 students filled up the questionnaire after the conduct of programme.

The mean correct percentage of all individual questions were analyzed before and after the programme for effectiveness of programme.

Conclusions: A pain and palliative care educational programme is an effective tool for educating outgoing medical students. We propose similar educational programs all over India for better pain and palliative care management.

ESRA1-0076
Postoperative Pain Management

CHRONIC PAIN FOLLOWING C-SECTION: PROSPECTIVE VS RETROSPECTIVE ANALYSIS OF INCIDENCES AND RISK FACTORS

Verster A.1,2 Vercauteren M.P.1,2
1Anesthesiology, Antwerp University Hospital, Edegem, Belgium.

TABLE 1.

<table>
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FIGURE 1. Pre-post questionnaire

FIGURE 2. Non-cumulative oral morphine equivalent dose consumed with respect to diamorphine (D) and fentanyl (F) dose.
Background and aims: In a previous retrospective study in 120 patients we found a correlation between intra-operative discomfort and pain after 8 weeks but not with pain at 6 months nor between acute postoperative pain and pain at 6 months. We wanted to verify whether a prospective analysis differs from the retrospective data.

Methods: During one year with study approval by the ethic committee, consenting C-section patients were included in a prospective analysis. Main outcome parameters were pain after 2, 6 and 12 months, postoperative pain (48 h), intraoperative pain while possible risk factors were also considered.

Results: Actually 180 patients completed the study. Pain at 2, 6 and 12 months was present in 30.4%, 17.3% and 7.4% resp. with moderate or severe pain in 19% (6 months) and 2.8% after one year. Pain at 6 months was not correlated with type of anesthesia (significant in the retrospective study) or degree of emergency nor with twin delivery or previous C-section. Neither was acute postoperative pain at risk for pain to become chronic (confirming the retrospective study). The correlation between 2 and 6 months remained (p=0.01). A trend (p=0.055) towards more chronic pain at 6 months with intra-operative discomfort differed from the retrospective analysis.

Conclusions: Moderate to severe pain after C-section occurred in less than 3% Prospective studies are required to determine risk factors. The confirmation of acute postoperative pain not being responsible for the development of chronic pain may be surprising but possibly explained by the quality of analgesia we offer our patients mostly with PCEA.

ESRA-0090
Peripheral Nerve Blocks

EARLY EXPERIENCE WITH BILATERAL CONTINUOUS FEMORAL NERVE BLOCK AND SINGLE INJECTION SPINAL ANESTHESIA FOR BILATERAL TOTAL KNEE ARTHROPLASTY

Patrick M.1, Parvateni H.1, Bohannon D.1, Munro A.1, Boezzaert A.1,1Department of Anesthesia, University of Florida, Gainesville, USA.

Background and aims: Total knee arthroplasty (TKA) and bilateral total knee arthroplasty (BTKA) are commonly performed surgeries in the United States. Regional anesthesia has been found effective in reducing perioperative complications and improving pain control in unilateral TKA, but not in BTKA. We report our early experience in a consecutive series of BTKA performed under regional anesthesia.


In this retrospective case series, we examined all BTKA performed from October 2011 to April 2013 by a single surgeon. Only patients receiving bilateral continuous femoral nerve blockade (CFNB) and single injection sciatic nerve blockage (SISNB) in combination with a single injection subarachnoid block were included in the study. Of the 32 patients identified, 25 met inclusion criteria. The patient's entire hospital record was then reviewed systematically.

Results: Only 1 of 25 patients required conversion to general anesthesia during the surgery. There were no major medical complications perioperatively. The average Defense and Veterans Pain Rating Scale score (DVPRS) immediately postoperatively was 0.6, and the average daily DVPRS score remained below 4 throughout the hospital stay. The use of bilateral CFNB also did not appear to prevent patients from ambulating during physiotherapy.

Conclusions: This early retrospective case series suggests it is feasible to manage postoperative pain associated with BTKA effectively with staged bilateral CFNB and SISNB in combination with a single injection subarachnoid block as a sole anesthetic technique. A larger randomized controlled trial is needed to compare the techniques used in this series with epidural anesthesia and postoperative analgesia.

ESRA-0091
Peripheral Nerve Blocks

EFFECT OF SPINAL CLONIDINE AND MAGNESIUM AS AN ADDITIVES TO 2% HYPERBARIC PRilocaine IN ENDOSCOPIC UROLOGICAL SURGERY

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Background and aims: The aim of this study was to evaluate anaesthetic and postoperative effects of magnesium and clonidine as an additives to prilocaine in spinal anaesthesia for outpatient undergoing transurethral resection of prostate (T.U.R.P) and of bladder (T.U.R.B.).

Methods: 90 patients scheduled for endoscopic urological surgery under spinal anaesthesia were randomly assigned to 3 groups. Group P received an intrathecal injection of 2% hyperbaric prilocaine (60 mg) in combination with 1 ml of NaCl 0.9%. In Group M 1 ml (100 mg) of magnesium sulphate (Group M), Times to sensory and motor block onsets, duration of motor and sensory block, side effects and time to first voiding were evaluated.

Results: Onset time of sensory and motor block was faster in the group C, followed by group P and M respectively. The duration of motor block was longer in the clonidine group than in group M and P (mean 81 vs 75 vs 72 minutes, respectively) (P<0.05). Duration of sensory block was significantly longer in group M (mean 102 min) than in the other groups that showed similar values (mean 92 min) (P<0.05). A lower frequency of requirements for additional postoperative analgesics was found in group C, followed by group M and P.

Conclusions: The addition of magnesium to prilocaine included potential advantages like a longer sensory block that reduced the need for additional postoperative analgesics and a faster resolution of motor block that provided an earlier patients discharge.

ESRA-0092
Obstetric

A NOVEL INITIATIVE TO IMPROVE ASSESSMENT OF PARTURIENTS WITH ALTERED NEUROLOGY AFTER CENTRAL NEURAXIAL BLOCKADE (CBN)

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Background and aims: Follow-up of parturients requiring central neuraxial blockade to assist with labour or delivery is recommended as best practice. This allows early identification of neural injury and expedites management.

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To improve patient safety, standardise the assessment process, and improve documentation we developed an assessment pro forma at a tertiary maternity unit in the United Kingdom.

Methods: The pro forma facilitates a structured assessment—after ruling out emergencies such as infection and evolving haemorrhage the pro forma directs the history to rule out obstetric causes and clarify potential anaesthetic causes e.g. level of insertion. Neurology can be documented by annotating dermatome and myotome maps and the accompanying guide describes management and advice for specific lesions e.g foot drop. To evaluate the impact of the pro forma we carried out a departmental survey of 7 trainees and 12 consultant obstetric anaesthetists.

Results: Using a 4 point likert scale 84% of respondents agreed/strongly agreed that the pro forma was a useful addition to the assessment, 76% agreed/strongly agreed that it improved their confidence in assessing patients and 90% agreed/strongly agreed that subsequent follow up was easier with the new pro forma.

Conclusions: This novel and effective patient safety objective improved assessment in parturients with neurology after CNB. This pro forma will continue to evolve, but has standardised what was previously a highly variable assessment and is an initiative that will hopefully become commonplace in all obstetric anaesthetic departments throughout the United Kingdom.

ESRA1-0097
Postoperative Pain Management

MAKING SENSE OF THE ADDUCTOR CANAL BLOCK FOR TIBIAL PLATEAU FRACTURES

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Background and aims: Tibial plateau (TP) fractures are associated with significant perioperative pain. Peripheral blocks are rarely considered in such cases for fear of masking acute compartment syndrome (ACS).

Methods: Literature lacks reports of peripheral blockade used to treat TP fracture pain. We present here our preliminary results from treating severe postoperative pain in 4 patients after open reduction and internal fixation (ORIF) of TP fractures by ultrasound-guided adductor canal block (US-guided ACB).

Results: US-guided ACB combines the benefits of a distal femoral nerve branches block with a partial block of the distal obturator nerve branches without motor weakness. US-guided ACB should not mask the symptoms of ACS, since the compartments at risk are innervated by the sciatic nerve.

Conclusions: US-guided ACB is a very effective and safe method for postoperative analgesia in patients with TP fracture injury, experiencing severe pain.

ESRA1-0098
Case Reports

LIFESAVING CONTROLLED HYPOTENSIVE RESUSCITATION STRATEGY WITH EPIDURAL ANAESTHESIA IN MANAGEMENT OF ACUTE INTRAOPERATIVE BLOOD LOSS FOLLOWING INADVERTENT SPLENIC INJURY

Penaco A.1, Kcomrt M.1, Gonzalez J.1 Anesthesiology, Montefiore Medical Center, Bronx, USA.

Background and aims: For decades, controlled hypotensive anesthesia has been utilized in an attempt to reduce intraoperative blood loss and minimize the administration of allogeneic blood products. Controlled hypotensive anesthesia has traditionally been established pharmacologically with volatile anesthetics and vasoconstricting agents. Hypotensive epidural anesthesia (HEA) is a relatively new technique used to achieve a hypotensive state through a total sympathetic block. In previous studies, HEA has been associated with decreases in both perioperative blood loss and transfusion requirements in hip replacement and radical prostate surgeries.

Methods: We report the case of a 76 year-old patient with newly-diagnosed renal cell carcinoma with metastasis to the lungs who presented for cytoreductive left radical nephrectomy. Prior to induction of general anesthesia, a low thoracic epidural was placed for intraoperative use. During the course of the surgery, however, inadvertent splenectomy resulted in hemorrhagic shock with estimated blood loss of approximately 3 L.

Results: Crystalloid, colloid, minimal blood products and vasopressors were administered in conjunction with use of the thoracic epidural to maintain target MAP 50–60 mmHg. Deliberate hypotensive resuscitation was continued until bleeding was adequately controlled ultimately with performance of a splenectomy. The planned nephrectomy was aborted and the patient was transferred in hemodynamically stable condition to the surgical ICU.

Conclusions: Hypotensive epidural anesthesia not only offers major advantages in reducing intraoperative blood loss. It may also prove to be particularly advantageous during unexpected surgical complications. The use of hypotensive epidural anesthesia in the perioperative management of inadvertent splenic injury in this present case, proved to be a lifesaving resuscitative strategy.

ESRA1-0099
Peripheral Nerve Blocks

DEVELOPMENT OF A REGIONAL ANAESTHESIA SERVICE PROVIDING ANALGESIA FOR NECK OF FEMUR FRACTURES IN THE EMERGENCY DEPARTMENT

Vargulescu R.1, Zyzda A.1, Found P.1 Anaesthetics Department, King's College Hospital, London, United Kingdom.

Background and aims: Managing analgesia in the ED for elderly patients with neck of femur fractures is difficult due to complex comorbidities and unpredictable pharmacodynamics of analgesic drugs. Regional anaesthesia is a reliable technique to achieve controlled hypotensive anesthesia not only offers major advantages in reducing intraoperative blood loss. It may also prove to be particularly advantageous during unexpected surgical complications. The use of hypotensive epidural anesthesia in the perioperative management of inadvertent splenic injury in this present case, proved to be a lifesaving resuscitative strategy.

Methods: Literature search: use of regional anaesthesia in the ED; safety profile and side effects of opioids and NSAIDs in the elderly, complications of regional anaesthesia affects of opioids and NSAIDs in the elderly; complications of regional anaesthesia Figures for analgesia at our hospital from 3 sources NIFHD, CEM Audit, internal audit on Ortho-Geriatric wards.


Conclusions: Literature search: use of regional anaesthesia in the ED; safety profile and side effects of opioids and NSAIDs in the elderly, complications of regional anaesthesia Figures for analgesia at our hospital from 3 sources NIFHD, CEM Audit, internal audit on Ortho-Geriatric wards.

ESRA1-0100
Peripheral Nerve Blocks

REGIONAL ANAESTHESIA AND SAFETY IN EYE SURGERY

Vargulescu R.1 Nanavati N.1 Anaesthetic Department, King's College Hospital, London, United Kingdom.

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Background and aims:
- Stop Before You Block (SBYB) is an initiative that aims to eradicate wrong sided peripheral nerve blocks (PNBs). The supporting documentation from the Royal College of Anaesthetists specifies the safety check should occur ‘immediately before needle insertion’.
- Eye blocks typically require the introduction of an eye retractor prior to block performance, which can cause damage to the eye. We surveyed the current practice of eye blocks in our hospital.

Methods:
- We surveyed members of our Anaesthetic Department about their practice of eye blocks.
- We designed a custom poster to remind practitioners of the SBYB campaign in relation to eye blocks.

Results:
- None of the responders reported wrong sided blocks. One incident of wrong sided topicalisation was reported.
- Less than 50% of responders performed SBYB for eye blocks regularly and 16% never did. 75% of those who performed SBYB did it before topicalisation and cleaning the eye, with only 5.7% doing SBYB after eye retractor insertion.

Conclusions:
- SBYB is not performed regularly in eye theatres.
- Responders favor doing the check before inserting the eye retractor rather than before needle insertion as the SBYB documentation suggests.
- The absence of wrong sided blocks in our survey confirms this is rare, possibly because:
  - These patients undergo repeated instillation of eye drops prior to coming to theatre, and hence repeated checks.
  - The dilated pupil is a supplementary “mark” to ensure the correct side is blocked.
  - Patients are awake and can confirm the correct side.

ESRA1-0103
Peripheral Nerve Blocks

CERVICAL PLEXUS BLOCK FOR CAROTID ENDARTERECTOMY OUTCOMES- A 9 YEAR RETROSPECTIVE STUDY AT A DGH IN THE UK

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Background and aims: Various techniques for placement of cervical plexus block (CPB) have been described. We determined the efficacy and safety of the fluoroscopic-guided CPB technique in patients undergoing carotid endarterectomy during and in the 6 weeks post procedure over last 9 years.

Methods: Between Jan 2004 and Dec 2012, all patients (n = 30) presenting with carotid artery stenosis requiring surgery under Local Anaesthesia (LA) using fluoroscopy guidance only were included in the study. In our setup fluoroscopy-guided deep CPB techniques along with superficial plexus block are followed and this study shows the outcome of these block procedures with regards to efficacy and safety. Great care was taken to avoid complications like intra-thecal or intravascular injections. Retrospective analysis of consent, theatre records, case notes and follow up informed our results. A total of 10 ml 0.5% Bupivacaine was injected at antero-lateral to tip of the C2, C3 and C4 transverse process for deep CPB and another 20mls Bupivacaine 0.25% was used for superficial CPB. Oxygen with Nasal spec and conscious sedation in form of TCI propofol was used.

Results: There were no major complications and only minor side effect noted was discomfort during the procedure.

Conclusions: Fluoroscopic guided cervical plexus block injections has a definite role in improving the safety for carotid endarterectomy performed under LA in the short term. Limitations of our audit are that it is retrospective and small numbers. More controlled studies are required to better assess the role of this cervical plexus block technique with regard to the efficacy and patient safety.

ESRA1-0104
Central Nerve Blocks

EVALUATION OF THE EFFICACY AND SAFETY OF TRANSOBTURATOR TENSION-FREE VAGINAL TAPE PLACEMENT FOR THE MANAGEMENT OF STRESS URINARY INCONTINENCE PERFORMED UNDER LOCAL VERSUS EPIDURAL ANAESTHESIA

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Background and aims: Transobturator tapes (both inside-out TVT-O, and outside-in TOT) present comparable objective cure rates, similar to those of the classical retropubic TVT-O method for the management of female stress urinary incontinence. The aim of this study was to assess the efficacy and safety of TVT-O and TOT method performed under local versus epidural anaesthesia.

Methods: Medical records of patients diagnosed with urodynamic stress urinary incontinence who underwent either TVT-O or TOT method between January 2009 and December 2012 were examined in this retrospective study. Patients were divided in two groups according to the type of anaesthesia administered: Group A (n1 = 76) received local anesthesia, using 15 ml of lidocaine 2% with 1:200.000 epinephrine, while Group B (n2 = 107) received epidural anaesthesia with 12 ml of 0.75% ropivacaine plus 100γ fentanyl.

Results: There were no statistically significant differences in patients’ basic characteristics, mean operative time, intrareoperative pain scores and postoperative analgesic requirements between the two groups. No severe complications occurred. Minor intraoperative side effects were reported from 8 patients of group B, including nausea and hypotension. Eleven patients (10.3%) of group B and 6 patients of group A (7.9%) complained for early postoperative symptoms of frequency and urgency. Rejection of the tape did not occur in any patient. The cure rates were not statistically different between the two groups.
Conclusions: The efficacy and safety of transoburator tension-free vaginal tape placement under local anesthesia seems to be comparable to the efficacy and safety of the operation performed under epidural anesthesia.

ESRA1-0107
Postoperative Pain Management

CONTINUOUS INFUSION OF LOCAL ANESTHETIC INTO SURGICAL WOUND AFTER BREAST CANCER OPERATIONS EFFICIENTLY REDUCES PAIN

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Background and aims: Perioperative analgesia has traditionally been provided by opioid analgesics. Our aim was to find out if pain treatment with a local anesthetic pump with local anesthetic is more effective than systemic pain treatment in breast cancer patients after surgical procedures.

Methods: We prospectively randomized 120 patients undergoing breast cancer surgical procedure. The study was approved by Slovenian Ethics Committee. Half of patients were after axillary dissection, the other half was undergoing breast cancer surgical procedure with immediate breast reconstruction with tissue expander. The patients included were surgically treated from December 2010 till May 2012. The test group was treated with continuous local anesthetic analgesia into surgical wound, while the control subgroup was treated with standard intravenous analgesia.

Data about postoperative pain were collected. A consumption of piritramide and metoclopramide was registered. Alertness of patients was estimated using the Observer’s Assessment of Alertness/Sedation Scale (OAA/S Scale). The presence of chronic pain was established three months after operation.

Results: The test group of patients had significantly smaller acute pain immediately after surgical procedure than control group of patient, the consumption of piritramide and metoclopramide was lesser (p<0.001). They had been more alert (p = 0.001). A smaller portion of patients treated with local anesthetics had chronic pain in comparison to the control group (p = 0.01).

Conclusions: Use of continuous infusion of local anesthetic into surgical wound reduces acute pain immediately after surgical procedure; it enables smaller opioid and metoclopramide consumption. Chronic pain three months after operation is less frequent in the test group.

ESRA1-0108
Postoperative Pain Management

VARIATIONS IN POST-OPERATIVE PAIN INTENSITY AND OPIOID ADMINISTRATION ACROSS SURGICAL SPECIALTIES

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Background and aims: A recent study demonstrated more minor surgical procedures are associated with greater than expected post-operative pain, associated with increased morbidity(1). We compared post-operative pain scores and analgesia administration after different surgical procedures in our hospital.

Methods: With audit committee approval, we prospectively reviewed (over one month) adult (with capacity) overnight admissions in two wards. In Ward A, two groups reviewed were gynaecology/urology (GYN) and general surgery (including nephrectomies) (GEN); in Ward B, two groups were lower limb surgeries: orthopaedic (ORTHO) and trauma (TRAUMA). Pain intensity scores used locally (0- no pain; 1-mild; 2-moderate; 3-severe pain), and overnight opioid requirements were reviewed. Opioid analgesia was converted into oral morphine equivalent doses to enable comparison(1).

Results: 84 patients were reviewed (20 GYN, 20 GEN, 22 ORTHO and 22 TRAUMA). Neuraxial analgesia supplementation was similar in all groups.

In Ward A, the GYN group received significantly less morphine (equiva-

lent) analgesia (p=0.009) compared to GEN group, despite similar moderate-severe pain scores (10/20 vs 6/20 respectively, p=0.1967).

In Ward B, both ORTHO and TRAUMA groups received similar appropriate amounts of opioids (p=0.80), with similar moderate/severe pain scores (7/22 vs 8/22 respectively; p=0.75).

These results suggest that in our hospital, the GYN group is overlooked as causing significant post-operative pain.

Conclusions: Subsequent to procedures considered less painful, patients are likely to receive inadequate opioid analgesia, despite similar pain scores. Our initial results have prompted development of local protocols for procedure-specific post-operative pain relief to improve patient outcomes.

Reference:

ESRA1-0109
Case Reports

PULMONARY EMBOLISM IN A PATIENT ON POSTOPERATIVE EPIDURAL ANALGESIA - CASE STUDY

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Background and aims: This paper describes a case of Pulmonary Embolism (PE) that occurred in a patient on postoperative epidural analgesia and the need to consider the ideal timing to start low molecular weight heparin (LMWH) therapeutic doses, since the risk of causing an epidural haematoma with catheter removal. The literature on similar cases is scarce and currently existing recommendations do not address this type of situation.

Methods: Case Report

Results: A 63 year old woman underwent radical vulvectomy under combined epidural and general anesthesia. The procedure was uneventful and had 6 hour duration. By 24 hours postoperatively she presented with electrical and hemodynamic instability: disorientation, atrial fibrillation, hypotension and desaturation. Further investigation revealed that it was a bilateral PE. We weighed the risk of epidural haematoma with catheter removal facing the need to start LMWH in therapeutic doses. It was decided to withdraw the epidural catheter, delaying 4 h LMWH initiation. Close monitoring of neurological signs was ensured. The patient had a good clinical outcome and was discharged under warfarin therapy.

Conclusions: Despite advances in prevention, diagnosis and therapy PE remains an underdiagnosed and often fatal1 entity. There are few similar case reports described and currently existing guidelines do not anticipate this type of situation. Coordination with Cardiology Department was preponderant in order to find a compromise between the risk of delaying the onset of LMWH and the risk of causing an epidural haematoma. Further discussion is necessary to find orientations that support future evidence-based decisions in situations like this.

ESRA1-0112
Obstetric

EPIDURAL USE IN LABOUR WARD IN MIGRANT POPULATION – A STUDY OF 8653 PARTURIENTS

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Background and aims: Investigators in multiple countries have reported disparities in the use of maternal analgesia during labour in patients from different ethnic groups. Such findings have been reported in the UK, Northern Europe, Australia and North America. We wished to determine if any disparity exists in labour ward analgesia in our institution.

Methods: After Ethical approval, a retrospective review was performed for the period Jan-Dec 2013 using an electronic database. Data collected included region of origin, ethnicity, parity, type of analgesia during the labour and mode of delivery. We excluded those with missing ethnicity and elective caesarean section.

Results: 8653 parturients from 108 different countries were analyzed. After exclusions, 5787 females were studied. 2370(42%) females were primagravidae and 3417 (59%) multigravidae with the rate of epidural analgesia 60.8% vs. 45.1% respectively. The use of epidural analgesia by area of geographical origin

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occurred as follows (lowest to highest): North Africa (22.7%), Far East (34.5%), South Africa (35.2%), India (40.5%), North America (41.1%), Western Europe (43.9%), Eastern Europe (45.1%), Australia/New Zealand (47.1%), Ireland (47.4%), and Middle East (55.1%). Using the native Irish population as reference, the relative risk of having epidural analgesia during labour was lowest in parturients from North Africa and highest in migrants from Middle East 0.54 and 1.17 respectively (Graph).

Conclusions: Patients from different geographic areas had different rates of use of epidural analgesia requirements during labour. Further studies are required to understand this phenomenon.

ESRA-0115  
Case Reports  
ULTRASOUND-GUIDED SUBCOSTAL TRANSVERSUS ABDOMINIS PLANE BLOCK: AN ALTERNATIVE FOR PAIN MANAGEMENT AFTER UPPER ABDOMINAL SURGERY IN CHILDREN  
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Background and aims: Recently, Hebbard1 et al described an oblique subcostal approach of transversus abdominis plane (TAP) and proposed it for pain control after upper abdominal surgery.

We present our experience with oblique subcostal TAP block in two children undergoing gastrostomy, and its analgesic efficacy.

Methods: After obtaining written informed consent from parents, two children aged 11 and 12 months, were induced with general anesthesia (fentanyl 1 μg.kg⁻¹ and propofol 3 mg.kg⁻¹) followed by placement of a laryngeal mask. Then, an ultrasound-guided oblique subcostal TAP block was performed using a linear high-frequency probe. The needle (23-G, 25-mm, Echoplex®, VYGON, France) was introduced in an in-plane approach into the TAP near the costal margin along a line from the xyphoid toward the anterior part of iliac crest. A dose of 0.5 ml.kg⁻¹ of 0.25% bupivacaine was injected.

We described the postoperative pain with LLANTO2 scale and opioids/NSAIDs usage after 2, 8 and 24 hours after surgery.

Results: We obtained 1 point in LLANTO scale in the first case, and 3 in the second one. No rescue analgesic medication was needed.

Conclusions: TAP block provides pain relief after gastrostomy in children; therefore it could be considered as a part of a multimodal postoperative analgesia regimen.

Reference:

ESRA-0118  
Obstetric  
CSE FOR A CAESAREAN SECTION IN A PATIENT WITH MYASTHENIA GRAVIS  
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Background and aims: Myasthenia gravis (MG) is a rare autoimmune disease which presents a challenge to the anaesthetist. Muscle fatigue may range from mild ptosis to life-threatening respiratory failure. Risk of myasthenic crisis, increased sensitivity to the muscle relaxants and respiratory depressants make regional anaesthesia, if possible, preferred anaesthetic technique. Pregnancy, labour and especially postpartum period may alter course

Methods: We present a patient of 28 years old (height 167 cm, weight 55 kg) primigravida at 37 weeks with MG who was scheduled for an elective caesarean section (CS).

Results: MG was diagnosed at 17 years old. Treatment with pyridostigmine and prednisone provided good symptoms control. CSE was chosen for CS. 12 mg of bupivacaine produced a satisfactory block. Postoperatively, epidural infusion of 0,125% bupivacaine provided excellent pain relief without necessity of using opioids. The surgery and postoperative period were uneventfull and she was discharged home 5 days after CS.

Conclusions: CSE provided both excellent block for CS and good quality pain therapy postoperatively. Prolonged postoperative monitoring of vital functions is essential for a rapid diagnosis of myasthenic crisis.

Reference:

ESRA-0122  
Peripheral Nerve Blocks  
QUALITY AND QUANTITY OF THE REGIONAL ANAESTHETIC TROLLEYS  
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Conclusions: TAP block provides pain relief after gastrostomy in children; therefore it could be considered as a part of a multimodal postoperative analgesia regimen.

Reference:
Background and aims: We set out to establish the quality and quantity of equipment on a regional block trolley in a London Teaching Hospital.

Methods: We conducted an audit of the five regional block trolleys in the trust. Each regional trolley was compared to a Performa designed together with the Regional Consultants in the Trust as to what they would expect to be on a Block Trolley.

Results:
- Two (40%) of the block trolleys displayed local anaesthetic toxicity guidelines and none (0%) displayed the location of the nearest intralipid.
- Regional Consent stickers, Working Nerve stimulator, Sterile Ultrasound covers and necessary accessories were found on all 5 trolleys (100%).
- Chance of finding a 50 mm (93%), 80 mm (60%), 100 mm (50%) sonoplex cannula on the block trolleys.
- Chance of finding a 50 mm (93%), 80 mm (60%), 100 mm (50%) sonoplex cannula on the block trolleys.
- Chance of finding 0.25/0.5% levobupivacaine (58%) and 1%/2% lidocaine (58%) and the local anaesthetic labels were present on three (60%) block trolleys.
- Injecting Syringes (2 ml, 5 ml, 10 ml, 20 ml) were present on three trolleys (60%) and the injecting needles for local anaesthetic (23, 25 gauge) only present on two (40%) of the block trolleys.
- Sterile Gloves present on two trolleys (40%) and 2% Chlorhexidine spray available on only one (20%) block trolley.
- Three Block (60%) trolleys were organized and compartments properly labeled.
- Spinal packs and needles were present on three (60%) trolleys but no trolleys had any 0.5% chlorhexidine spray.

Conclusions: Our audit showed that the quality and quantity of equipment on the block trolley was not up to standards. Highlighted the need for a Standardized Trolley throughout the Trust.

ESRA1-0128
Peripheral Nerve Blocks

Efficacy of Continuous Femoral Nerve Catheters in Patients Undergoing Total Knee Arthroplasty
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Background and aims: Pain after total knee arthroplasty (TKR) can be severe and debilitating with 60-90% in moderate-severe pain. While the trend is moving towards peripheral nerve block, the most superior form of analgesia is still debatable. We attempted to study the outcomes of TKR patients in our institution on a continuous femoral nerve infusion.

Methods: All patients undergoing unilateral TKR with a femoral nerve catheter from October 2012 - January 2013 were included in the study. A TKR analgesia protocol was instituted (Annex 1) and they were followed-up during their hospitalization and assessed daily for pain at rest and on movement, complications of the femoral nerve catheter and length of stay.

Results: 50 patients were included in the study. 88% had pain score < 3 at rest and 26% on movement on POD 1 and 96% and 64% respectively on POD 2. 38% ambulated independently on POD 3. 24% of patients were discharged on POD 1 and 68% by POD 4. There were no cases of motor blockade or nerve injury. 18% of patients experienced problems with their femoral nerve catheters (refer to annex 2).

Conclusions: Continuous femoral nerve catheters are efficacious in managing postoperative pain in TKR patients. Protocolised management of postoperative pain in patients undergoing TKR helps in effective pain management and rapid rehabilitation and recovery.

ESRA1-0130
Case Reports

Continuous Regional Anaesthesia for Prolonged Major Upper Limb Surgery in a Patient with Poor Respiratory Reserve: Choice of Technique and Lessons Learnt. Case 2.
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Background and aims: A 67-year-old lady presented for revision open internal fixation of infected non-union humerus fracture. She was morbidly obese (BMI of 47) with shortness of breath on minimal exertion. Due to a high risk of respiratory complications, regional anaesthesia (RA) with conscious intravenous sedation – as opposed to general anaesthesia (GA) with artificial ventilation – was planned.

Methods: Ultrasound-guided supraclavicular brachial plexus block (SBPB) was performed, albeit technically difficult, and a catheter for continuous...
Peripheral Nerve Blocks

ANESTHETIC MANAGEMENT OF A DISTAL RADIUS FRACTURE SURGERY IN A PATIENT WITH OSTEOSIS IMPERFECTA

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Background and aims: Osteogenesis imperfecta (OI) is a genetic disorder of connective tissue characterized by easily fractured bones, hypermobile joints and skeletal deformities. Anesthetic implications of OI includes difficult airway control and intubation, plateau dysfunction, cardiovascular anomalies, malignant hyperthermia and problems with positioning due to brittle bones.

Methods: A 52-years-old female was scheduled for distal radius fracture surgery after a fall from height. Her medical history was significant for sarcoidosis and moderate COPD, type 2 diabetes mellitus, OI and two prior surgeries for total hip replacement under general anesthesia. Patient’s OI lead to severe kyphoscoliosis, short stature (116 cm) and history of eighty five bone fractures treated with a 22Gx50mm Stimuquik® needle was performed under ultrasound guidance.

Results: The local anesthetic used was ropivacaine 0,5% (20mL) which produced success peripheral nerve blockade (CPNB) postoperatively was inserted. Sedation was maintained with small aliquots of midazolam and low-dose ‘Ketofol’ (ketamine-propofol admixture) target-controlled infusion.

Conclusions: In the obese population, RA is associated with greater technical difficulties and complication rates. However, these patients are also at a much greater risk of GA problems, including airway and respiratory complications.

We advocate that, once adept in the use of ultrasound guidance for regional blocks, trainee anaesthetists should become competent in this block.

WHAT'S BEHIND ALL THIS? AN UNUSUAL FINDING AFTER INTERSCALENE BLOCK

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Background and aims: A 68y female was scheduled for shoulder surgery.

Methods: An US guided interscalene block with 15ml Ropivacaine 7.5mg/ml was performed without problems and the patient had uneventful anesthesia (TIVA) for the operation. The postoperative period was unremarkable.

Results: What is your opinion? How to proceed?

Here are some possible suggestions:
1. After 1 week, a connection with ISB is very unlikely, it is something connected to surgery.
2. A harmless hematoma and nothing to worry at all. Wait and see.
3. The swelling was there before and went unnoticed - now the hematoma drew attention to it.
4. Something to do with the breast cancer?
5. Infection? What about lab testing and infection markers?
6. Something completely different?
7. Which further examinations (if any) would your suggest?

Conclusions: Solution: (read from right to left)

‘Ti saw a easlaf myruena, gunitariro morf a hcnarb fo eht lanretxe raluguj niev. Eht tneitap saw nees yb a ralucsav noegrus ohw detats taht on rehtruf ypareht saw yrassecen.

E222

PEDiATRIC EPIDuRAL KiT eQUIPMENT FAILURE – CASE REPORT

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Background and aims: Epidural catheters are used in pediatric patients for intraoperative and postoperative pain relief. The small anatomical structures and catheter insertion under general anesthesia make it more difficult to perform.

Methods: A 12-month-old child presented for femoral Salter osteotomy. The anesthetic plan was a combined anesthesia with continuous caudal epidural block.

After general anesthesia, the patient was positioned in left lateral decubitus to place the epidural catheter (Perifix®Paed – B.Braun). Epidural space was found with ultrasound, T9/10 needle placed followed by the injection of bupivacaine 0,25%/7ml through the needle. The epidural catheter and the snap catheter connector were placed but the injection of 1ml of isotonic saline solution was impossible. Therefore the set (epidural catheter plus snap catheter connector) was removed.

Results: The analysis of the set revealed that the epidural catheter surpass the lumen of the snap catheter connector justifying the malfunction of the kit. Another Perifix®Paed Kit was checked and revealed the same problem, only the checkup of a third kit found out a functioning one which permitted a successfully technique. After surgery a perfusion of levobupivacaine 0,25% was connected to epidural catheter. The problem was reported to B.Braun.

Conclusions: The authors would like to draw the attention that a simple checkup of the epidural kit would avoid the need for a second attempt at epidural catheterization. Thereby we suggest that before using an epidural kit an “injection test” should be made with the snap catheter connector placed, mainly in pediatrics in which anesthesia is needed to perform the technique.
ESRA1-0136
Case Reports
CONTINUOUS REGIONAL ANAESTHESIA FOR PROLONGED MAJOR UPPER LIMB SURGERY IN A PATIENT WITH POOR RESPIRATORY RESERVE: CHOICE OF TECHNIQUE AND LESSONS LEARNT. CASE 3.
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Background and aims: A 57-year-old man required excision of shoulder osteomyelitis and interposition arthroplasty with local pedicled latissimus dorsi flap. He had poor respiratory reserve (PEFR of 200 l/min after nebulisers) due to morbid obesity (BMI of 44) and asthma, and tendency for postoperative lower respiratory tract infections.

Methods: The nature and unpredictable duration of surgery necessitated general anaesthesia (GA) with artificial ventilation via endotracheal tube. To minimize postoperative respiratory problems associated with GA and systemic opioids, a combination of two continuous peripheral nerve blockades (CPNB) was used: suprascapular and brachial plexus block (SBPB) and interpleural block (IB).

Results: An ultrasound-guided SPB was performed and a catheter was inserted for the first CPNB. An approximately 4h crural orthopaedic procedure under GA and SSBP went as planned. At the end of the operation, an IB was performed with a second CPNB catheter. Extubation was uneventful. Both CPNBs continued for 48 hours in the recovery ward under Acute Pain Service (APS) care. Particular care was given to ensure that the prescription did not allow for an inadvertent overdose. The patient made a good recovery without respiratory complications.

Conclusions: This case demonstrates the advantages of combining two CPNBs to ensure uneventful recovery following major upper limb surgery in a patient with poor respiratory reserve.

Whilst CPNB is a well-established postoperative analgesia modality, adequate training of the staff and clear instructions for managing CPNBs - such as the APS guidelines in our institution - are critical for optimal and safe pain relief without untoward events.

ESRA1-0139
Central Nerve Blocks
AWAKE OPEN BIOPSY OF A LARGE ANTERIOR MEDIASTINAL TUMOR UNDER THORACIC PARAVERTEBRAL NERVE BLOCK AS THE SOLE ANESTHETIC
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Background and aims: Mediastinal tumors can cause life-threatening complications during general anesthesia (GA). Several studies have demonstrated that thoracic paravertebral nerve block (TPVB) is adequate for use as the sole anesthetic for various surgical procedures. The aim of this study was to determine the use of TPVB as the sole anesthetic for parasternal anterior mediastinotomy in 8 patients.

Methods: After written informed consent, 8 patients ASA class IV with a large superior and middle anterior mediastinal tumor scheduled for anterior mediastinotomy and the biopsy of anterior mediastinal mass. The first outcome of the study was postoperative pain control. Pain was assessed using a visual analogue scale (VAS) at 1, 4, 24 and 48 hours after surgery. Further outcome included plasma concentration of glucose, C-reactive protein, interleukins (IL-1 and IL-6), tumor necrosis factor alpha (TNF-?), as well as leukocyte count.

Results: In all patients onset of sensory loss occurred approximately 25 minutes after the injections. During the operations, the patients were awake, did not experience pain, and were hemodynamically stable and spontaneously breathing. Excellent analgesic effect was achieved.

Conclusions: The use of a TPVB as the sole anesthetic for anterior mediastinotomy and the biopsy of anterior mediastinal mass resulted in adequate unilateral anesthesia. It was safe to use in high-risk patients in whom GA should have been avoided.

ESRA1-0141
Chronic Pain Management
SUPERIOR HYPOGASTRIC PLEXUS BLOCK – THE POSTEROMEDIAN TRANSDISCAL APPROACH: A CASE REPORT
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Background and aims: Cancer patients with tumors of the pelvic region can present severe pain difficult to control with opioids. The superior hypogastric plexus block (SHPB) have come to prove effective in improving pain complaints of the pelvic region.

Methods: Man, 85 years, ASA II, with history of rectal cancer underwent Hartmann’s surgery is referred to the outpatient chronic pain due to uncontrollable pain in the anal region. Initially treated with transdermal buprenorphine, oral morphine sos and amitriptyline without full control of pain. It was decided to perform a diagnostic / therapeutic SHPB. CT scan revealed calcified atheromatous disease of the iliac arteries. So we opted for a transdiscal approach.

Results: After monitoring and sedation with midazolam and fentanyl, the patient was placed in the prone position. Prophylactic cephalazin was administered before the procedure. The L5-S1 space was identified by fluoroscopy. After local anesthesia, a Chiba’s 22G needle with 20 cm was inserted perpendicularly to the skin at the center of the L5-S1 space and advanced toward the intervertebral disc under fluoroscopy control. The correct position (11.5 cm) has been confirmed by administration of 4 ml of radiopaque contrast. Then administered 8 ml of 0.5% levobupivacaine followed by 10 ml of 70% alcohol for neurolysis.

Conclusions: The patient had significant improvement in pain after blocking and reduced progressively the consumption of opioids.

This block with transdiscal approach may be more advantageous because can be accomplished in a prone position and we only need a single injection reducing risk compared to other approaches while maintaining efficacy.

ESRA1-0142
Postoperative Pain Management
PERIOPERATIVE INTRAVENOUS LIDOCAINE EFFECTS ON POSTOPERATIVE PAIN AND CYTOKINE PRODUCTION IN PATIENTS UNDERGOING NEPHRECTOMY-A PILOT STUDY
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Background and aims: Perioperative intravenous lidocaine infusion effectively controls pain after major surgery.

The aim of present study was to compare its effects on patients scheduled for nephrectomy regarding pain and cytokine production.

Methods: Following the local Ethic Committee approval, the patients scheduled for nephrectomy consented to participate in this study. Twenty patients randomly received either a lidocaine infusion 1.5 mg/kg/h (Lidocaine group) or the normal 0.9% saline infusion (Saline group) for a period of 4 hours.

Anesthetic and surgical procedure were standardized. The first outcome of the study was postoperative pain control. Pain was assessed using a visual analogue scale (VAS) at 1, 4, 24 and 48 hours after surgery. Further outcome included plasma concentration of glucose, C-reactive protein, interleukins (IL-1 and IL-6), tumor necrosis factor alpha (TNF-?), as well as leukocyte count. Data were compared using Mann-Whitney nonparametric test. P-value of less than 0.05 was considered statistically significant.
Methods: Demographic data of both groups were similar. The values of glucose, C-reactive protein, leukocyte count and the concentration of II-1, IL-6 and TNF-α in peripheral blood did not differ between groups at any time point. Intensity of pain at rest and in coughing were significantly lower 1, 4 and 24 hours after surgery in the Lidocaine group, compared to the Saline group.

Conclusions: Perioperative continuous intravenous infusion of lidocaine is effective for pain relief in patients scheduled for nephrectomy.

ESRA1-0145
Case Reports
CONTINUOUS REGIONAL ANAESTHESIA FOR PROLONGED MAJOR UPPER LIMB SURGERY IN A PATIENT WITH POOR RESPIRATORY RESERVE: CHOICE OF TECHNIQUE AND LESSONS LEARNT. CASE 1.

Wallis A.1, Cole P.1, Galitzine S.1 Nuffield Department of Anaesthetics, Oxford University Hospitals NHS Trust, Oxford, United Kingdom.

Background and aims: A 56-year-old man presented for excision of elbow osteomyelitis and pedicled brachialradialis muscle flap reconstruction. His overall respiratory reserve was poor (PEFR 180 l/min), due to chronic obstructive pulmonary disease, lifelong heavy smoking, obstructive sleep apnoea and previous pulmonary embolism. Other co-morbidities included insulin-dependent diabetes mellitus, chronic pain syndrome, and personality disorder.

Methods: To avoid respiratory complications related to general anaesthesia and systemic opioids, a vertical infracavicular brachial plexus block (VIB) was performed under nerve stimulator guidance. A continuous ultrasound-guided axillary brachial plexus block was also performed, with the catheter position confirmed radiologically.

Conclusion: The patient was provided with low dose 0.1 mcg/ml - target-controlled ‘Ketofol’ infusion; a propofol-ketamine admixture consisting of 1% propofol and 2mg/ml of ketamine.

Results: Adequate surgical regional anaesthesia (RA) was maintained for an approximately 5hr procedure. The patient was physiologically stable throughout. Postoperatively, the patient required no rescue opiates and there were no complications related to anaesthesia. The axillary brachial plexus catheter was used for continuous infusion postoperatively.

Conclusions: This case demonstrates that in patients with poor respiratory reserve prolonged major upper limb surgery can be safely performed under RA with minimal sedation. The choice of a single shot and continuous peripheral nerve block depends on the anaesthetist's expertise.

ESRA1-0146
Peripheral Nerve Blocks
MAGNESIUM SUPPLEMENTATION OF PERIPHERAL NERVE BLOCKS-WHAT DO WE KNOW FROM ORIGINAL CLINICAL STUDIES

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Background and aims: Adjuvants supplementing local anaesthetics (LA) for regional anaesthesia are used to improve and/or prolong the duration of block. The aim of this pilot literature study is to determine its current role as adjuvant in supplementation of peripheral nerve blocks (PNB) and to possibly point out the perspectives for future investigation.

Methods: Scopus Database of medical knowledge and ISI web of knowledge Anaesthesia subject list journals were accessed. Search words "magnesium" and "peripheral nerve block" were used, articles describing original studies from 2000 to 2014 were tracked. Clinical studies found were, one by one, addressed for the next: Randomization, double-blindness, number of subjects, type of the PNB used, type of surgery, the dosage of magnesium, the effect on prolongation of analgesia/anaesthesia, quality of pain control, rescue analgesia, side effects, type of LA.

Results: Only 4 relevant studies were retrieved. There were between 50 and 107 participants in a study, further randomized into smaller groups. Dosage of Mg sulphate was 150-500 mg, added to femoral, interscalene or axillary block. Mg prolonged analgesia in all studies, and improved quality of analgesia in two studies. Rescue analgesia was less used only in one study. There were no side effects of Mg usage.

Conclusions: Studies on Mg as PNB adjuvant are lacking. Randomized, double blinded, dose-finding studies, containing more participating study subjects are needed. It would be interesting to determine if Mg can lower the LA dose and reduce cardiotoxicity of LA with its inherent antiarrhythmic properties.

ESRA1-0147
Obstetric
DOES EPIDURAL ANALGESIA INCREASE THE RISK OF CAESAREAN SECTION AND INSTRUMENTAL VAGINAL DELIVERY? AUDITING IN A HOSPITAL CENTER

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Background and aims: Since epidural analgesia (EA) was introduced for pain relief in labour, controversy has persisted about its effect on labour process. The aim of this study is to document the incidence of caesarean section (CS) and instrumental vaginal delivery (IVD) in parturients having EA in our maternity.

Methods: Retrospective study, including all pregnant women submitted to EA from January 2010 to October 2013. The sample was divided into two groups, one with EA and another without and the mode of delivery was analyzed.

Results: Our study had a sample of 5925 pregnant women. In 3428 patients with EA, 54.4% had eutocic delivery, 28.3% dystocic by vacuum or forceps, and remaining 17.3% by CS. In 2407 patients without EA, 22.6% had eutocic delivery, 3.2% delivery by vacuum or forceps, and 74.2% by CS. However, EA was associated with an increased risk of IVD (relative risk RR 2.8), there was no association with risk of CS (RR 0.2). Incidence of IVD was 34.2% in parturients with EA, and 12.4% in parturients without and about CS, incidence varied from 17.3% to 74.2%, in patients with EA and without respectively.

ESRA1-0150
Case Reports
COMBINED-SPINAL-EPIDURAL FOR CESAREAN DELIVERY IN A PARTURIENT WITH HERIDITARY ANGIOEDEMA TYPE III

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Background and aims: Hereditary angioedema type III (HAE 3) is a rare inherited condition affecting 45 families worldwide in which spontaneous and fatal airway oedema can occur. This is the first report of a parturient with HAE 3 undergoing cesarean delivery under regional anesthesia.

Methods: A 37-year-old primiparous woman presented at 38 weeks for elective cesarean delivery. Her medical history included a diagnosis of HAE 3 reached in Israel following a history of lip and tongue swelling aged 25. Her symptoms and frequency oedema had significantly worsened during pregnancy.

Results: A combined –spinal- epidural (CSE) was performed using 16G Tholy/27 G Whitacre needles at the L4/5 interspace. Intracerehal anaesthesia was achieved with hyperbaric bupivacaine 12.5mg / dianormhe 300mg with bilateral sensory blockade to T4. Surgery proceeded uneventfully with the delivery of a healthy male neonate with no maternal complications reported at 1 month.

Conclusions: HAE 3 is caused by an abnormal factor XII coagulation factor. It leads to inappropriate activation of the kinin forming cascade resulting in severe submucosal oedema. 4 deaths from airway oedema in patients with HAE 3 are reported. Regional anesthesia is preferable as airway manipulation under general anesthesia (GA) can precipitate catastrophic airway swelling and should be avoided. A CSE technique was used to minimize chances of GA, airway manipulation and precipitating airway oedema. The additional epidural component is advantages in avoiding GA in the event of prolonged surgery or insufficient intracerehal blockade. CSE should be considered in all parturients with hereditary angioedema undergoing cesarean delivery.
Conclusions: Our results revealed that EA is associated with an increased risk of IVD and does not increase CS rate, as shown in the previous studies. Due to logistic problems in designing studies, definitive answers are not being possible yet. Although IVD is probably increased with EA, there are factors which increase this incidence, like obstetrician practice, pain free patient and teaching opportunity.

ESRA1-0152
Case Reports
ONCOLOGICAL PAIN IN PEDIATRICS: TUNNELING OF EPIDURAL CATHETER FOR PROLONGED USE
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Background and aims: Ewing's sarcoma is the second most common bone sarcoma affecting children. Frequently occurs in the pelvis, arm or leg. Studies found that epidural anesthesia is more efficacious in treating postoperative pain in patients with orthopedic tumors than other modalities.

Methods: A 12-year-old male with diagnosis of Ewing's sarcoma of the right tibia with a pulmonary metastasis. Neoadjuvant chemotherapy with disappearance of pulmonary metastasis and decrease size of the tibial lesion. Underwent surgery for malignant resection followed by sterilization with liquid Nitrogen and skeletal reconstruction under combined general and epidural anesthesia – tunneled catheter space L3-L4. At fifth day post-operative the patient returned to the OR for surgical cleaning because of an infection of the wound. This complication took the patient to the OR every other day.

Results: The epidural catheter was maintained for analgesia during 31 days because the patient became dependent on the regional analgesia for pain control. Due to bone necrosis one month after the initial surgery the patient was amputated under combined anesthesia with general, epidural and a peripheral nerve block (catic nerve block) for prevention of phantom pain. Epidural catheter was removed at the fifth day after amputation. Laboratory culture of the amputated space was negative.

Conclusion: Pain after extensive limb-sparing resections of bone is severe and difficult to control. The use of multiple analgesia modalities is ideal. The tunneled epidural in this case proved to be effective both intra-and post-operatively; without catheter related complications. The quality of analgesia contributed to the physical and psychological recovery of the patient.

ESRA1-0154
Case Reports
CONTINUOUS SPINAL BLOCK FOR CESAREAN SECTION IN A HIGH RISK PATIENT
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Background and aims: Continuous Spinal Anesthesia (CSA) is one of the most useful and reliable ways to provide analgesia and anesthesia. Despite its benefits, it’s one of the most underused regional anesthetic techniques.

Methods: Our case reports a 25-year-old female, 200P1A with an angiolipoma in the posterior medianism, communicating with the left pulmonary and subclavian arteries, causing obstruction to the flow output of right and left ventricles.

At 32 weeks, she was proposed for a c-section due to severe oligohydramnios. It was decided to perform a CSA to allow precise titration of anesthetic drugs. A Spinocath® catheter was introduced through the needle in the subarachnoid space at L3-L4 interspace. Fentanyl and ropivacaine 0.5% were dosed intermittently, until the desired sensitive level was achieved.

Results: The patient remained hemodynamically stable throughout the procedure, with adequate sensitive and motor blockade.

Post-op analgesia was performed through the intrathecal catheter with an infusion of ropivacaine 0.1%, being effective in pain relief and with no record of hemodynamic instability.

Conclusions: Obstetric patients with heart disease are at great risk of hemodynamic instability. With CSA, the titration of small doses given incrementally allows the block level and accompanying sympathectomacy to be only as extensive as necessary for surgery.

Fear of DPH is the primary reason CSA is infrequently used. However, the relative risk of this treatable side effect should be weighed against the many advantages of the technique in challenging patients.

ESRA1-0157
Obstetric
ANOTHER CASE ABOUT HORNER’S SYNDROME DURING EPIDURAL ANALGESIA FOR LABOUR
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Background and aims: Epidural analgesia (EA) is commonly used in obstetrics and it is important for all staff caring for parturients to recognise associated complications.

Methods: We report a case of horners syndrome (HS) following EA for labour in a parturient with a previous EA without any record of the same signs.

Results: A 24-years-old woman, GII PI, had labour induced for post-maturity following an uncomplicated antenatal course. After her request an epidural was placed in the sitting position without complication. An initial dose of 5 ml of Ropivacaine 0.2% was injected followed by the same dose of ropivacaine with 0,01 mg of sufentanil, 5 minutes later. Approximately fifty minutes after, the epidural appeared to be working well, but patient presented left-sided ptosis and miosis as well as loss of hemifacial sweating(†). Blood pressure and CTG remained reassuring. Sensation tested appeared intact and no motor block was present. It was explained to the patient that the symptoms were secondary to EA. She did not require further analgesia and progressed well to the second stage of labour. A boy (3495 g) was delivered (APGAR 9-10).Horner’s syndrome resolved within 1h following EA.

Conclusions: The incidence of HS is rare with EA but increases to 0.4-2.5% in labor analgesia. It is considered benign and self-limiting condition, however, true respiratory compromise and hemodynamic instability due to a high sympathetic block should be considered. Recognition of the development of HS is important and reassurance of the patient and monitoring the mother and baby vital signs are crucial.

ESRA1-0160
Central Nerve Blocks
MANAGEMENT OF EPIDURAL CATHETER DISCONNECTION IN THE NORTH WESTERN DEANERY, UK
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Background and aims: Accidental disconnections of epidural catheters from the filter are not uncommon. There is no quoted incidence rate in the literature. The best practice guideline advises that local guidelines should include its management to aid anaesthetist to minimise risk to patients, but contains no suggested management plan. A survey was conducted to ascertain the standards of practice and awareness to local trust policy.

Methods: A survey was sent via email to all practicing anaesthetists and pain nurses in the North Western Deanery using Google form. Responders were asked questions on management of epidural disconnection (between catheter and connector) in situations when witnessed or not, time limits, in obstetric patients and difficult epidurals and local trust policy awareness.

Results: 128 anaesthetists and 4 pain nurses responded with 44% being consultants. If disconnection was witnessed, 44% would reconnect immediately, after cleaning and/or cutting end. If not witnessed, 44% would abandon and either reinsert a new epidural or change to a different regime. 19% would only reconnect if immediately witnessed and 42% would reconnect within 30 minutes. Most indicated their management would not change for obstetric patients or those with difficult epidurals. Awareness of local trust policy is poor.

Conclusions: This is clearly a grey topic with huge variation of management strategies. Recent evidence indicating the cutting of 12cms of epidural catheter is enough to minimise infection risk could play a huge role in removing good working epidurals unnecessarily and exposing patients to risks of another epidural, especially those on thrombophrophylaxis.
ESRA1-0161
Peripheral Nerve Blocks

THE EFFECT OF LOCAL ANAESTHETIC CHOICE ON OUTCOMES OF BRACHIAL PLEXUS BLOCKS IN HAND TRAUMA PATIENTS
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Background and aims: A disparity in clinical practice in the choice of local anaesthetic (LA) exists when used for brachial plexus blockade (BPB). We aimed to clarify whether the different LA solutions used produced a significant difference in block onset and duration in our specialist hospital.

Methods: Following institutional approval and informed consent we aimed to collect data on 100 patients undergoing surgery under BPB. Operators filled in forms detailing block information. 24-hours later we telephoned patients to obtain further block details.

Results: 41 blocks were performed with 0.25% levobupivicaine, 50 with a combination of 1% lidocaine/0.25% levobupivicaine and 9 with 1% prilocaine. When lidocaine was used, adrenaline was an additive in 3 blocks.

The mean block onset time was 22 minutes (6 – 55 minutes) for all blocks. With levobupivicaine/lidocaine the mean time was also 22 minutes (10 – 55 minutes), while this was reduced without the use of lidocaine to 19 minutes (6 – 50 minutes).

Mean block duration was 13:07 hours for all blocks, 14:25 for levobupivicaine, 11:38 for levobupivicaine/lidocaine, 11:17 when levobupivicaine/lidocaine was used without adrenaline but 16:11 when used with adrenaline.

Block duration was longest if <20mL or >40mL. volume was utilized, although a positive correlation between duration and dose was seen.

Conclusions: The use of levobupivicaine/lidocaine mixture did not reduce block onset or prolong duration unless used with adrenaline, thus providing minimal benefit when used in BPBs. LA volumes less than 20mL, presumably due to precise injection and nerve localization, or greater than 40mL, prolonged block duration.

ESRA1-0162
Peripheral Nerve Blocks

INFLUENCE OF SITTING AND STANDING POSITIONS IN ULTRASOUND-GUIDED NEEDLE PLACEMENT: A PHANTOM BASED OBSERVATIONAL STUDY
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Background and aims: Successful ultrasound-guided regional anaesthesia (UGRA) requires knowledge of sono-anatomy and accurate needle placement. Evidence suggests that manual dexterity is improved in the sitting position. We hypothesised that accuracy and efficiency of needle placement during UGRA is better whilst needing seated. This may improve safety and reduce procedural time.

Methods: This was a randomised observational cross-over study using a phantom containing two targets. Volunteer anaesthetists were recruited and randomised, each acting as their own control. Participants were tasked with sequential needle-tip placement at pre-determined positions (2cm or 5cm target; 6 or 12 o’clock position relative to target) in sitting and standing positions according to randomisation. A blinded observer scored accuracy using a verified scoring system. The primary outcome measure was accuracy of needle placement in the sitting versus standing position. Data regarding time taken, gender, seniority, prior experience and position preference were also collected.

Results: 28 participants were recruited. There was no significant difference in accuracy of needle placement between sitting or standing positions (t = 0.34, p = 0.738, 95% CI -0.235 to 0.232) or in time taken (t = -0.098, p = 0.335, 95% CI -16.39 to 5.78). Secondary outcomes showed accuracy improved with greater experience (p = 0.008) and increased needle distance from the probe (p = 0.007).

Conclusions: Accuracy of needle placement was not affected by the sitting or standing position of the operator. When training in UGRA, individuals should adopt the position in which they feel most comfortable.

ESRA1-0164
Obstetric

RETROSPECTIVE COMPARISON OF INTRATHecal MORPHINE ADMINISTRATION WITH SPINAL ANAESTHESIA AND COMBINED SPINAL AND EPIDURAL ANAESTHESIA IN 48 HOUR POSTOPERATIVE ANALGESIA IN CAESAREAN SECTION
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Background and aims: Recently, intrathecal morphine administration with spinal analgesia (it-m SA) is getting popular for postoperative analgesia in Caesarean section (C/S). We compared the it-m SA and combined spinal and epidural anaesthesia (CSEA) in postoperative analgesia and adverse effects after cesarean section using a retrospective chart review.

Methods: IRB approval was obtained. The patients who underwent C/S by it-m SA or CSEA at Nagaoka Chuo General Hospital from February 2012 to January 2013 were enrolled in this study. In the it-m SA group, 0.1mg of morphine chloride was supplemented in 0.5% isobaric or hyperbaric bupivacaine. In CSEA group, epidural catheter was inserted at T11/12 to L1/2 intervertebral space, and then 0.5% isobaric or hyperbaric bupivacaine was administered for spinal anaesthesia. After operation, continuous infusion of 0.2% ropivacaine (4mL/hr) with patient-controlled epidural analgesia (PCEA) was started via epidural catheter. Postoperative PCEA usage, supplemental analgesics consumption and incidence of adverse event during 48h after surgery were extracted from medical record.

Results: We included 32 patients receiving it-m SA and 27 patients receiving CSEA in this survey. Average time for first administration time of supplemental analgesics usage after C/S and incidence of postoperative nausea (PON) were not significantly different between it-m SA group and CSEA group (supplemental analgesics: 1508.3 ± 963.7 min vs. 1344.9 ± 976.4 min, p=0.92, incidence of PON: 6.3% vs. 7.4%, p=0.637, respectively). Incidence of pruritus was higher in the it-m SA group and numbness of lower extremity was higher in the CSEA group.

Conclusions: This survey demonstrated that it-m SA is equipotent with CSEA in 48-hour postoperative analgesia.

ESRA1-0166
Case Reports

SEVERE THROMBOCYTOPAENIC PURPURA (TTP) IN PREGNANCY AS A CONTRAINDICATION TO NEUROAXIAL BLOCKADE AND MANAGEMENT OF POTENTIAL MASSIVE OBSTETRIC HAEMORRHAGE – A MULTIDISCIPLINARY APPROACH
Blyth K.1, Singh N.1 1Anaesthetics, Worcester Royal Hospital, Worcester, United Kingdom.

Background and aims: We report the multi-specialty management of this rare condition presenting acutely in the 3rd trimester. TTP is an autoimmune condition characterised by microangiopathic haemolytic anaemia. The formation of multiple thrombi results in platelet consumption and potentially life threatening clinical features.

Methods: A 30 year-old primiparous woman presented to Birmingham Women’s Hospital (BWH) at 32 weeks gestation with lethargy and shortness of breath. Investigations revealed worsening respiratory failure, severe anaemia and thrombocytopenia. Her past history included a tentative diagnosis of an undefined connective tissue disease, later confirmed on serology. Upon review by multiple specialties the patient was transferred to the Queen Elizabeth Hospital Birmingham, the nearest centre with necessary specialties, for delivery by emergency caesarean section.

Due to severe thrombocytopenia, neuroaxial block was absolutely contraindicated. Major obstetric haemorrhage was a real concern and measures were taken to reduce this risk and manage any haemorrhage quickly. Intra-iliac balloon catheters were inserted under local anaesthesia prior induction, to stem any uncontrollable haemorrhage intra-operatively.
Results: The result of meticulous planning involving multiple specialities was the safe delivery of a healthy neonate with minimal blood loss to the mother.

Conclusions: With increased availability of near patient coagulation testing, it is possible to assess function of platelets as well as absolute number. However, following current recommendations, we proceed with general anaesthesia. A multidisciplinary approach was needed, requiring careful coordination by the anaesthesiologist. This resulted in a safe transfer of the patient from a single specialty hospital to a larger centre with the facilities to provide appropriate pre-, intra- and post-operative care.

ESRA1-0178

Case Reports

ULTRASOUND GUIDED THORACIC PARAVERTERBAL CATHETER TO THE RESCUE FOR RIB FRACTURE PAIN

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Background and aims: We describe ultrasound guided thoracic paravertebral catheter insertion as a rescue technique to treat acute pain associated with traumatic rib fractures in a young male patient.

Methods: A 34 year old male sustained traumatic left sided rib fractures following a fall. He developed pain on inspiration and coughing, requiring a patient controlled analgesia device. His morphine requirement increased, (133 mg in 24 hours) with pain scores of 10/10. His pain prevented physiotherapy and he required oxygen to maintain arterial SpO2 above 96%. He was assessed for non invasive ventilation and a single dose of morphine failed to relieve his pain. A paravertebral catheter was placed at the level of the 9th thoracic vertebra, under ultrasound guidance. The paravertebral space was located with an 18G Tuohy needle at a depth of 6 cm, an epidural catheter was inserted to the paravertebral space, under ultrasound guidance. The paravertebral space was located with an 18G Tuohy needle at a depth of 6 cm, an epidural catheter was inserted to the paravertebral space, under ultrasound guidance. The paravertebral catheter remained in situ for five days before discharge.

Conclusions: Different regional anaesthetic techniques exist for rib fracture pain, the optimal technique should be tailored to the patient. Since the duration and intensity of pain can not be predicted and single shot nerve block techniques may not suffice, a continuous catheter technique may be more appropriate. The paravertebral block is a useful and under emphasised alternative to thoracic epidural.

ESRA1-0180

Case Reports

REGIONAL ANAESTHESIA WITH FOUR “SINGLE SHOT” PERIPHERAL NERVE BLOCKS FOR BILATERAL TIBIAL ILIZAROV FIXATORS: A FEASIBLE OPTION FOR POSTOPERATIVE ANAESTHESIA

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Background and aims: When central neuraxial anaesthesia (CNA) is contraindicated, long-lasting regional anaesthesia for bilateral lower limb (LL) surgery can be challenging. We present a case of successful four “single shot” peripheral nerve blocks (SSPNBs) for bilateral LL Ilizarov fixators (IFs).

Methods: A 27-year-old 67.5 kg patient with tibial deformities presented for corrective osteotomies and IFs. Opiates had to be avoided due to previous vomiting. The patient refused CNA due to childhood meninges.

Results: Bilateral SSPNBs – femoral and popliteal – were performed in combination with general anaesthesia, using 20ml 0.75% ropivacaine for each block (total dose 300mg, 4.4 mg/kg).

At no stage were there signs of local anaesthetic toxicity. No rescue morphine or antiemetics were required. The patient made good recovery, reported excellent postoperative analgesia lasting approximately 24hrs and gave excellent feedback a few months later on returning for IF removal.

If is a circular external frame which allows correction of deformity and fixation of the fracture fragments with almost no soft-tissue exposure. However, the pain in the first 24hrs post-operatively can be significant. Maximum recommended dose of ropivacaine 3-4mg/kg. Higher doses are frequently used in clinical practice and it is recommended that doses should be block and site specific and individualised according to age and disease-related influences on the pharmacodynamics and kinetics of local anaesthetics.

Conclusions: While CNA may be most appropriate for bilateral LL Ilizarov surgery, we demonstrate that bilateral SSPNBs are a feasible option for postoperative analgesia. Measures for treating unlikely LA toxicity should be in place.

ESRA1-0181

Postoperative Pain Management

LOW DOSE SPINAL ANAESTHESIA REDUCES PAIN AND FENTANYL CONSUMPTION IN ADULTS UNDERGOING LAPAROSCOPIC GROIN HERNA REPAIR

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Background and aims: Laparoscopic repair of inguinal hernia is reported to facilitate early ambulation and reduce hospital stay. However pain in the immediate post operative period may be significant. Studies evaluating role of post site local anaesthetic (LA) infiltration have yielded conflicting results. We study the impact of LA infiltration on pain in the immediate postoperative period.

Methods: This double-blind, randomized clinical trial included sixty ASA I-III patients scheduled for elective TEH repair. The control group (n=29) received a ‘sham’ subarachnoid block and the study group (n=31) received subarachnoid block with 5 mg bupivacaine and 25 μg fentanyl prior to general anaesthesia. Postoperatively, all patients received PCA fentanyl. The two co-primary outcome measures were pain after TEH repair and perioperative analgesic consumption.

Results: Patients receiving sub arachnoid block maintained their haemodynamic variables closer to baseline throughout surgery, consumed significantly less fentanyl (p<0.001) post operatively and had significantly lower pain scores at rest and on movement up to 7 hours post operatively (p<0.001). The majority of patients in the control group (25/29) experienced catheter-related bladder discomfort (CRBD) compared to none in the study group (p<0.001). All study group patients could ambulate within 1 hour.

Conclusions: Low-dose subarachnoid block with bupivacaine and fentanyl provides superior intra operative haemodynamic stability and decreases intensity of post operative pain in patients undergoing TEH repair. It reduces perioperative fentanyl consumption, prevents CRBD and improves quality of recovery and does not affect ambulation.

ESRA1-0183

Case Reports

SPINAL ANAESTHESIA FOR CESAREAN SECTION IN A PATIENT WITH HELLP SYNDROME AND THE USE OF IV DESMOPressin

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Background and aims: Desmopressin causes transient improvement of coagulation because it stimulates platelet adhesiveness. We report a case of a patient with HELLP syndrome who was successfully managed with an intraoperative hemorhage with IV desmopressin administration.

Methods: A 32-year-old, 75kg twin primigravida at 32 weeks of gestation was referred to our hospital for hypertension. Initial blood pressure (BP) was 170/100 mmHg. Laboratory testing showed a hemoglobin of 12.2g/dL, platelet count of 71,000/μL, ALT/AST of 109/153 U/L, and normal coagulation parameters. Despite MgSO4 and Hyaluronidase treatment of two days, the patient’s condition worsened (BP 195/100 mmHg, ALT/AST 202/250 platelet 65,000/μL). We used 25-gauge spinal needle and intrathecal 12mg of heavy bupivacaine for emergent Cesarean section, and 0.3 μg/kg IV of desmopressin.

Results: There were many early surgical bleeding, but the bleeding gradually been reduced, almost no bleeding after surgery. She was transfused with 3 units of packed red cells in the recovery room because of low hemoglobin (5.8 g/dL). Without any complications, she was discharged three days after surgery.
Conclusions: HELLP syndrome patients show progressing thrombocytopenia and platelet dysfunction. Desmopressin can be a good choice in these patients.

ESRA1-0187
Obstetric

DOES THE PRESENCE OF A DEDICATED OBSTETRIC ANAESTHETIST IMPROVE THE TIME FROM EPIDURAL REQUEST TO ATTENDANCE?

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Background and aims: Regional analgesia is the most effective form of labour analgesia. When a 24 hour epidural service is offered, the time from maternal request until anaesthetist presence should be under 30 minutes, and exceed one hour only in exceptional circumstances. A previous audit showed the request-attendance time was under 30 minutes in only 30% of cases, and under an hour in 69%. Subsequently, an additional tier of dedicated obstetric anaesthesia covering was added. This audit intended to assess whether the request-attendance time had improved.

Methods: After audit committee approval, a retrospective analysis of epidural request-attendance times was performed. Data collected included mean range of times to anaesthetist presence, reasons for and consequences of delay.

Results: 89 epidural records were analysed. The mean request-attendance time was 29.3 minutes. This table shows the timing range:

In 21 cases of delayed attendance, the reasons are shown below:

- An anaesthetist with another obstetric patient: 3 (14%)
- An anaesthetist in obstetric theatre: 9 (43%)
- An anaesthetist involved in non-obstetric duties: 4 (19%)
- No obvious reason: 5 (24%)

In 4/21 cases, alternative analgesia was offered while waiting; in two cases Entonox and two cases diamorphine.

Conclusions: The percentage of patients waiting under 30 minutes from request to anaesthetist attendance has improved to 76%, following staffing changes. Re-audit should aim to establish whether the request-attendance times were maintained, and assess maternal satisfaction with the labour analgesia service provided.

References:

ESRA1-0188
Case Reports

TRANSVERSUS ABDOMINIS PLAIN (TAP) BLOCK AS A SOLE ANAESTHETIC FOR POST LAPAROTOMY HERNIA REPAIR IN HIGH RISK PATIENT

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Background and aims: TAP involves an injection of local anesthetic into the anatomical space between the internal oblique and transversus abdominis muscles. Raffi first described TAP block with landmark technique, then ultrasound have aided the development of this block. It is used as component of multimodal analgesia in abdominal surgery.

Methods: 64-year old male, ASA III, weighing 100 kg, scheduled for urgent toilettte of para-umbilical post laparotomy infected hernia with ischemic heart disease (IHD), severe ventricular dysfuntion, waiting for ICD placement, systemic hypertension, obesity (BMI30), CABG (2012), vascular AAA treated recently with graft prosthesis and closure of umbilical hernia with a prosthetic mesh. Echocardiography showed EF 30%. After detailed explanation about tap block technique, written informed consent was obtained. After monitoring (NIBP, SpO2, HR), patient was sedated by fentanyl i. v. 0.1 mcg/Kg. After all aseptic measures, the US-TAP block was performed using a linear high frequency ultrasound transducer (10–18 MHz). A 22G insulated, 100 mm long needle (Echoplex®) was advanced in-plane with the ultrasound beam in a medial-to-lateral direction, inserted into anterior axillary line using subcostal approach. At the endpoint, a total of 20 mL of 0.25% levobupivacaine + 1% mepivacaine were injected on each side.

Results: Surgery was allowed to start after 20–25 min, after checking the level block with pinprick test. During the procedure the patient remained pain free and all vital signs normal.

In 4/21 cases, alternative analgesia was offered while waiting; in two cases Entonox and two cases diamorphine.

Conclusions: In our experience the US-TAP block may facilitate surgical anesthesia for abdominal wall and parietal peritonium in selected procedures for high risk patients.

ESRA1-0190
Chronic Pain Management

PARAVERTEBRAL BLOCK AS GOOD PREDICTOR OF DRG STIMULATION

Di Dato M.T.1, Gazzerro G.1, Tammaro D.1, Panzanella C.2, Papa A.3 1Pain Therapy, AO dei Colli V. Monaldi, Naples, Italy, 2Neuroradiology, AO San Giovanni Bosco, Naples, Italy, 3Pain Therapy, AO dei Colli V. Monaldi, Naples, Italy.

Background and aims: Paravertebral block is a useful way to give pain relief after thoracotomic surgery or chronic pain. Regional Eco-guided Anaesthesia allows a good visualization of the anesthetic spread, of the needle position and of the technique-related adverse events.

Methods: We have performed echo-guided paravertebral block in four patients (4) with benign chronic pain of the thoracic district. All the patients were previously treated with pharmacological therapy with no results.

CASE 1: postherpetic neuralgia refractory to drugs
CASE 2-CASE 3: Post-thoracotomic intercostal neuropathic pain
CASE 4: previous T7 discal decompression.

All patients underwent single shot thoracic paravertebral block, needle 100 mm 21 G, with levobupivacaine 0.5 mL 24 mL, T3-T7 (multiple injections at three levels), Convex Sonosite, 2–5 MHz.

All the patients have performed trial with DRG Stimulation.

Results: 3 patients experienced resolution of the neuropathic pain after 20 minutes, with progressive disappearance of allodynia. The analgesic effect disappeared at 10–12 hours. 3 patients have been successfully implanted. Follow-up has been done with VAS Scale and NRS at 12-24-48-72-hours, 15 and 30 days. NPSI Scale has been performed at 90 days. Just the first patient (postherpetic neuralgia) had no response to paravertebral block; he underwent just trial phase of DRG implant with no success, and was explanted after 10 days.
Conclusions: Paravertebral Single Shot Block is a simple, useful and safe technique, and a good predictor in pain therapy for patients scheduled for Dorsal Root Ganglion Stimulation.

ESRA1-0192 Case Reports

PATIENTS’ REPORTED EXPERIENCE WITH NOVEL AUDIOVISUAL DISTRACTION TECHNIQUE FOR PROLONGED UPPER LIMB SURGERY UNDER REGIONAL ANAESTHESIA

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Background and aims: Our institution performs high volume of upper limb operations, often under regional anaesthesia (RA) as the sole technique, or combined with general anaesthesia (GA) or sedation. Patients frequently request sedation or GA. When asked “why?”, boredom and/or anxiety are given as explanation.

We present the first two patients who successfully underwent prolonged surgery under RA with a novel in our institution technique of audiovisual distraction (AVD) used to combat these problems.

Methods: Two patients presented for complex Dupuytren’s fasciectomies. The AVD equipment comprised of a tablet device linked to the Internet, noise reduction headphones and a custom-made mounting arrangement. Music and movies were downloaded prior to surgery.

Both patients had ultrasound-guided supraclavicular blocks (30ml 1% prilocaine) adequate for surgery lasting approximately 4 hours. The tablet was placed on the mounting arrangement, patients positioned themselves comfortably, and the AVD started prior to surgical incision.

Results: Intraoperatively the patients watched iPlayer, surfed the internet, read emails and listened to music. One of the patients requested sedation for the last 30 minutes of surgery due to tourniquet pain.

Postoperatively they were asked to answer a standardised questionnaire to assess their experience. They were both extremely happy with AVD and “definitely” recommended it. They reported that having the opportunity to use the services on the tablet enabled them to “forget about the operation” and they did not understand “how time flew”.

Conclusions: AVD enhanced patients’ experience and satisfaction of undergoing surgery under RA without sedation. Excellent RA quality is of paramount importance for AVD to work.

ESRA1-0193 Peripheral Nerve Blocks

BRACHIAL PLEXUS BLOCK IN A SPECIALIST HAND TRAUMA CENTRE: A REVIEW OF CURRENT PRACTICE

AL-SHATHER H.1, El-Boghdady K.1, Adams L.1, Reed I.1, Curran J.1, Krone S.1 1Anaesthesia, Queen Victoria Hospital, East Grinstead, United Kingdom.

Background and aims: At Queen Victoria Hospital (QVH), brachial plexus blockade (BPB) is routinely performed for more than a thousand patients per year to enhance throughput, satisfaction and outcomes from hand surgery. QVH offers dedicated staff, theatres and nerve block rooms. Our objective was to assess current regional anaesthetic (RA) practice at QVH.

Methods: After informed consent and departmental approval, data was collected from 100 patients undergoing hand surgery under BPB only. Operators completed detailed forms specifying BPB technique, timings and outcomes. We then contacted patients 24-hours later to obtain further quality information from patients.

Results: Out of 100 BPB, 67% were performed by trainee registrars, 26% by consultants and 7% by staff grades. 85% of BPBs were axillary, 9% infracavicular and 6% supravacular. Ultrasound was used in 91% of BPBs.

Levobupivacaine was the most commonly used agent (91%), with an average dose of 108mg. The most commonly used procedural sedative was propofol (48%), with an average dose of 38.3mg. Minor complications were documented in 8% of BPB, most commonly inadvertent vascular puncture, with no known major complications. The mean starvation time was 12-hours for food and 8-hours for fluid. 99% of the patients avoided general anaesthesia and patient satisfaction with BPB RA was very high (94%).

Conclusions: The majority of BPBs were axillary blocks and performed by trainees. Our study showed that patients were starved for longer than recommended. We conclude that QVH offers high quality RA services, ample opportunities for trainees to advance their competency in regional anaesthesia and a high patient satisfaction rate.

ESRA1-0194 Peripheral Nerve Blocks

THE EFFECT OF OPERATOR GRADE ON OUTCOMES OF BRACHIAL PLEXUS BLOCKS IN HAND TRAUMA PATIENTS

AL-SHATHER H.1, El-Boghdady K.1, Reed I.1, Adams L.1, Curran J.1, Krone S.1 1Anaesthesia, Queen Victoria Hospital, East Grinstead, United Kingdom.

Background and aims: The provision of adequate training is essential in the delivery of regional anaesthesia (RA) service. We aimed to assess whether the operator grade had a significant effect on the quality of the brachial plexus block (BPB).

Methods: Following informed consent and hospital approval, we collected data on 100 patients undergoing hand surgery under BPB. We assessed grade of block operator, local anaesthetic (LA) volume, block difficulty, block supplementation and block onset time. A 24-hour telephone follow-up focused on patient satisfaction was conducted.

Results: Out of 100 BPB, 85% were axillary, 9% were infracavicular and 6% were supravacular. Nerve location was ultrasound guided in all but the infracavicular blocks, where a peripheral nerve stimulator was used. Consultants were more likely to perform difficult BPBs. Only one patient required conversion to general anaesthesia. Patient satisfaction with RA was very high (94%).

Key results are shown in Table1.

<table>
<thead>
<tr>
<th>TABLE 1. Operator grade and outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>BPB Number (100)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Volume of LA (mL)</td>
</tr>
<tr>
<td>Requiring supplementation (%)</td>
</tr>
<tr>
<td>Intraoperative Pain (%)</td>
</tr>
<tr>
<td>Block-onset (hh:mm)</td>
</tr>
<tr>
<td>Block-duration (hh:mm)</td>
</tr>
<tr>
<td>Severe Pain Following Block Resolution (%)</td>
</tr>
</tbody>
</table>

Conclusions: Trainees performed the majority of BPBs. Although they used higher volumes of LA and supplemented more frequently, their blocks appear to be of excellent quality (quick onset, long duration and less likely to have intraoperative pain). We concluded that well-trained registrars can be an essential cog in delivering high-quality BPB for day-case surgery.

ESRA1-0200 Case Reports

VERY LOW DOSE INTERSCALENE BRACHIAL PLEXUS BLOCK FOR MANIPULATION OF SHOULDER DISLOCATION IN THE EMERGENCY DEPARTMENT

Hamilton D.L.1,2 Anaesthesia & Intensive Care Medicine, County Durham & Darlington NHS Foundation Trust, Darlington, United Kingdom.

Background and aims: Acute shoulder dislocation is commonly encountered in the Emergency Department (ED). Previous authors have reported the use of interscalene block (ISB) for manipulation of dislocated shoulder in the ED, but with large volumes of local anaesthetic. Described here for the first time is the use of very low dose ultrasound guided ISB for reduction of acute shoulder dislocation in the ED.

Methods: Following informed consent and physical examination an ultrasound guided ISB was carried out using an in-plane approach. 3ml of 1% Prilocaine was injected within the brachial plexus sheath producing rapid onset good
quality analgesia and muscle relaxation. In each case the dislocation was reduced by manipulation without pain.

Pain scores were recorded prior to ISB, prior to and during manipulation, and during the postoperative period.

The patients were discharged home with verbal and written instructions and an Orthopaedic clinic appointment. They were followed up by telephone within 24-72 hours.

**Results:**

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Dislocation Type</th>
<th>Before ISB</th>
<th>During Manipulation</th>
<th>After Manipulation</th>
<th>Peak Pain</th>
<th>Duration of block (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>M</td>
<td>Primary Anterior</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>60</td>
<td>F</td>
<td>Primary Anterior</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>F</td>
<td>Recurrent Posterior</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>≤ 10*</td>
</tr>
<tr>
<td>16</td>
<td>F</td>
<td>Recurrent Posterior</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>≤ 8.5*</td>
</tr>
</tbody>
</table>

*Bold Italics* = Pain Scores

1 Highest pain score reported during the first 24 hours post manipulation

* In these cases the block wore off during sleep

**Conclusions:** Low dose ISB is a safe effective method for facilitation of reduction of acute dislocation of the glenohumeral joint in the ED.

ESRA1-0202
Pediatric

**AUDIT ON CONSENT FOR CAUDAL EPIDURAL BLOCK**

Jayanthan S.1, Kajekar P.1, Misra V.1, Fee P.1 1Department of Anaesthesia, Birmingham Children’s Hospital, Birmingham, United Kingdom.

**Background and aims:** How informed is our consent for caudal epidural? General Medical Council’s good medical practice states “An informed consent can be said to have given based upon a clear appreciation and understanding of the facts, implications and future consequences of an action.”

**Methods:**

Phase 1: To assess how much parents understood of the caudal epidural procedure and its complications following a routine preoperative visit.

Phase 2: To assess how much parents understood the procedure following a routine preoperative visit and a caudal information leaflet. Data collected 3–4 hours after the initial information.

**Results:** Results as follows

**Patient Information Regarding Caudal Epidural Local Anaesthetic Block**

1. Did your anaesthetist discuss with you the caudal epidural block?
   - Yes [ ]
   - No [ ]
   - Cannot remember [ ]

2. Do you remember what they told you about why they wanted to give the block?
   - Yes [ ]
   - No [ ]
   - Cannot remember [ ]

3. What possible side effects/complications did they mention to you?
   - Yes [ ]
   - No [ ]
   - Cannot remember [ ]

4. Would you have found written information to read beforehand helpful?
   - Yes [ ]
   - No [ ]
   - Cannot remember [ ]

5. If yes, when would you have liked the written information
   - a. Sent to you at home [ ]
   - b. Given in the surgical out patient clinic [ ]
   - c. On the ward, on the day of the procedure [ ]
   - d. Any of the above [ ]

**Results-Phase 1**

- Would you have liked written information
  - Yes [ ]
  - No [ ]
  - Cannot remember [ ]

- Where would you have liked it to be sent
  - sent at home [ ]
  - Out patient clinic [ ]
  - On the ward day of procedure [ ]
  - any of the above [ ]

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Background and aims: Peripheral nerve blocks provide superior analgesia, enhance patient rehabilitation and comfort. However, they are associated with potentially serious complications. Anaesthetists have a responsibility to discuss regional block techniques and engage in a shared decision-making process with patients during the process of informed consent. At Freeman Hospital, we do not have a formal system for following up regional blocks performed to assess preoperative consent, post procedure complications and satisfaction. We at Freeman Hospital do not have any documentation of the risk of nerve damage being discussed. 86% of patients were very satisfied, 12% satisfied and 2% neutral. 98% of patients had been documented.

Methods: We conducted a prospective audit over a six-week period. Data was collected perioperatively to analyse the process of informed consent. Patients were questioned about choice, explanation of risks and benefits and satisfaction levels. Anaesthetic charts were reviewed to assess if the risk of nerve damage had been documented.

Results: 42 blocks performed were recorded. 36% patients were not given a choice. 24% patients were not explained risks and benefits. 45% patients did not have any documentation of the risk of nerve damage being discussed. 86% of patients were very satisfied, 12% satisfied and 2% neutral. 98% patients would have a repeat block in future. 95% patients would recommend the block to others. 71% patients said they wanted an information leaflet detailing a regional block technique.

Conclusions: We suggest an improvement in the process of informed consent taken from patients being considered for a regional block technique. Other measures recommended were robust documentation and providing an information leaflet to patients.

ESRA1-0205
Peripheral Nerve Blocks

INFORMED CONSENT AND PERIPHERAL NERVE BLOCKS
Chhabra G.1, Timms G.1 2 Anaesthetics, Freeman Hospital Newcastle Hospitals NHS Foundation Trust, Newcastle, United Kingdom.

Background and aims: Peripheral nerve blocks provide superior analgesia, enhance patient rehabilitation and comfort. However, they are associated with potentially serious complications. Anaesthetists have a responsibility to discuss regional block techniques and engage in a shared decision-making process with patients during the process of informed consent. At Freeman Hospital, we do not have a formal system for following up regional blocks performed to assess preoperative consent, post procedure complications and satisfaction. An introduction of such a system would lead to an improvement in the process of consent, decrease the incidence of potentially severe complications and the likelihood of any complaints.

Methods: We conducted a prospective audit over a six week period. Data was collected perioperatively to analyse the process of informed consent. Patients were questioned about choice, explanation of risks and benefits and satisfaction levels. Anaesthetic charts were reviewed to assess if the risk of nerve damage had been documented.

Results: 42 blocks performed were recorded. 36% patients were not given a choice. 24% patients were not explained risks and benefits. 45% patients did not have any documentation of the risk of nerve damage being discussed. 86% of patients were very satisfied, 12% satisfied and 2% neutral. 98% patients would have a repeat block in future. 95% patients would recommend the block to others. 71% patients said they wanted an information leaflet detailing a regional block technique.

Conclusions: We suggest an improvement in the process of informed consent taken from patients being considered for a regional block technique. Other measures recommended were robust documentation and providing an information leaflet to patients.

ESRA1-0209
Case Reports

SURGICAL APPROACH FOR EPIDURAL ANALGESIA IN A PREGNANT WOMAN WITH A LUMBAR TATTOO
Duque M.1, Duarte J.1, Ribeiro S.1, Guedes L.1, Barros A.1, Cordeiro L.1, Assunção J.P.1 2 Anaesthesiology, Centro Hospitalar Tondela Viseu, Viseu, Portugal.

Background and aims: Over the last years we have assisted to a growing number of pregnant women soliciting labor analgesia, bearing a tattoo over the midline region of the lower back. Safety of epidural puncture and catheter placement in these women has been questioned. Not enough evidence exists to exclude the risk of epidermoid tumor or aracnoiditis due to coring of ink pigments. Our research of PubMed.gov did not result in any papers reporting the description of epidural catheter placement after surgical incision of the skin. We describe this approach for labor pain analgesia.

Methods: A 26-year-old ASA-I pregnant woman, 39-weeks of gestation, with a lumbar tattoo extending over L1-L5, presented to us for labor analgesia. We proposed surgical incision. A 2.5cm vertical incision of the skin in L3-L4 interspace was made until the musculo-ligamentous plane. An epidural needle was inserted into this ligamentous-plane and the epidural space found using a loss of resistance to air method.

Results: Epidural catheter was placed without complications and the skin sutured (Fig.1 and 2). Labor analgesia underwent uneventfully and the catheter
Pain was significantly reduced for 2 days and the patient was scheduled for pulsed radiofrequency therapy (PRFT). PRFT was performed at 42 °C for 120 seconds which was repeated 3 times (Fig. 1). The patient has not complained of any occipital radiculopathy for 6 months and posterior neck pain has been reduced to VAS 3.

Conclusions: PRFT at C2 DRGB and C-MBB can be an alternative method to treat posterior neck pain/occipital headache due to AAS in RA patients.

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Case Reports

EFFECT OF PULSED RADIOFREQUENCY THERAPY FOR SECOND CERVICAL RADICULAR PAIN

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Background and aims: Rheumatoid arthritis (RA) patients may have posterior neck pain/occipital headache due to cervical facet joint arthritis and anterior atlantoaxial subluxation (AAS). We report that posterior neck pain/occipital headache in RA patient was successfully treated with pulsed radiofrequency at C2 dorsal root ganglion and cervical median branch blocks (C-MBB).

Methods: A 74-year-old female patient with RA visited our clinic due to right posterior neck pain/occipital headache which started 3 years ago. The patient complained of severe radiating occipital pain which increased during cervical movement. Jackson compression test showed positive results and there was tenderness in the right facet joint region. Radiologic examination revealed focal sagittal segmental instability in the atlantoaxial joint (Fig. 1). Initial treatment with third occipital nerve block and C-MBB reduced posterior neck pain but did not affect the radiating occipital pain. Additional greater occipital nerve, cervical epidural block were effective for only a short period. We next suspected second cervical (C2) radiculopathy due to AAS and performed a C2 dorsal root ganglion block (DRGB).

Results: Pain was significantly reduced for 2 days and the patient was scheduled for pulsed radiofrequency therapy (PRFT). PRFT was performed at 42 °C for 120 seconds which was repeated 3 times (Fig. 1). The patient has not complained of any occipital radiculopathy for 6 months and posterior neck pain has been reduced to VAS 3.

Conclusions: PRFT at C2 DRGB and C-MBB can be an alternative method to treat posterior neck pain/occipital headache due to AAS in RA patients.

ESRA-0212

Obstetric

THE INFLUENCE OF THE PROLONGED LATERAL POSITION ON BLOOD PRESSURE DECREASE AND SENSORY BLOCKADE LEVEL OF SPINAL ANESTHESIA FOR CESAREAN DELIVERY

Lee Y.J.1, Kim E.Y.1, Choi E.S.1, Oh A.Y.1, Hwang J.W.1 1Department of Anesthesiology and Pain Medicine, Seoul National University Bundang Hospital, Seongnam, Korea.

Background and aims: Maternal hypotension occurs commonly during cesarean delivery under spinal anesthesia. We evaluated whether hypotension due to aortocaval compression would be prevented by maintaining lateral position after intrathecal injection.

Methods: After approval of the Institutional Review Board, 86 women undergoing elective cesarean delivery were enrolled. Spinal anesthesia was conducted in the right lateral position using hyperbaric bupivacaine 8mg and fentanyl 15μg. They were randomly assigned to maintain right lateral position for 6min (lateral group) or to assume the wedged supine position immediately after injection (supine group). Hypotension was defined as a decrease in mean arterial pressure to below 80% of baseline value, and ephedrine was given if blood pressure decreased to <70% of baseline values. The incidence of hypotension and nausea, the ephedrine requirement, and maximal block height were evaluated.

Results: There were no significant between-group differences in the incidence of hypotension(49% vs. 47%), the lowest blood pressure, or ephedrine requirement. The onset of hypotension was delayed (6±2 vs. 10±3 min, P<0.001) and the maximal block height was more cephalad in lateral group (T2[C8-T5] vs. T4[T1-T6], P=0.001). Apgar scores did not differ between groups.

Conclusions: During spinal anesthesia for cesarean delivery, maintaining the lateral position for 6min after intrathecal injection of hyperbaric bupivacaine, resulted in a more gradual and higher cephalad sensory block, without an increase in the incidence or severity of maternal hypotension.

ESRA-0217

Peripheral Nerve Blocks

THE EFFECT OF BRACHIAL PLEXUS BLOCK APPROACH ON BLOCK QUALITY IN HAND TRAUMA PATIENTS

El-Boghdaledy K.1, Al-shater H.2, Reed I.1, Adams L.1, Krone S.1 1Anesthetics, Queen Victoria Hospital, London, United Kingdom.

Background and aims: Brachial Plexus Block (BPB) can be performed with a variety of techniques for hand surgery. We aimed to assess whether the BPB approach used for hand trauma patients had an effect on quality outcomes.

Methods: Following institutional approval and informed consent we aimed to collect data on 100 patients undergoing hand surgery under BPB. Operators filled forms detailing block timings and technique, with intraoperative tourniquet and surgical site pain assessed every 15 minutes. Patients were called 24-hours later to obtain further block information.

Results: Data from 85 ultrasound-guided axillary, 6 ultrasound-guided supraclavicular and 9 nerve stimulator-guided infraclavicular BPBs was collected. Key results are below.

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Our results are comparable to published data. Although the volume of local anesthetics used was 0.2% Ropivacaine in the amount from 18 ml to 50 ml at the rate of 0.2 mg/kg with the addition of 0.5 ml brilliant green dye solution per 10 ml of the local anesthetic.

Results: In all cases of the correct execution of this procedure femoral nerve was stained up to the level where it merged from 3-4 branches of the lumbar plexus. When catheter was placed under m. iliopsoas femoral nerve was partially stained to the level of the inguinal ligament. Lateral Femoral Cutaneous nerve was stained in 8 cases. Obtrurator nerve was stained in 7 cases. We have conducted 46 continuous fascia iliaca block under ultrasound for postoperative analgesia in children aged 4 to 18 without complication.

Conclusions: Experimental data showed a good distribution of the local anesthetic bolus into a catheter inserted laterally under the fascia iliaca under the ultrasound.

ESRA1-0223
Miscellaneous

COMPARISON OF THE USE OF KIND REMOVAL SILICON TAPE VERSUS MICROPORPAPER TAPE ON PATIENTS’ EYELIDS UNDER GENERAL ANAESTHESIA - IS ONE SUPERIOR TO ANOTHER?

Wong L.1, Chow S.Y. 1, Gadiali N.1, Chong S.Y. 1, Tham C.S.1 1Department of Anaesthesiology, Singapore General Hospital, Singapore, Singapore.

Methods: In this IRB approved, double-blinded, randomised controlled trial, we recruited 61 subjects undergoing elective surgery under GA over 3 months. Subjects received silicon tape on one eye and paper tape on another, chosen at random. After tape removal, the patients’ eyelids were assessed by an independent assessor in the post anaesthesia care unit for erythema or denudation. Results: Mild erythema developed in 3 patients with tape and 2 patients with silicon tape, one patient had erythema with both tapes (p=1.00). Mild denudation occurred in one patient with paper tape and none with silicon tape (p=1.00). None of these patients had risk factors for skin injury. Although greater numbers of patients had skin injury with paper tape, it did not reach statistical significance.

Conclusions: There is no statistically significant difference in skin injury of patients’ eyelids with the use of silicon tape versus paper tape while under GA.
Results: At the end of the surgery, 62% of patients (19/29) had significant prolonged QT interval (P<0.011). The ΔQTc was 24±44 ms (mean and SD). ΔQTc > 50 ms was 34% (10/29). The preoperative QTc was 402±43 ms and postoperative QTc was 426±50 ms. 7% of patients (2/29) had postoperative QTc > 500 ms. One patient developed torsades de pointes (QTc preop 377 ms and QTc post 480 ms).

Conclusions: Postoperative QT interval prolongation is frequent. One patient developed torsades de pointes (3.4%). We cannot conclude that methadone is the cause of prolonged QTc because more drugs were involved in the perioperative period.

ESRA1-0232
Obstetric

POOR CORRELATION BETWEEN VISUAL ANALOGUE SCORE (VAS), SUBJECTIVE PAIN RELIEF AND PATIENT SATISFACTION AFTER LOWER SEGMENT CAESAREAN SECTION (LSCS) YET STILL ACHIEVING NEW AUDIT STANDARD

Pachucki M.1, Grier S.1, Herbert L.1, Knight T.1, Moxham S.1, Ricci P.2, Wharton N.1
1Anaesthesia, Bristol Royal Infirmary, Bristol, United Kingdom, 2School of Medicine, University of Bristol, Bristol, United Kingdom.

Background and aims: In 2009 our department failed the standard of post LSCS pain relief defined at that time as pain scores on the visual analogue scale (VAS) of less than 3 for >90% women. In 2012 new standard has been established by the RCOA recommending >95% women to be satisfied with analgesia on day 1 post LSCS with no mention of pain scores.

Methods: We undertook a prospective audit of post LSCS pain relief and patient satisfaction in our institution. Our project was registered with the Audit Department with the data collection and patient follow-up over 2 days post op (July 2013). We reviewed the anaesthetic record, drug chart and questioned 86 consecutive mothers re: pain, side effects and satisfaction using a standardized data collection proforma.

Results: We reached the recommended ‘satisfaction’ target on both days (>95% respondents satisfied or more than satisfied) despite the fact that the percentage of women who described their pain as mild was only 58% and 56% on day 1 and 2 post op respectively (similar to previous audit findings). Alarmingly, it transpired that a large number of women suffered from pruritus on day 1 (50.6%) but did not receive any treatment despite appropriate prescription.

Conclusions: Audit recommendations have changed since 2006 with emphasis on ‘satisfaction with analgesia’ rather than pain score on VAS. Satisfaction with analgesia and assessment of pain with VAS score do not seem to go hand in hand (in our sample 33% patients with mild pain gave a score above 3 on VAS).

ESRA1-0235
Peripheral Nerve Blocks

PATTERN OF PREOPERATIVE ANALGESIA FOR FRACTURED NECK OF FEMUR FRACTURE IN THE EMERGENCY DEPARTMENT & WARDS: A REGIONAL SURVEY

Patel N.1, Emamdeee R.1, Mehrotra S.1 1Anaesthetics, Broomfield Hospital Chelmsford, Chelmsford, United Kingdom.

Background and aims: The UK incidence of fractured neck-of- femur (NOFs) is approximately 75000 annually(1). The establishment of fascia iliaca blocks (FIB) has increased the NOF analgesic repertoire. FIB as a primary mode of analgesia is currently unknown in our region.

Methods: An internet-based anonymous survey was sent to anaesthetists and emergency department doctors and senior nurses in 12 hospitals in the North East Deanery, UK. Questions included current analgesic regimens (including fascia iliaca blocks) used for NOFs, the first department where FIB was done and the training schema in place for fascia iliaca blocks.

Results: An internet-based anonymous survey was sent to anaesthetists and emergency department doctors and senior nurses in 12 hospitals in the North East Deanery, UK. Questions included current analgesic regimens (including fascia iliaca blocks) used for NOFs, the first department where FIB was done and the training schema in place for fascia iliaca blocks.
ESRA1-0237
Case Reports

ANESTHETIC MANAGEMENT OF PATIENT WITH GAMMA SARC GlyC)ANOPATHY FOR ELECTIVE CAESAREAN SECTION – CASE REPORT

1Anesthesiology and pain therapy, CHTMAD, Vila Real, Portugal, 2 Anesthesiology and pain therapy, chimal, Vila Real, Portugal.
Background and aims: Gamma sarcoglycanopathy, also called Limb Girdle Muscular Dystrophy (LGMD), is an autosomal recessive genetic disorder, characterized by proximal muscle weakness mainly in the pelvic and shoulder girdle. It comprehends a very heterogeneous group with great clinical variability due to the altered production of Gamma-Sarcoglicana protein, important in the muscle cell membrane integrity, caused by a change in chromosome 13q13.

We aimed to report the anesthetic management adopted for a parturient with this syndrome.

Methods: A 24-year-old, 76 kg, very anxious gypsy woman, with genetic diagnosis of LGMD, showing predominantly proximal tetraparesis, without cardiorespiratory compromise, was scheduled for elective caesarean section. After evaluation by anesthesiology, neurology and obstetric teams, patient submitted to epidural analgesia for labour. Catheter placed in L3-L4, and analgesia was provided with paracetamol, diclofenac and a bilateral transversus abdominis plane block with Levobupivacaine.

The birth took place without complications and newborn Apgar score was 10/10.

Two days postoperatively the neurology team found no worsening of the patient’s neurological deficits.

Conclusions: LGMD’s patients have increased risk of aspiration, susceptibility to malignant hyperthermia, important interaction with drugs often used in general anesthesia (Succinylcholine, volatile anesthetics and non-depolarizing muscle relaxants) and very common perioperative respiratory complications. Therefore, anesthetic approach should be very careful.

In this case, we chose spinal anesthesia, by the maternal-fetal benefits, and because it allowed overcoming some of the anesthetic handicap inherent to this condition.

ESRA1-0239
Case Reports

ACCIDENTAL SUBDURAL BLOCK – A RARE COMPLICATION FROM EPIDURAL ANALGESIA/ANESTHESIA IN OBSTETRIC PATIENT

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Background and aims: Epidural analgesia may present complications like accidental subdural block. It’s suspect arise from uncommon clinical signs, that aren’t explained by subarachnoid or intravascular administration.

We present a case of coma, respiratory depression and anisocoria after epidural analgesia/anaesthesia which diagnosis is based on clinical signs.

Methods: A 29 years, 85Kg, 165cm, nulliparous, 41th gestation week, ASA I, de Braga, Cabeceiras de Basto, Portugal.

FIGURE 1.

A 24-year-old, 76 kg, very anxious gypsy woman, with genetic NRS and NRSi, compliance with analgesic treatment, rescue therapy

Ropivacaine (7,5mg/ml) 60mg by epidural catheter with expected motor and sensitive block. In the first 30min patient maintained drowsiness, hemodynamically stable with a sensitive block at T1-T2. 30min after injection became non responsive with respiratory depression and anisocoria.

Results: Patient was intubated and mechanically ventilated. CT scan showed no cerebral lesions. 20min after, initiated gradual recovery of consciousness, being extubated without complications and neurological exam showed only lower limbs motor block. Transferred to the Post-Anesthesia Care Unit were 12h later was discharged for her room and 4 days later was discharged home with any complaints.

Conclusions: Accidental subdural block is a rare complication from epidural analgesia/anaesthesia which diagnosis is based on clinical signs.

The negative catheter aspiration associated with an extensive sensitive block, unconsciousness, respiratory depression, anisocoria and little sympathetic block plus a negative CT scan and a complete recovery without sequelae arise the suspicion of subdural block.

ESRA1-0240
Peripheral Nerve Blocks

10. LEVOBUPIVACAINE 0.125% 2 ML/H THROUGH AN ELASTOMERIC PUMP ENOUGH FOR POSTOPERATIVE HAND PHYSICAL THERAPY IN OUTPATIENT RECONSTRUCTIVE HAND SURGERY?

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Background and aims: Ultrasound-guided (USG), single-injection distal block in forearm are mainly used to control pain during hand surgery1. We investigated the efficiency of pain management via continuous local anaesthetic infusion through ulnar nerve catheter in the forearm in ambulatory reconstructive distal hand surgery.

Methods: In two patients who underwent reconstructive hand surgery, we placed an USG ulnar nerve catheter (FIG 1). An infusion of 0,125% levobupivacaine was continued at home using an elastomeric pump set at 2ml/h. We checked by phone the pain rate and the consumption of pain killers during their daily hand rehabilitation.

Results: NRS and NRSi, compliance with analgesic treatment, rescue therapy and patient satisfaction were evaluated and both our patients confirmed satisfying pain control and an appropriate rehabilitation program keeping finger motility. We registered no problems regarding the management of the pump and the catheter at home.

References:
1. www.nice.org.uk/nicemedia/pdf/infocusfinal
2. Successfully Locally Organised Regional Anaesthesia Workshops are achievable on a limited budget, 4th NWAC 2013/abstract

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E235
Conclusions: USG continuous peripheral local anaesthetic infusion were effective in our patients. This approach has been designed to provide adequate analgesia minimizing exposure to adverse events. In outpatient reconstructive surgery the use of this locoregional techniques allow an efficient adherence to postoperative rehabilitation management.

References:

ESRA-0241
Case Reports

EPIDURAL BLOOD PATCH IN THE TREATMENT OF SEVERE HEADACHE BY INTRACRANIAL HIPOTENSION IN A PATIENT WITH MARFAN’S SYNDROME

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Background and aims: Spontaneous intracranial hypotension (SIH) is a postural headache syndrome, not related to dural puncture, surgery or trauma, normally accompanied by nausea, vomiting, dizziness, vertigo, tinnitus, and ocular manifestations, that can be acute or subacute in onset.

Methods: Femur, 34y, ASA II with Marfan’s Syndrome with two weeks complaints of severe cervical and occipital postural pain, with nausea, vomiting and right tinnitus. MRI showed bilateral subdural hematoma in head and cervical region, global reuction in the cerebral and cerebellum sulcus convexity, bilateral transtentorial herniation and low position of cerebellum amygdalae, however, there’s no clear fistula identifiable. Admitted for conservative treatment. At day 37 of admission it was decided to perform an epidural blood patch (EBP).

Results: EBP made at L2-L3 level with injection of 25ml of autologous blood and complaints of lumbar tension on 24h, with bed rest for 2h. At 24h after the technique, maintained some headache and nausea. At day 3, patient has no postural headache and was discharged home. 3months after discharge in follow-up, patient refers a light headache at the end of the working day and occasional tinnitus.

Conclusions: The etiology of SIH remains unclear. Some patients present structural spinal dural abnormalities and some connective tissue disorders have been associated with meningeal abnormalities including Marfan’s syndrome. For the leaks along the spinal column, and those of undetermined origin, EBP has been used with a relatively high degree of success. The exact volume of blood is unknown and sometimes more than one EBP may be necessary.

ESRA-0243
Postoperative Pain Management

UNILATERAL EPIDURAL ANALGESIA AFTER TOTAL KNEE ARTHROPLASTY

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Background and aims: Unilateral sensory or motor block contralateral to the operated side may develop during prolonged epidural block as an undesirable side effect of postoperative analgesia. Rotation of a needle in the epidural space and lateral orientation of an epidural catheter can contribute to selective distribution of a local anesthetic with development of unilateral epidural block. The efficiency of unilateral (UEA) and conventional epidural analgesia (CEA) after total knee arthroplasty is compared.

Methods: A randomized, prospective study included 40 patients aged 46 to 79 years, divided into two groups. Ropivacaine (0.25%) was infused in the epidural space at 4-10 mL/h. The efficiency of postoperative analgesia was assessed with VAS, stress response of the cardiovascular system (ABP, HR, and MSI), as well as cortisol and glucose levels. Motor block in both lower extremities was evaluated by Bromage scale.

Results: In UEA group, the pain level at rest was ≤ 30 mm according to VAS, and in CEA group, pain level at rest was > 30 mm in 3 and 4 patients at 24 and 48 hours, respectively. The higher incidence of motor block of the contralateral extremity was observed in CEA group compared to UEA group. Hemodynamic values, as well as glucose and cortisol levels did not differ significantly between the two groups.

Conclusions: Intentional lateral orientation of an epidural catheter toward the operated side ensured preferential distribution of the sensory and motor block on the operative side with greater analgesic effect at rest and lower consumption of a local anesthetic.

ESRA-0246
Central Nerve Blocks

COMPLICATIONS AND FAILURE WITH ULTRASOUND CAUDAL BLOCK IN NEONATES AND INFANTS: A SURVEY ANALYSIS

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Background and aims: The incidence of local anesthetic toxicity, nerve injury or failure during caudal block may be possible also if performed by ultrasound. The objectives of this survey were to estimate the incidence of the above complications in neonates and infants despite the use of ultrasound.

Methods: Data were collected through a web-based case report form. The primary objective was the complications observed during ultrasound caudal block and the secondary was the block failure in neonates and infants (0-6 months).

Results: We estimated a frequency along with 95% confidence interval and use the software Proc SurveyFreq 9.22, (SAS Institute, Cary, NC, USA) to compute degrees of freedom, the t-percentile for confidence limits for proportions and F statistic.

Results: 453 ultrasound caudal block were recorded. About primary objective two complications related to local anesthetic systemic toxicity were recorded and treated with intralipid rescue protocol; the estimated frequency was 1.22 per 10,000 (95% CI 0.00 - 2.34). One case of perforation of the rectal ampulla in a 2 months old infant scheduled for inguinal hernia repair was described. The estimated frequency was 0.11 per 10,000 (95% CI 0.00 - 1.15). For the secondary objective, 13 patients enrolled (2.9%, 95% CI 1.2% - 3.1%) reported the failure of the block despite being used ultrasound technique.

Conclusions: Local anesthetic systemic toxicity and block failure is rare. The risk of local anesthetic systemic toxicity decrease when compared with ultrasound technique, anyway this complication cannot be excluded as demonstrated in our survey, particularly in neonates, infants and preterm infants.

ESRA-0248
Postoperative Pain Management

EFFICACY OF COMBINED ULTRASOUND SHEATH AND TAP BLOCK FOR ABDOMINAL POSTOPERATIVE WALL PAIN CONTROL IN VIDEOLAPAROSCOPIC SURGERY

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Background and aims: Videolaparoscopic surgery is performed for many procedures, anyway this technique causes abdominal wall pain particularly at the site where trocarts are inserted. Objective of our study is to analyze the efficacy of combined ultrasound-guided rectus sheath and transversus abdominis plane (TAP) blocks in postoperative pain.

Methods: After ethics committee approval 48 patients 18-71 years old underwent abdominal laparoscopic surgery were enrolled and divided into two groups: Ultrasound Group-Control Group (each with 24 patients). General anesthesia was induced in both groups with propofol, remifentanil, cisatracurium, mixture of air/O2/desflurane. In Ultrasound Group a bilateral ultrasound TAP block was performed with 20 ml levobupivacaine 0.25% followed by a bilateral ultrasound rectus sheath block with 10 ml levobupivacaine 0.25% for each side. In Control Group only a unilateral ultrasound rectus sheath block with 10 ml levobupivacaine 0.25% was performed.
Group postoperative pain control was assured by administration of ketorolac. The postoperative pain was assessed using VAS score at 0, 3, 6, 12 and 24h. Statistics was conducted by a Chi-square test and the analysis of variance. A level of p<0.05 was considered to be significant.

**Results:** Abdominal wall pain at the sites of the trocart insertion was significantly lower in Ultrasound Group versus Control Group (p=0.01), postoperative VAS score in Ultrasound Group was lower compared with Control Group particularly at 0 (p=0.02), 3 (p=0.02) and 6 (p=0.03) hours after surgery. Rescue analgesic consumption was higher in the “Control Group” at 12 and 24 hours.

**Conclusions:** Ultrasound TAP and rectus sheath blocks, when used simultaneously, significantly reduce post-operative abdominal wall pain from insertion of the trocarts in videolaparoscopic surgery.

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**ESRA1-0249**

**Case Reports**

**ANESTHESIA MANAGEMENT FOR CESAREAN SECTION IN A PREGNANT PATIENT WITH AN ANTERIOR MEDIASTINAL MASS. A CASE REPORT.**

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**Background and aims:** Patients with mediastinal masses are at risk for pulmonary complications. Circulatory collapse may also occur because of a decrease in venous return. These effects might be accentuated when the physiologic changes of pregnancy are present. We report a case of a gestation woman with a mediastinal mass who was presented for Cesarean delivery.

**Methods:** We report a case of a 38-years-old women gravida 1 para 0, at 36 weeks gestation who developed shortness of breath and cough, and symptoms of superior vena cava obstruction. A computed tomography scan demonstrated a large mass sized 10 x 10 cm filling the right hemothorax, attached to the diaphragm and the visceral pleura, causing cava vein displacement and right auricular compression.

**Results:** A continuous lumbar epidural block was performed. The patient was placed in the sitting position. Two incremental doses of 5ml of ropivacaine 0.5%, 4ml of lidocaine 2% and 50mcg of fentanyl were administered via the catheter in a 10minutes period. A level of T5-T6 was obtained bilaterally. 0,5%, 4ml of lidocaine 2% and 50mcg of fentanyl were administered via the catheter in a 10minutes period. A level of T5-T6 was obtained bilaterally. Surgery proceeded uneventfully. The patient was discharged to the medical oncology service for evaluation and treatment. The diagnosis was a lymphoma no Hodgkin B.

**Conclusions:** Regional anesthesia is the anesthetic of choice. Continuous intrathecal epidural analgesia allows spontaneous breathing and less risk of airway collapse and achieves progressive blockade and less hemodynamic instability.

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**ESRA1-0250**

**Pediatric**

**CONTINUOUS CAUDAL BLOCK IN NEWBORNS**

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**Background and aims:** Caudal block remains the most popular block performed in paediatric patients but evidence that they improve outcome is lacking. Unlike single shot, continuous caudal block (CCB) provides adequate duration of analgesia, depending on the tip of the catheter.

**Methods:** Study conducted in 13 newborns between 1 day - 14 months, ASA grade I - Ill, undergoing routine or emergency (R=E=7:6) abdominal surgery (Low abdominal:High abdominal (11:2). Pre-anaesthetic check-up and written consent obtained. GA or sedation instituted (GA:S=12:1) and with full aseptic precautions, caudal block performed: 7 (Abocath 24) and 6 (Tuohy 20G/35 mm). Epidural catheter threaded through (ultrasound guided in 3/13) and fixed properly (6/13 tunelized). The length of the catheter inside decided according surgery level. Ropivacaine 0.2% (0,5-1 mL/kg) or bupivacaine 0,25% (0,8 mL/kg) administered. The onset of block and quality of analgesia assessed. Catheter kept for 24-48 hrs.

**Results:** Table I shows relevant data. In 12, GA supplemented due to nature of surgery and positional problems. 3 required supplementary intraoperative analgesia. No neurologic complications but 1 intravascular catheter. NIPS scale used to evaluate pain in next 48 hours. None needed ventilator support.

**FIGURE 1.**

**ESRA1-0252**

**Case Reports**

**CONTINUOUS CAUDAL BLOCK IN INFANT WITH MULTIPLE CONGENITAL ANOMALIES**

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**Background and aims:** Epidural caudal block in children is challenging and may avoid risks associated with general anaesthesia and obviate the need for postoperative mechanical ventilation. We present our experience with continuous caudal anaesthesia using 0.25% bupivacaine in a 11 kg infant during colostomy closure.

**Methods:** A 18 months-years-old infant scheduled for colostomy closure. Past medical history included trisomy 21, interauricular communication, severe laryngomalacia, inter-auricular communication, bilateral cataracts, anorectal malformation with colostomy done months ago. History of reverted cardiopulmonary arrest in the OR, at 15 months-years-old, after extubation because of airway obstruction followed by severe hypoxia. On the day of surgery, weighed 11.01 kg. With ASA monitoring, sedation with sevoflurane and oxygen and nasopharyngeal tube N.16 placed, child was placed in lateral position and with axicpic technique the needle (Tuohy G20) advanced through the sacrococcgeal membrane and catheter threaded through the needle to a distance of 11 cm (T7 level), ultrasound guided. With direct visualization, 10 mL of 2,5% bupivacaine administered. Catheter tunelized to cranialateral position. Surgical procedure lasted 65 mins with a calm child. Continuous infusion of ropivacaine...
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0.05% 2ml/hr intufulated 15 minutes before surgery end and after a bolus of Ropivacaine 0.05% (0.4mg/kg).

Conclusions: Caudal catheters have been used successfully in awake babies (27 patients).

The survey asked about: number of epidural labor analgesia during

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(respectively mean time 1

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Patient satisfaction with regional anaesthesia was very high,

and 64.2 ± 12.3 mg, (p=0.002) in the

Regional Anesthesia and Pain Medicine

3

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Methods:

Background and aims: In our tertiary referral centre elective and emergency hand surgery is commonly performed under brachial plexus block (BPB). The aim of the survey was to evaluate patient satisfaction with our practice.

Methods: Following institutional approval and informed consent we aimed to collect data on 100 patients undergoing hand surgery under BPB between 28/10/2013 and 17/12/2013. Patients were followed up by phone in the 24-48 hour period following surgery and asked to rate their anxiety pre and post procedure, satisfaction, block and intraprocedural pain and post operative analgesia.

Results:

· Satisfaction data was collected on 98 patients out of 100.

· 92 patients rated satisfaction as excellent or good, 5 as satisfactory and 1 poor.

· 93 patients would have another block, 3 would not, 2 were undecided.

· 14 patients would have preferred GA, 80 would not, 4 were undecided.

· Patients had a range of anxiety levels pre procedure. 69 patients would have reduced anxiety for a repeat procedure.

· 36 patients experienced pain during block insertion, 62 did not.

· 29 patients experienced intraoperative pain, 69 did not.

· 86 patients felt post-operative analgesia was sufficient.

Conclusions: Patient satisfaction with regional anaesthesia was very high, most patients would have another block and would not have preferred general anaesthesia. Most patients would have reduced anxiety for a repeat procedure compared with the first procedure. It may be possible to further reduce pre operative anxiety with a new patient information leaflet for example.

ESRA1-0253
Peripheral Nerve Blocks

PATIENT SATISFACTION SURVEY FOR PATIENTS HAVING AKEE SURGERY UNDER BRACHIAL PLEXUS BLOCK

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Background and aims: In our tertiary referral centre elective and emergency hand surgery is commonly performed under brachial plexus block (BPB). The aim of the survey was to evaluate patient satisfaction with our practice.

Methods: Following institutional approval and informed consent we aimed to collect data on 100 patients undergoing hand surgery under BPB between 28/10/2013 and 17/12/2013. Patients were followed up by phone in the 24-48 hour period following surgery and asked to rate their anxiety pre and post pro-

procedure, satisfaction, block and intraprocedural pain and post operative analgesia.

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Conclusions: Patient satisfaction with regional anaesthesia was very high, most patients would have another block and would not have preferred general anaesthesia. Most patients would have reduced anxiety for a repeat procedure compared with the first procedure. It may be possible to further reduce pre operative anxiety with a new patient information leaflet for example.

ESRA1-0254
Obstetric

TIME AND EFFECTIVENESS OF EPIDURAL ANALGESIA IN LABOR: AN INTERNATIONAL SURVEY

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Background and aims: Our web survey has the purpose of assessing whether there is a different effectiveness in controlling pain during epidural labor analge-

sia at night time than daytime.

Methods: The survey asked about: number of epidural labor analgesia during the last month; VAS score by 1-2-4-6 hours; accidental dural puncture, catheter

resect, age/weight/years of experience of the anesthesiologist; identify and collect the above data during two periods: 08:00h to 20:00h and 20:00h to 08:00h; if

the anesthetist felt tired during the nightshift.

Results: 456 responses were collected and 1.824 epidural labor analgesia re-
corded. 812 (44.52%) were performed between 08:00h to 20:00h and 1.012 (55.48%) between 20:00h to 8:00h. Inadequate analgesia between 08:00h and

20:00h was 13.8% (112 patients vs 812) and 16.5% (167 patients vs 1.012) be-

tween 20:00h to 8:00h. The highest failure rate in analgesia was observed during the nightshift (P value 0.001) versus daytime (P value 0.061). 8 accidental
dural puncture were observed during the nightshift and 4 during the daytime.

2% of anesthetists declared to felt tired during the nightshift.

Conclusions: Highest failure rates in labor analgesia occur during nightshift in which only 2% of anesthetists declared to felt tired. During the night the partic-

ients have higher level of oxytocin, lower level of β-endorphin and epidural loc-

cal analgesics show variation in the duration of action related to the hour of administra-

tion. It is likely that the chronobiological hormonal and local anesthe-

tic variations of the parturients may be responsible for the reduced analgesia
during the night.

ESRA1-0255
Postoperative Pain Management

ULTRASOUND TAP BLOCK VERSUS LOCAL INFILTRATION ANALGESIA FOR POSTOPERATIVE PAIN CONTROL IN ABDOMINAL LAPAROSCOPIC SURGERY

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Background and aims: Purpose of this study is to evaluate the efficacy of ultrasound-guided TAP block versus local infiltration analgesia for abdom-

inal laparoscopic surgery.

Methods: After ethics committee approval, 54 patients undergoing abdominal laparoscopic surgery were randomized into two groups; “Group Li” (27 patients) received a standard analgesia consisting of intravenous fentanyl 2 mcg/kg, pre-

emptive intravenous acetaminophen 10mg/kg, 20 ml levobupivacaine 0.25% for local infiltration of the surgical wounds. “Group Tap” (27 patients) received ultrasound TAP block with 20 ml levobupivacaine 0.25%. All patients had standard general anesthesia and assessed for postoperative pain with VAS score. The amount of rescue analgesics drugs (intravenous ketorolac) was recorded postoperatively.

Results: Mean total ketorolac administered was 25.5 ± 6.5 mg in the “Group Tap” and 64.2 ± 12.3 mg. (p<0.002) in the “Group Li.” “Group Tap” demonstrated more prolonged analgesia versus “Group Li” (respectively mean time 8.3±4.1 hours versus 3.4±1.5 hours). No differences were observed in the total amount of rescue analgesics drugs administered based on type of surgery. No complication was observed as a result of the ultrasound tap block and hemody-

namic and respiratory parameters were normal.

Conclusions: Ultrasound TAP block ensures a better and more prolonged analgesia compared to infiltration of the surgical wound. It is very likely that the greater effectiveness of the tap block is due to the greater time of contact and permanence of the local anesthetic on the branches of the lumbar plexus be-

tween the internal oblique and transversus abdominis muscles in addition to greater accuracy of ultrasound-guided block.

ESRA1-0257
Chronic Pain Management

MANAGEMENT OF CHRONIC PAIN AND CONSEQUENT COMPLICATIONS IN PATIENTS WITH POSTHERPETIC NEURALGIA

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Background and aims: Approximately 5 million cases of herpes zoster (HZ) are reported in the world annually. Risk of developing HZ is strongly age-depen-
dent (3.2 to 4.6 cases per 1000 person-years in 45–59 years population). From several complications of HZ, the postherpetic neuralgia (PN) and consequent sexual constitution weakness (SCW) are most prominent problems of this pa-
thology, and often SCW (and not the main complication - PN) in male popula-
tion is the reason of severe depression. So, any alternative method of guiding not only viral infection, but its primary and secondary complications are of great value.

Methods: Fifty-eight males (mean age 54±9.2) with HZ were observed during 2008–2013 in Tbilisi University Clinic. Thirty patients (I group) were undergo-
generally accepted therapy (antiviral, anticonvulsant and antidepressant drugs); second group (28 patients) in addition, instead of antidepressants were
ESRA1-0258
Case Reports

FEMORAL NERVE NEUROPRAXIA FOLLOWING POSSIBLE LOCAL INFILTRATION ANALGESIA TECHNIQUE FOR TOTAL HIP REPLACEMENT

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Background and aims: Nerve injury occurs in 1% to 2% of patients who undergo total hip arthroplasty. Injury to the peroneal division of the sciatic nerve is most common, but the superior gluteal, obturator, and femoral nerves can also be injured. Femoral neuropathy incidence following THA is 0.1 to 2.3%. Possible aetiologies are Haemorrhage, direct nerve encaement, leg lengthening or stretch, improper positioning, and difficulty in surgery.

We report a case of a 35 year old with a 6 year history of rheumatoid arthritis who developed temporary femoral nerve neuropaxia following total hip replacement possibly from local infiltration analgesia.

Methods: The patient received spinal anaesthesia which was straight forward with no difficulties during the procedure. Patient was positioned on left lateral position with all the care taken to protect the pressure points. Surgical approach for the hip was a posterior approach with no technical difficulties or complications during the operation. There was minimal leg lengthening and the sciatic nerve was checked for integrity all through. LIA was administered towards the end with 50 ml of 0.2% Ropivacaine with Adrenaline.

Results: The patient developed right leg weakness and was unable to mobilise after the spinal effect has worn off. On examination she had mild sensory deficit in right leg in L1, L2 and L3 and unable to perform knee flexion actively but able to dorsiflexion and plantar flexion. This gradually improved by day 5 and she has regained her normal power.

Conclusions: The probable causes in this case could be femoral neuropaxia from dense unilateral spinal anaesthesia or diffusion from local infiltration analgesia technique.

ESRA1-0260
Chronic Pain Management

EFFICACY OF PALMITOYLETHANOLAMIDE IN PERIPHERAL NEUROPATHIC PAIN

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Background and aims: Palmitoylthanolamide (PEA) is an endogenous fatty acid belonging to the class of anti-inflammatory and analgesic amides. Our goal is to assess the benefit arising from the association of PEA with the usual treatment in patients suffering from peripheral neuropathic pain from various etiologies.

Methods: We conducted a retrospective study on 23 patients with neuropathic pain of more than 12 months of evolution. They were administered PEA at 600 mg/24 hr, along with their usual treatment, with a first assessment made at 30 days in accordance with VAS and the verbal pain rating scale, and a second assessment made at 90 days. The appearance of side effects was recorded. Patients were rated as non-responders, partial responders to treatment, with an EVA reduction of <50%, and good responders, with an EVA reduction of higher than or equal to 50%.

Results: We obtained 47% of good response to treatment, with a 66 reduction rate in conventional therapy within one month; 17% of patients would have achieved a partial improvement in neuropathic pain; 36% of patients would not have achieved any response to treatment, and out of these, 75% showed limiting digestive discomfort. The most prevalent pathology was lumboesicalalgia (66%).

Conclusions: Palmitoylthanolamide has proved to be effective in 64% of our patients, which has enabled us to reduce conventional therapy, with a relatively high side effect incidence rate, but always in those patients refractory to treatment.

ESRA1-0262
Obstetric

A RE-AUDIT OF THE ADEQUACY OF PAIN RELIEF AFTER CAESAREAN SECTION

Saleem S.1, Yurma A.1, Patel K.1, Cochran D.1 1Anaesthetics, SWBH NHS Trust UK, Birmingham, United Kingdom.

Background and aims: Best practice for analgesia after caesarean section (CS) is unknown, however, benefits of neuro-axial blockade are well recognised and NICE has recommended diamorphine as the opioid of choice to complement this.

An audit in March 2013 highlighted the superiority of diamorphine over fentanyl in CS, with reduced pain scores and opiate consumption. Consequently, diamorphine was deemed as opiate of choice to supplement neuro-axial anaesthesia in category two to four CS.

Following the MHRA alert in 2013, we removed codeine from our standard post-CS prescription, leaving only paracetamol and ibuprofen. To counter this, we downgraded the checking of oral morphine to ‘single person’ to reduce the time patients potentially have to wait for analgesia.

We re-audited this in November 2013 to assess the effects of codeine removal.

Methods: Retrospectively, patients were reviewed day two post-CS recording mode of anaesthesia, time to first and total opiate consumption. Their overall satisfaction and pain scores were recorded using visual analogue scales.

Results: The total number of CS was 75 with 6 fentanyl cases. Immediately after CS average pain score was 3.75 (compared with 4.0 in March 2013) and 4.5 (4.3) twenty-four hours later. Satisfaction scores were 81% (compared with 90%). Consumption of morphine post-CS was 26mg (compared to 25mg).

Conclusions: Despite optimising the time for oral morphine delivery to patients, the satisfaction with our service reduced: One can only infer codeine removal is the major contributing factor.

We are seeking slow release morphine as an alternative and will re-audit when this is established.

ESRA1-0263
Postoperative Pain Management

LANDMARK THORACIC PARAVERTICAL VERSUS ULTRASOUND-GUIDED BLOCK OF THE CUTANEOUS BRANCHES OF THE INTERCOSTAL NERVES FOR BREAST-CANCER SURGERY; COMPARISON OF POSTOPERATIVE ANALGESIA QUALITY AND ASSOCIATED COMPLICATIONS

Pavon A.1, Pérez Bergara E.1, Dufur M.1, Hernández S.1, Irizarri M.1, Salvador M.1 1Anaesthesiology, Complejo Hospitalario de Navarra, Pamplona, Spain.

Background and aims: To compare landmark guided paravertebral (LGPVB) versus single-shot ultrasound-guided block of the cutaneous branches of the intercostal nerves on the midaxillary line, supplemented by intercostal block when needed (UGPFB), for breast cancer surgery.

Methods: All patients gave informed written consent to be anonymously included in retrospective studies.

A two-year review of breast-cancer patients was undertaken. Age, ASA, surgical approach, general and regional anesthetic techniques, postoperative morphine and non-steroidal analgesic (NSAID) requirements, complications (infection and hematoma) and length of stay (LOS) were retrieved.

Propofol/Remifentanil-based anesthesia cases for partial or radical mastectomy with axillary surgery or with without reconstruction were included.

44% of patients were reviewed. 155 met inclusion criteria (50,3% LGPB versus 49,7% UGPFB). There were no differences in age, ASA and...
type of surgery distribution between both groups. Results are displayed on the following table:

**Conclusions:** Regional anesthesia choice was not related to complications or LOS.

<table>
<thead>
<tr>
<th></th>
<th>LGPVB</th>
<th>UGPFB</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure</td>
<td>35.3%</td>
<td>14.4%</td>
<td>0.002</td>
</tr>
<tr>
<td>Ong-Morphine</td>
<td>28.6%</td>
<td>55.2%</td>
<td>0.004</td>
</tr>
<tr>
<td>Ong-Morphine&lt;sup&gt;1&lt;/sup&gt;</td>
<td>44.9%</td>
<td>64.6%</td>
<td>0.036</td>
</tr>
<tr>
<td>Mean Morphine(mg)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1.2</td>
<td>1.90</td>
<td>0.022</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>34.4%</td>
<td>42.1%</td>
<td>0.143</td>
</tr>
<tr>
<td>NSAIDs&lt;sup&gt;1&lt;/sup&gt;</td>
<td>24.5%</td>
<td>43%</td>
<td>0.040</td>
</tr>
<tr>
<td>Complications&lt;sup&gt;1&lt;/sup&gt;</td>
<td>18.7%</td>
<td>23%</td>
<td>0.57</td>
</tr>
<tr>
<td>Mean LOS (day)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3.8</td>
<td>5.56</td>
<td>0.865</td>
</tr>
</tbody>
</table>

<sup>1</sup>Blockade failure cases excluded.

In spite of including learning-curve cases, ultrasound led to higher success rate in PFB.

After excluding failures, a slight trend towards more rescue NSAIDs use in UGPFB emerged, but this approach still proved more effective in reducing morphine requirements (0 and mean mg of morphine).

**ESRA1-0264**

**Case Reports**

**CESAREAN DELIVERY, EPIDURAL ANESTHESIA AND LYMPHANGIOLEIOMYOMATOSIS: A SUCCESSFUL COMBINATION**

Henriques A.R.<sup>1</sup>, Marques J.<sup>1</sup>, Pedrosa S.<sup>1</sup>, Bettencourt M.<sup>1</sup>, Silva B.<sup>1</sup>, Gamelas S.<sup>1</sup>, Saraiva A.<sup>1,2</sup> Anestesiologia, Centro Hospitalar Baixo Vouga, Aveiro, Portugal.

**Background and aims:** Lymphangioleiomyomatosis (LAM) is a rare multisystem disease of unknown etiology. It may occur sporadically or in association with other pathologies, affecting mainly females of reproductive age.

The progressive proliferation of abnormal smooth-muscle cells throughout the peribronchial, perivascular and perilymphatic regions is responsible for nonspecific pulmonary and extra-pulmonary clinical manifestations. The most common clinical symptoms are progressive dyspnea on exertion, cough, recurrent spontaneous pneumothorax and chylosous effusions.

Progression of the disease is variable but may lead to terminal respiratory failure. It seems to be oestrogen-depend, which supports and favors the onset in pregnancy or the exacerbation of established disease during pregnancy and post-partum. The overall incidence of complications during pregnancy was 11 times higher than at any other time.

**Methods:** Published case reports in the last 30 years in PubMed described caesarian delivery in pregnant with LAM performed under general anesthesia or combined spinal-epidural anesthesia. No reports describe epidural anesthesia as anesthetic choice. This option aimed to avoid tracheal intubation, positive pressure ventilation and high thoracic motor block.

**Results:** We report a 35 years-old 2nd gesta pregnant woman with diagnosis of LAM since 2003 by video-assisted thoracoscopic surgery (VATS) lung biopsy, smoker, ASA III. At 37 weeks of gestation, she underwent a cesarean section under epidural anesthesia without complications. She was followed-up in the pulmonary outpatient clinic without deterioration of the disease.

**Conclusions:** In our study, women who received intravenous analgesic protocol with elastomeric pump, experience high levels of comfort with good control of acute pain regardless of the anesthetic technique or surgical indication for caesarean section through intravenous analgesic elastomeric pump protocol.

**ESRA1-0269**

**Postoperative Pain Management**

**BILATERAL BLOCK OF THE LATERAL AND ANTERIOR INTERCOSTAL CUTANEOUS BRANCHES ASSOCIATED WITH INTERPECTORAL BLOCK. IS IT A FEASIBLE OPTION FOR BREAST SURGERY?**

Pérez Bergua E.<sup>1</sup>, Pavón A.<sup>1</sup>, Úgasti O.<sup>1</sup>, Barrena J.<sup>1</sup>, Dufur M.<sup>1</sup>, Salvador M.<sup>1</sup> Anestesiología, Complejo Hospitalario de Navarra, Pamplona, Spain.

**Methods:** We used this approach in five patients undergoing bilateral cancer surgeries with resection.

**Results:** Blockade choice was made considering the surgical location and reconstructive technique. LICB, performed in all the cases, was supplemented with AICB when partial mastectomy involved the areolar area, whereas PECI was made for subpectoral implants.

**Conclusions:** No possible risk factor was found to be significantly associated to moderate-severe pain.

<table>
<thead>
<tr>
<th>24h control</th>
<th>VAS-rest</th>
<th>VAS-movement</th>
<th>Analgesic rescue consumption</th>
<th>Comfort grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule cesarean</td>
<td>0.44±1.2</td>
<td>5.06±1.8</td>
<td>33.84%</td>
<td>93.8%</td>
</tr>
<tr>
<td>Unplanned cesarean</td>
<td>0.49±1.1</td>
<td>4.83±1.7</td>
<td>27.11%</td>
<td>89.7%</td>
</tr>
<tr>
<td>Unplanned cesarean</td>
<td>0.6±1.3</td>
<td>4.82±1.8</td>
<td>29.41%</td>
<td>96.1%</td>
</tr>
</tbody>
</table>

**ESRA1-0267**

**Postoperative Pain Management**

**INFLUENCE THE TYPE OF ANESTHESIA AND THE DEGREE OF EMERGENCY IN ACUTE PAIN AFTER CESAREAN DELIVERY**

Trespalacios Guerra R.<sup>1</sup>, Soto Mesa D.<sup>1</sup>, Albaladejo Magdalena J.<sup>1</sup>, Gonzalez Castaño R.<sup>1</sup>, Menendez Clavero M.<sup>1</sup>, Fayad Fayad M.<sup>1</sup>, Cosio Carreño E.<sup>1</sup>, Bermejo Alvarez M.A.<sup>1</sup> Anestesiología, HOSPITAL DE CABUÑÉS, Gijón, Spain.

**Background and aims:** The management of acute pain after cesarean section is described as moderate-severe in up to 80-85% of cases. The aim is to identify possible factors associated with acute pain after cesarean section and evaluate pain control among different groups.

**Methods:** 185 cases were collected over 12 months (12 were excluded). All cases were included in the acute pain after cesarean program where they have received analgesics via elastomeric pump, consisting of tramadol, metamizol and ondansetron for 24 hours.

The patients were divided into 3 groups according to degree of emergency and anesthetic technique: Group A (n=64) scheduled cesarean under intradural anesthesia; Group B (n=58) unplanned cesarean under intradural anesthesia and Group C (n=51) unplanned cesarean under epidural anesthesia.

Data were analyzed using SPSS 17.0.

**Results:** We found no significant statistical differences among different groups in postoperative pain scores (VAS at rest and movement 24 hours later), analgesics rescue consumption and adverse effects or anesthesic complications (P > 0.05) (Table 1).

**Conclusions:** Thoracic Fascial Blocks are a feasible option in cases of IMC higher than 40, hemostasia disorders, vertebral pathology and patient refusal.

* Large local anesthesia dose in bilateral subpectoral implants might be a limiting factor. Adding vasoconstrictor and carefully calculating minimal efficient dose can reduce local anesthetic needs.
In our experience, Fascial Blocks associate low side-effects and iatrogenia rates with an easy to perform learning-curve.

**ESRA-0270**
Peripheral Nerve Blocks

**SCIENTIFIC ISSUE: IS ULTRASONOGRAPHY BETTER THAN NERVE STIMULATION?**
Martinez Navas A.¹, Echevarria Moreno M.², Rodriguez de la Torre R.³, Dávila Arias M.L.⁴, Cuéllar Obispo E.⁵.¹ ² ³ ⁴ ⁵. Anesthesiology department, Valme Hospital, Seville, Spain; ² Anesthesiology department, HARE Hospital, Benalmádena Málaga, Spain.

**Background and aims:** Ultrasound has been implemented to improve the efficacy and to decrease complications in peripheral nerve blocks. The objective of the study is to compare the efficacy and safety between ultrasound and neurostimulation in posterior popliteal sciatic block.

**Methods:** Comparative, prospective, randomized study in two health areas. We included patients of 30–65 years, ASA I-II, scheduled for major ambulatory surgery of hallux valgus under posterior popliteal sciatic block. Patients who refused to participate, diabetic or with contraindications for this anesthetic technique were excluded. Patients were allocated randomly to two groups: ultrasound (US) or neurostimulation (NS) or ultrasound (US). Registered variables can be grouped into those related to efficacy and safety. Numerical variables are described as means and standard deviation or medians and percentiles 25 and 75 and qualitative variables are expressed as frequencies and percentages. To compare an average quantitative variable between the two techniques, Student’s t test or nonparametric Mann-Whitney test are used. To compare qualitative variables Chi-Square test or not asymptotic Monte Carlo methods are used. A value of p<0.05 is considered significant.

**Results:** We included 115 patients, 49 in NE group and 67 in US group. Success at first puncture was greater in the US group (p=0.040). The success rate of block was greater and average execution time slightly less using the US technique versus NS. No significant differences regarding safety, sensory block and motor block.

**Conclusions:** Ultrasound was more successful at first puncture, had a higher block success, and required less time to perform, however it had a higher incidence of paresthesia.

**ESRA-0271**
Central Nerve Blocks

**RISK FACTORS RELATED TO ACCIDENTAL INTRAVASCULAR INJECTION DURING CAUDAL ANESTHESIA**
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**Background and aims:** Recently, ultrasound-guided caudal anesthesia has been performed for postoperative pain management after lumbar spine surgery. Although it is well known that intravascular injection often occurs in the caudal part of the spine, and that this cannot be detected at the time of injection under ultrasound screening, the risk factors for intravascular injection have not been evaluated.

**Methods:** To assess the risk index for prediction of accidental intravascular injection during caudal anesthesia, we retrospectively examined the hospital records of patients suffering from chronic low back pain who underwent sacral epidurography.

**Results:** Multivariate logistic regression analysis demonstrated that radicular symptoms of the lumbar spine (OR 2.511, 95% CI 1.097-5.748) and duration of symptoms (OR 1.066, 95% CI 1.002-1.010) were significant and independent risk factors for accidental intravascular injection during sacral epidurography.

**Conclusions:** This study suggests that the incidence of accidental intravascular drug injection during caudal anesthesia would be higher in patients with chronic radicular symptoms of the lumbar spine.

**ESRA-0272**
Case Reports

**ANESTHETIC APPROACH OF SURGICAL CORRECTION OF STERNAL CLEFT IN AN INFANT – CLINICAL REPORT**
Rodrigues M.¹, Vitor B.², Marques J.³.¹ ² ³. Anesthesiology, Hospital São Bernardo, Setúbal, Portugal; ² Anesthesiology, Hospital Divino Espírito Santo, Ponta Delgada, Portugal; ³ Anesthesiology, Centro Hospitalar Baixo Vouga, Aveiro, Portugal.

**Background and aims:** Sternal cleft, a rare congenital malformation, results from defective fusion of the sternum. Surgical correction for the protection of the mediastinal structures, improved ventilation and aesthetics, should be performed in the neonatal period, when the thoracic compliance is maximum. The approach is complicated by the rapid changes in cardiopulmonary dynamics is injury of vital structures occur with risk of bleeding, arrhythmias, cardiac dysfunction and pneumothorax. Challenges persist in the postoperative risk of cardiovascular compromise after sternal closure by direct compression of the heart and great demand in painful scrutiny that this surgery entails.

**Methods:** Infant, female, 10kg, with chest wall defect and anemia. ASA2; proposal for surgical correction of Sternal cleft. Preoperative evaluation by cardiology, excluding cardiovascular changes. We choose anesthetic combined approach with thoracic epidural block.

**Results:** The surgery progressed uneventfully. Transferred to Pediatric ICU, sedated and ventilated under epidural analgesia with 0.05% ropivacaine and morphine.

**Conclusions:** This case is about the importance of epidural analgesia in major thoracic surgery. The use of regional anesthesia facilitates the control of pain and function pulmonar. Although not without risk, this technique has great benefits.

**ESRA-0274**
Postoperative Pain Management

**COMPARISON BETWEEN DICLOFENAC AND PARACETAMOL FOR TREATMENT OF PAIN AFTER TOTAL ABDOMINAL HystereCTOMY**
Samini Sadegh S.¹, ², davari tanha F.³.¹ ² ³. Anesthesiology, TUMS, Tehran, Iran; ² Anesthesiology, Tums, Tehran, Iran; ³ Gynecology, Tums, Tehran, Iran.

**Background and aims:** Both rectal diclofenac and paracetamol are used to treat acute postoperative pain, but combining them to improve the quality of analgesia is controversial. We aimed to detect whether the preoperative combined administration of rectal diclofenac and paracetamol is superior to placebo or rectal diclofenac alone.

**Methods:** 90 patients scheduled for abdominal hysterectomy were recruited to this double blind trial and randomized to receive one of three modalities before surgery: Rectal combination of diclofenac and paracetamol, rectal diclofenac alone or rectal placebo alone. Studied drugs were given as a suppository one hour prior to surgery. The primary outcomes were visual analogue pain scores measured at 0, 0.5, 2, 4, 8, 16 and 24 hours after surgery. The time of first administration and total amount use of morphine in the first 24h after surgery were compared between groups. A 10 cm visual analog scale was used to assess pain intensity at rest.

**Results:** VAS was significantly lower in combination group compared to other groups all time during first 24 hours (p<0.05). In combination group there was a significant difference in terms of the first request of morphine and also total use of morphine (13.9 ± 2.7 mg) compared to diclofenac group (16.8± 2.8 mg) and placebo group (20± 1.36 mg) (p<0.05).

**Conclusions:** Patients who receive the rectal diclofenac-paracetamol combination experience significantly a lower VAS in first 24h after surgery compared with other groups. Their need to supplementary analgesic is significantly later and lower compared to placebo and diclofenac alone.

**ESRA-0275**
Obstetric

**REMPFENTANIL PATIENT CONTROLLED ANALGESIA VERSUS EPIDURAL ANALGESIA DURING LABOUR: A RANDOMISED TRIAL (NTR3687)**
Logtenberg S.¹, Oude Rengerink K.¹, Verhoeven C.², Mol B.W.².¹ ². Research & Obstetrics, Academic Medical Centre Amsterdam, Amsterdam, Netherlands; ² Research & Obstetrics, Emgo Institute, Amsterdam, Netherlands.

**Background and aims:** We investigated whether using a Remifentanil patient-controlled analgesia (PCA) system reduces the amount of morphine consumption and general dissatisfaction compared to epidural analgesia during labour, the standard analgesia regimen for labour pain.

**Methods:** We completed a randomised controlled trial in a single university hospital in the Netherlands. Patients were randomised to receive a PCA device (Remifentanil 0.2 μg/kg/min) or epidural analgesia (10 ml/h). Primary outcome was the amount of morphine administered during the first 6 hours of labour. Secondary outcomes were general satisfaction with pain relief, and the incidence of nausea, vomiting, and hypotension. Between-group differences were compared using linear mixed models.

**Results:** A total of 124 patients were included in the study. The amount of morphine administered was significantly lower in the PCA group compared to the epidural group (57.9± 22.9 mg vs. 77.5± 23.7 mg, p<0.001). There was no significant difference in general satisfaction with pain relief between the two groups. The incidence of nausea, vomiting, and hypotension was similar in both groups.

**Conclusions:** The use of Remifentanil PCA in labour significantly reduces the amount of morphine administered compared to epidural analgesia, with similar general satisfaction and incidence of side effects. This suggests that Remifentanil PCA is a valuable alternative to epidural analgesia during labour.
Background and aims: Epidural analgesia (EA) is considered the most effective method for pain relief during labour. Recent studies suggest that maternal satisfaction with remifentanil patient controlled analgesia (RPCA) is equivalent to EA. A limitation so far, satisfaction with pain relief was inconsistently measured and reported in some trials. The aim of this study was to compare pain appreciation during labour between RPCA and EA.

Methods: Before active labour, low risk pregnant women were randomly allocated to pain relief with EA or RPCA, administered if pain relief was requested. Primary outcome was pain appreciation, expressed by women's satisfaction with pain on a VAS-scale, measured hourly from the onset of active labour. Secondary outcomes were overall satisfaction with pain during delivery judged 2 hours and 6 weeks after delivery, pain scores during labour and maternal and neonatal side effects.

Results: Between September 2012 and May 2013 415 women were randomised. Pain relief was requested by 51% of the 205 women in the RPCA group and 48% of the 210 women in the EA group. Mean pain appreciation scores were 5.54 for RPCA (SD 1.74) and 5.61 (SD 1.94) for EA, mean difference -0.07; 95% CI -0.47 to 0.34. Mean pain scores were 6.70 in the RPCA versus 6.45 in EA group, mean difference 0.24; 95% CI -0.11 to 0.60. When asked at 2 hours and 6 weeks after delivery, the overall pain score and the satisfaction with pain did not differ between the groups.

Conclusions: RPCA provided comparable pain appreciation scores during active labour compared with EA.

ESRA1-0276
Postoperative Pain Management
THE EFFECT OF LOCAL ANESTHETIC WOUND BEFORE THE SURGICAL INCISION ON SELECTED INTRAOPERATIVE AND POSTOPERATIVE PARAMETERS IN PATIENTS WITH BREAST CANCER UNDERGOING MASTECTOMY
Zielinski J.1, Jaworski R.2, Smietanska L.3, Wujtewicz M.3, Sadowski A.1, Ptach A.1, Maliszewski D.1, Jaskiewicz M.1 1Department of Surgical Oncology, Medical University of Gdańsk, Gdańsk, Poland. 2Department of Pediatric Cardiac Surgery, Mikolaj Kopernik Pomeranian Centre of Traumatology of Gdańsk, Gdańsk, Poland. 3Department of Anaesthesiology and Intensive Care, Medical University of Gdańsk, Gdańsk, Poland.

Background and aims: The study was designed as prospective, randomized, placebo-controlled, double-blinded clinical trial. We have tested a hypothesis that preventive analgesia with bupivacaine applied in the area of surgical incision in patients undergoing mastectomy for breast cancer would reduce: the amount of analgesics used during surgery, post-operative acute pain, the amount of analgesics in post-operative period and frequency post-mastectomy chronic pain syndrome.

Methods: Participants were assigned into two groups: with bupivacaine applied in the area of surgical incision or with placebo. We assessed the intraoperative consumption of fentanyl, the postoperative consumption of morphine (placebo). The final study group comprised 112 breast cancer cases. Between September 2012 and May 2013 415 women were randomised. Pain relief was requested by 51% of the 205 women in the RPCA group and 48% of the 210 women in the EA group. Mean pain appreciation scores were 5.54 for RPCA (SD 1.74) and 5.61 (SD 1.94) for EA, mean difference -0.07; 95% CI -0.47 to 0.34. Mean pain scores were 6.70 in the RPCA versus 6.45 in EA group, mean difference 0.24; 95% CI -0.11 to 0.60. When asked at 2 hours and 6 weeks after delivery, the overall pain score and the satisfaction with pain did not differ between the groups.

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ESRA1-0276
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ESRA1-0276
Postoperative Pain Management
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Conclusions: RPCA provided comparable pain appreciation scores during active labour compared with EA.

ESRA1-0280
Postoperative Pain Management
TRANVERSUS ABDOMINIS PLANE BLOCKS WITH LIPOSOMAL BUPIVACAINE VERSUS EPIDURALS FOR POST-OPERATIVE PAIN CONTROL IN PATIENTS UNDERGOING TOTAL ABDOMINAL HYSSTERECTOMY: A RETROSPECTIVE COHORT STUDY
Hutchins J.1 1Anesthesiology, University of Minnesota, Minneapolis, USA.

Background and aims: Epidurals are commonly used for the treatment of acute post-operative pain following open lower abdominal surgery. However, other techniques, such as transversus abdominis plane (TAP) blocks are being used as a less invasive alternative. We sought to compare the pain control of a TAP block with liposomal bupivacaine to an epidural in patients undergoing open total abdominal hysterectomy procedures.

Methods: With IRB approval, we retrospectively analyzed 40 charts of women who had open hysterectomies, 20 had epidurals and 20 had ultrasound-guided TAP blocks with liposomal bupivacaine. Patients maximum and minimum pain scores, opioid usage, length of stay, and presence of complications were recorded.

Results: We found that those with TAP blocks had significantly less maximal and minimal pain in PACU as well as time spent in PACU. Those with TAP blocks received significantly less opioids in the first 24 hours as well as 24–48 hours post-operatively with no difference in opioid use between the two groups from 48–72 hours. There were no differences in pain scores in first 24 hours or 48–72 hours, however there were significantly lower maximal pain scores in those who had epidurals from time 24–48 hours post-operatively. There was no difference in length of stay or presence of nausea, but those with epidurals experienced more modality related side-effects (9/20 in epidural vs 0/20 in TAP p=0.001).

Conclusions: Transversus abdominis plane blocks with liposomal bupivacaine are a viable alternative to epidurals for treatment of post-operative pain in open hysterectomy patients.

ESRA1-0282
Case Reports
ULTRASOUND-GUIDED BILATERAL TRANSVERSUS ABDOMINIS PLANE-BLOCK AS POSTOPERATIVE RESCUE ANALGESIA AFTER ABDOMINAL HYSSTERECTOMY
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Background and aims: In gynecological and visceral surgery the transversus abdominis plane (TAP)-block is a reasonable alternative to neuraxial or systemic postoperative pain therapy. As described in the literature TAP-block is usually applied during spinal or general anesthesia before or at the end of surgery. We report on a patient who received multiple postoperative TAP-blocks as rescue analgesia.

Methods: A 36-year-old female patient suffering from Lynch-syndrome underwent abdominal hysterectomy and adnexectomy. History revealed multiple deep vein thrombosis and family disposition for thrombosis. Consequently the patient received perioperative systemic heparinization representing a contraindication for an epidural catheter for postoperative analgesia. Despite of postoperative systemic analgesia with piritramide, metamizole and paracetamol the patient suffered from intense lower abdominal pain (NRS=9). Therefore an ultrasound-guided bilateral TAP-block with 20 ml ropivacaine 0,2% on each side was performed 4 and 28 hours postoperatively as rescue analgesia.

Results: The TAP-block was performed without any complications. Due to subcutaneous infiltration with local anaesthesia the puncture was very well tolerated by the patient. Pain level was immediately reduced from NRS=9 (4h postoperative) to NRS=3, maintaining for 5 hours. Repetition of TAP-block 28 hours postoperatively led to pain reduction from NRS=8 to NRS=2, lasting 6 hours.

Conclusions: The ultrasound-guided TAP-block is an appropriate alternative to systemic or neuraxial analgesia and is very well tolerated.

ESRA1-0285
Case Reports

CASE REPORT- PREOPERATIVE MANAGEMENT OF A PATIENT TAKING DABIGATRAN FOR ELECTIVE SURGERY

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Background and aims: We would like to describe preoperative management of a patient taking Dabigatan (direct thrombin inhibitor) presenting for a knee arthroscopy.

A seventy four year old gentleman presented for knee arthroscopy, he had multiple co-morbidities including Atrial Fibrillation, Hypertension, Ischaemic heart disease, COPD, NIDDM, Ulcerative Colitis, Peripheral vascular disease, High BMI and his drug history included Dabigatan, Carvediol, Ramipril, Fluvostatin, GTN Spray, Salmeterol, Pioglitazone, Gliclazide, Sitagliptin, Mesalazine, Naptidofuryl. He was allergic to Warfarin with rash and wheeze- ness, he was started on Dabigatan by his cardiologist.

Methods: He attended Pre Operative Anaesthetic Clinic in view of optimising him and as per the guidelines in our hospital he was asked to omit Dabigatan for 24 hours as for a standard risk procedures like knee arthroscopy but spinal anaesthetic was a higher risk procedure. After discussion with haematologist, Thrombin time was done which was 42 seconds which was twice the normal, so the operation was cancelled as patient only wanted spinal anaesthetic.

Results: Patient presented again for surgery few weeks later after stopping Dabigatan for more than three days and he had a lengthy discussion regarding the risks and benefits of regional anaesthetic and then agreed to have a general anaesthetic although he was ready for central neuraxial blockade.

Conclusions: The described technique was adequate in the anesthetic manage- ment of the newborn, with avoidance of risks regarding general anesthesia such as regurgitation and postoperative central nervous system depression. In our

ESRA1-0286
Miscellaneous

INHALATIONAL SEDATION COMPARED WITH TOTAL INTRAVENTOUS SEDATION FOR ENDOSCOPIC PROCEDURES IN THE RADIOLOGICAL SUITE

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Background and aims: The best anesthetic technique for sedation would be one that allows a depressed state of consciousness, with maintained reflexes and preserving spontaneous breathing and rapid recovery (1,2,3).

The aim of this preliminary study was to compare the efficacy of deep seda- tion with sevoflurane versus conventional technique with propofol in patients selected for endoscopic procedures in the upper gastrointestinal tract (endos- copic retrograde cholangiopancreatography and esophageal dilations).

Methods: A randomized trial was performed. In P group: oxygenation with nasal cannula, propofol initial bolus of 20-40 mg and continuous perfusion of 2-4 mg kg⁻¹ h⁻¹ was administered. In S group: oxygenation with Boussignac® facial mask, inhalational induction with sevoflurane 8% and maintenance with sevoflurane for an etSevo 1CAM was given.

Midazolam 0.025-0.05 mg kg⁻¹ and fentanyl10,5ug kg⁻¹ were administered in both groups.

Demographic data, respiratory disease, duration of the procedure and complica- tions were collected.

Results: These are preliminary results of descriptive statistics, with 10 patients (6 in P group and 4 in S group).

Main results and complications are shown in Tables 1-2.

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<th>TABLE 1.</th>
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<td>P group (mSD)</td>
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<tr>
<td>Age (y) 79,0 (3,1) 66,5 (22,6)</td>
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<tr>
<td>BMI (kg m⁻²) 27,5 (3,0) 23,1 (4,3)</td>
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<tr>
<td>Procedure (min) 41 (6,0) 61 (22,0)</td>
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<tr>
<td>Recovery (min) 2,7 (0,5) 4,3 (2,8)</td>
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<th>TABLE 2.</th>
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<td>P group (n)</td>
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<tr>
<td>Bradycardia 0</td>
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<td>Desaturation 2</td>
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<td>Apnea 1</td>
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<td>Nausea/vomiting 0</td>
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<td>Hypotension 1</td>
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Conclusions: Inhalational sedation with sevoflurane seems to be a safe and ef- fective technique, maintaining haemodynamic and respiratory stability. Further- more, it allows a better control of the airway and the use of positive pressure.

ESRA1-0288
Pediatric

ULTRASOUND GUIDED CAUDAL BLOCK ANESTHESIA FOR HYPERTROPHIC PYLORUS STENOSIS: A CASE REPORT

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Background and aims: Hypertrophic pylorus stenosis is a common dis- order in the neonate and a challenging issue for the anesthetist. Although gen- eral anesthesia has high risk, only a few publications describe use of regional anesthesia.

Methods: Newborn 22 days old, weighing 4kg, ASA II, proposed for pyloromyotomy. Clinical episode initiated with history of regurgitation/ vomiting for the past 15 days. Gastric content was aspirated via a naso-gastric tube before anesthetic approach. Moderate sedation using ketamine was used, titrated to the effect. Ultrasound guided caudal block was performed with bupivacaine 0.2% 1.5mg/kg. Trendelenburg position was assumed during entire technique. Skin incision was accompanied by mild tachycardia, blunted by a dose of 5mg of ketamine. Supplemental analgesia was completed with 30mg paracetamol. Remaining surgery was uneventful and systemic pain therapy in the immediate post-operative setting unnecessary.

Results: The use of ketamine allowed for airway reflex preservation, with spontaneous ventilation and adequate sedation. Ultrasound guided caudal block allowed clear visualization of the epidual space with single puncture and local anesthetic spread. T2 level was reached with a total volume of 6ml.

Conclusions: The described technique was adequate in the anesthetic manage- ment of the newborn, with avoidance of risks regarding general anesthesia such as regurgitation and postoperative central nervous system depression. In our
Peripheral Nerve Blocks

CERVICAL PLEXUS BLOCK FOR CAROTID ENDARTERECTOMY – IMPROVED ACCURACY AND SAFETY UNDER ULTRASOUND

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Background and aims: Carotid endarterectomy is commonly performed under regional anaesthesia using landmark technique. It is associated with various complications, that can be reduced with the aid of ultrasound. We describe our experience and technique of ultrasound guided approach for Carotid Endarterectomy in 50 patients.

Methods: High-resolution ultrasound guided regional anaesthesia was performed using a 13-MHz linear array transducer with depth adjusted at 3 cm for superficial and 5 cm for the deep block. For the superficial cervical block, the Greater auricular nerve was identified as an hyper-echoic shadow that moved laterally from the upper third to mid STM where it joins the main superficial plexus. 15 to 20 ml of 0.5% Chirocaine given in this area below the superficial investing layer of cervical fascia will block the superficial plexus. For the deep cervical plexus block the anterior and posterior tubercles of the transverse processes of C2, C3, C4 and the nerve roots were identified and 10, 5, 5 ml 0.5% Chirocaine was deposited at C2, C3, C4 transverse processes respectively.

Results: The anaesthesia was effective for all our patients in this series. There were no complications due to the combined cervical plexus block and recovery was uneventful for all patients.

Conclusions: Our experience indicates that ultrasound-guided regional anaesthesia for carotid endarterectomy is safe and effective alternative to the traditional landmark technique. However larger multi centre studies are required to confirm safety and efficacy.

Peripheral Nerve Blocks

PROTECTION AGAINST COGNITIVE DYSFUNCTION IN FRACTURED NECK OF FEMUR PATIENTS WITH ADMISSION FASCI A ILIACA BLOCKS

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Background and aims: Elderly hip fracture patients are at high risk of post-operative delirium. Early fascia iliaca blocks (FIB) may reduce this risk. At our institution approximately 50% of hip fracture patients receive admission FIB, depending on anaesthetist availability. This study evaluated whether admission fascia iliaca block catheters improved post-operative Abbreviated Mental Test Score (AMTS).

Methods: Retrospective case-control analysis was conducted for patients selected from the hospital hip fracture database during the 12-month period from June 2012. 194 patients with FIB catheters were compared to 199 controls (who did not receive pre-operative FIB) matched for demographics, admission AMTS and Hip Fracture Score. FIBs were 30ml 0.25% levobupivacaine and catheters run at 7ml/hr of 0.125% levobupivacaine. The primary outcome measure was change between admission and post-operative AMTS (ΔAMTS).

Results: Groups were well matched for the following parameters: duration until surgery, type of anaesthetic (spinal vs. GA) and type of surgery (all p > 0.5). Median admission AMTS was 9 in both groups. Overall mean ΔAMTS was +0.15 (2.05) in the FIB group, vs. -0.67 (2.20) in the control group without FIB (p <0.01). Fewer patients with FIB had a fall in post-operative AMTS (21.1% vs. 35.2%, p < 0.01). Cohen’s d measure of effect size was 0.39.

Conclusions: These results show a small protective association between pre-operative FIB catheters and AMTS retention following hip fracture surgery.

LOCAL INfiltrATION ANALGESIA FOLLOWED BY CONTINuouS WOUND INFUSION AS VALID ALTERNATIVE IN PAIN CONTROL AFTER TOTAL HIP ARTHROPLASTY: CASE REPORT

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Background and aims: Wound infiltration of local anesthetics (Local Infiltration Analgesia - LIA) combined with continuous infusion of local anaesthetic solution through catheter placement (Continuous Wound Infusion - CWI) is emerging in the management of post-operative pain after total hip arthroplasty (THA). This technique could represent a viable alternative to neuraxial and peripheral nerve blocks in patients receiving anti-platelet or anticoagulant therapy.

Methods: Male patient, 68 years old, ASA III, in dual antiplatelet therapy after implantation of drug eluting stent, undergoing THA for femoral neck fracture under general anaesthesia. At the end of the intervention was performed a periprosthetic infiltration of the surgical wound with 40 ml of 0.25% ropivacaine and Adrenaline 0.1 mg followed by placement of periprosthetic catheter (Painfusor Baxter®) connected to an elastomeric pump containing a solution of 0.25% Ropivacaine and physiological saline, for a total volume of 300 ml at infusion rate of 5 ml/h. In the postoperative period was administered IV Acetaminophen 1000 mg every 8 hours. A rescue analgesic medication was provided with IV administration of Ketorolac 30 mg and, in the case of VAS score greater than 4, SC Morphine 5 mg.

Results: The mean VAS scores was 3 on the second postoperative day. The patient did not require rescue medication. Side effects correlated with local anesthetic infusion and/or the catheter have not been reported.

Conclusions: The case report demonstrates how LIA + CWI is a valid alternative to traditional techniques (neuraxial blocks and/or peripheral nerve blocks) when these are contraindicated or not technically executable.
ESRA1-0294
Central Nerve Blocks

CENTRAL NEURAXIAL ANAESTHESIA AND SEDATION FOR PROLONGED ORTHOPHATIC LOWER LIMB SURGERY REQUIRING FREE TISSUE TRANSFER: A SEVEN YEAR EXPERIENCE

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Background and aims: Our national referral centre specialises in orthoplastic surgery for lower limb osteomyelitis (LLOM). These operations are complex, prolonged and often require free tissue transfer (FTT). Care for perioperative anaesthesia (EA) is advocated due to perceived positive impact on FTT outcomes.

While EA and sedation (EA+Sed) is widely used in orthopaedics its use is still uncommon for FTT. Since 2007 we have growing positive experience of using central neuraxial anaesthesia with sedation (CNA+Sed) – EA+Sed in particular – over conventional general anaesthesia (GA) for LLFT. We present 43 consecutive LLFT cases completed under CNA+Sed.

Methods: In 2007–2013 forty three patients underwent FTT for LLOM under CNA+Sed. Twenty (46.5%) patients received lumbar combined spinal-epidural anaesthesia and twenty three (53.5%) patients – EA.

Results: Two epidurals required resiting preoperatively to ensure effective EA.

Methodology and if devices were removed due to any complication, were retrospectively collected and analyzed.

Results: 17 patients were diagnosed of Primary Headache (PH) and 18 of Secondary headache (SH). Migraine was the most frequent PH and Occipital Neuralgia (ON) was the most frequent SH. 50% of pain relief was achieved in 63% and more than 75% of pain relief in 43%.

55% of patients were satisfied.

Satisfied in ON group were 44.4%, in Migraine group, 66.7% and in SH group, excluding ON, were 71%.

Infection was the most frequent complication.

ONS had to be removed from 17% of patients with any complication.

Conclusions: Despite ONS is an invasive procedure, major complications are uncommon.

ONS should be considered not only for PH but also for other types of Headaches. More controlled studies on different spectrum of diagnoses should be performed.

ESRA1-0296
Postoperative Pain Management

EFFECT OF HIGH-VOLUME SYSTEMATIC LOCAL INfiltration ANALGESIA IN CAESAREAN SECTION: A RANDOMIZED, PLACEBO-CONTROLLED TRIAL

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Background and aims: Pain after caesarean section is often treated with opioids with a risk of side-effects. Wound infiltration with local anaesthetics is effective and has few side-effects, but the volume vs. dose concentration has not been examined.

Methods: Ninety patients scheduled for elective caesarean section were included in a randomized, double-blind, placebo-controlled trial receiving infiltration with 50 mL ropivacaine 0.5% (Ropi 0.5%) or 125 mL ropivacaine 0.2% (Ropi 0.2%) or 50 mL 0.9% saline (Placebo) during surgery. All surgery was performed under lumbar spinal anaesthesia. Primary endpoint was post-operative pain, secondary endpoints were rescue analgesic, postoperative nausea and vomiting, time spent in the postoperative care unit (PACU) and time to first mobilisation.

Results: Time until maximum pain score was prolonged in the Ropi 0.5% group compared to Placebo (p = 0.0493). No difference was found between the Ropi 0.2% group and the Placebo group (p = 0.9369). Administration of ketobemidone at 24 hours postoperatively in the Ropi 0.5% group was significantly reduced compared to the Placebo group (p = 0.020), and between the Ropi 0.2% group and the Ropi 0.5% group (p = 0.0044). However there was no difference between the Placebo group and the Ropi 0.2% group (p = 0.936). There were no other significant differences between groups concerning secondary endpoints found.

Conclusions: Wound infiltration with a high concentration, low volume ropivacaine compared to low concentration high volume ropivacaine showed limited analgesic and opioid sparing effect compared with placebo, although the high concentration, low volume technique was most effective.

ESRA1-0295
Chronic Pain Management

OCCIPITAL NERVE STIMULATION NINE YEARS OF CLINICAL EXPERIENCE

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Background and aims: Headache is ranking at the top of all neurological disorders and the most important cause of Years lived with disability (YLD).

Neuromodulation has been used as the last step treatment to manage refractory headache.

We aim to describe our experience with Occipital Nerve Stimulation (ONS) on the treatment of refractory headache.

Methods: 35 patient, 22 women and 13 men, aging 33 to 84, (mean 57 y.o. SD ±14.23) received ONS for refractory headache.

All patients were classified according to the International Classification of Headache Disorders; and data about time before implantation, pain relief, coverage area of pain, medications reduction, patient satisfaction, complications and if devices were removed due to any complication, were retrospectively collected and analyzed.

Results: 17 patients were diagnosed of Primary Headache (PH) and 18 of Secondary headache (SH). Migraine was the most frequent PH and Occipital Neuralgia (ON) was the most frequent SH. 50% of pain relief was achieved in 63% and more than 75% of pain relief in 43%.

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Satisfied in ON group were 44.4%, in Migraine group, 66.7% and in SH group, excluding ON, were 71%.

Infection was the most frequent complication.

ONS had to be removed from 17% of patients with any complication.

Conclusions: Despite ONS is an invasive procedure, major complications are uncommon.

ONS should be considered not only for PH but also for other types of Headaches. More controlled studies on different spectrum of diagnoses should be performed.

ESRA1-0297
Postoperative Pain Management

COMPARISON OF CONTINUOUS INTERCOSTAL BLOCK AND THORACIC EPIDURAL FOR OPEN PARTIAL NEPHRECTOMY

Background and aims: We aimed at comparing postoperative analgesia provided by continuous intercostal block (CIB) versus thoracic epidural (TE) for open parcial nephectomy.

Methods: Twenty five patients undergoing parcial kidney resection were reviewed, 10 receiving CIB before end of surgery, and 15 with TE placed before general anesthesia induction.

All patients gave us written consent to use their medical records for investigation purposes.

Surgical incision was performed on T11-12 intercostal space, including rib resection, with preservation of the corresponding intercostal nerve. Before closure, under direct visualization, a multi-perforated catheter was sutured to the transverse abdominal muscle close to the intercostal nerve.

Numeric Rating Scale (0–10) scores at rest and on mobilization, morphine consumption at the Post Anesthesia Care Unit and postoperative complications were retrieved.

Differences were calculated with T of student, U of Mann–Whitney and $\chi^2$ tests with the SPSS pack.

Results: There were no differences in pain scoring at 24 and 48 hours after surgery.

Morphine requirements in the PACU were significantly greater in the CIB group ($p<0.002$).

Postoperative complications did not reach statistical significance between groups.

Conclusions: Though higher doses of morphine with CIB were needed in the PACU, a similar quality of analgesia at 24 and 48 hours was observed. Preemptive analgesia with TE may have placed a role in this finding.

CIB is a good option when TE is contraindicated, turns out to be impracticable or open surgery is not expected.

By direct positioning of the catheter for CIB, complications due to technical difficulties or catheter dislocations are minimized.

ESRA1-0298
Peripheral Nerve Blocks

REGIONAL ANAESTHESIA NEEDLING PHANTOMS: CAN INTERSCALENE AND SUPRACLAVICULAR ANATOMY BE REPLICATED IN HOMEMADE MODELS?
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Background and aims: Anaesthetists learning ultrasound-guided nerve blocks can practise scanning on patients and volunteers. Visualising needle position during block placement is a difficult and important skill to learn. Patient safety would be improved if the operator were proficient before first puncturing human skin. Commercial phantoms are available, but lack realism. Objectives - to design and produce phantoms that approximate interscalene and supravacular sonoanatomy, to train anaesthetists in needle visualisation.

Methods: The ultrasound transmission characteristics of several kitchen ingredients were assessed, and raw materials selected. Edible jelly was set in moulds to mimic blood vessels and muscles. Strawberry bootlaces (a children's sweet) corresponded to nerve roots. Lasagne sheets represented bone. Shapes were wrapped in clingfilm to represent fascia. These were built into layers to produce a 3-dimensional model.

Results: Two phantoms were produced. Anaesthetists were invited to attend a live scanning training session on the brachial plexus. A separate needling station was provided with the phantoms. Feedback was positive, with requests for further needling sessions and other phantoms.

Conclusions: Homemade phantoms can mimic interscalene and supraclavicular sonoanatomy remarkably well. Needle visualisation can be practised and improved in a more realistic model, helping to increase patient safety.

ESRA1-0299
Peripheral Nerve Blocks

A QUESTIONNAIRE ON THE PRE-OPERATIVE PAIN MANAGEMENT OF HIP FRACTURES IN THE UK
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Background and aims: The use of nerve blocks is an important component in delivering optimal care to patients with fractured hips. The National Institute of Health and Care Excellence (NICE) recommends use of nerve blocks to supplement analgesia and reduce opiate requirements. NICE consider it as a quality standard and have included it in the Commissioning for Quality and Innovation (CQUIN) payment framework thus incentivising hospitals to achieve the standards.

Aim: To determine whether protocols exist for preoperative management of hip fractures, the kind of pain relief offered and the frequency of nerve blocks. How they are administered, when and by whom.

Methods: A questionnaire was emailed to local trauma anaesthetists and circulated to hospitals in the UK.

Results: 40 responses were analysed. 58% had a protocol for the preoperative management of pain in patients with hip fractures. Anaesthetists were involved early (A&E or ward) in 33% of hospitals. 36% of hospitals offered a fascia iliaca block as pain relief in the preoperative period. Landmark technique was the commonest method (43%) used to administer the block. Anaesthetists administered the blocks in 40% of hospitals. Blocks were administered on the ward in 22% and in A&E in 19% of hospitals. The adequacy of pain relief was assessed in 54% of hospitals.

Conclusions: Early anaesthetic involvement can ensure that peripheral nerve blocks are administered quickly, providing superior pain relief. It provides an ideal opportunity for an anaesthetic review which may highlight medical problems that could delay operative repair and increase risk of complications.
ESRA1-0304
Pediatric
EFFECTIVENESS OF TRANSVERSUS ABDOMINIS PLANE BLOCK IN CHILDREN
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Background and aims: Transversus abdominis plane (TAP) block usually provides an effective analgesia of the abdominal region. Its role in adults is well studied however studies in children are scarce. Discharge criteria after pediatric ambulatory surgery include low pain level and no motor blockade. TAP block theoretically help to accomplish this goal with low risk of side effects. The objective of this study is to investigate the effectiveness of the TAP block analgesia in pediatric population after abdominal surgery.
Methods: 3 male and 4 female patients, aged between 3 and 24 months, underwent unilateral herniotomy surgery employing general balanced anesthesia. Induction and maintenance of the anesthesia were performed with sevoflurane and remifentanil. TAP block, ultrasound guided, was performed right after the end of the surgery using levobupivacaine 0.25% (4–6 mL), reinforced with intravenous metamizol (20 mg/kg).
Results: 100% of the population successfully expresses little pain (NIPS<3) at any point after TAP block. Children did not require additional analgesia as concomitant medication in the recovery room prior discharge. 71% of the population required less time for meeting discharge requirements and 100% showed no side effects.
Conclusions: It appears TAP block is an effective analgesic procedure for abdominal surgery in child population. It reduces postoperative medications and enhances the recovery program of the patients.

ESRA1-0309
Miscellaneous
THE EFFECTS OF COMMUNICATION, ATTITUDE OF PHYSICIANS AND STAFF ON THE PATIENT SATISFACTION UNDERGOING AWAKE HAND SURGERY
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Background and aims: Patient satisfaction is a vital indicator of the quality of healthcare. We aimed to find out whether communication and behavior of physicians and staff affected overall patient satisfaction.
Methods: 122 patients undergoing awake hand surgery under brachial plexus block in our Hand Unit completed a multi pronged questionnaire, between February and October 2013. Patient satisfaction was derived from the NHS Friends and Family test and their overall experience. We looked into the responses of 3 questions: anaesthetist explanation of the block, surgeon explanation of the procedure and overall staff attitude and supportiveness and their link to the patient satisfaction.
Results: 120 patients were satisfied with their care. They have rated either good, very good or excellent to the explanation of the block and procedure by the doctors and to the attitude of the staff. Two patients were unhappy and said their overall experience was worse than expected and would not recommend our Hand Unit to their Family and Friends. They both rated the explanation about the block as unsatisfactory. One rated staff attitude as poor. One did not get enough time to discuss surgical options and had insufficient explanation of side effects of postoperative medications. In both cases the block was a technical success.
Conclusions: Patient satisfaction determinants are complex and multifactorial. Good communication, developing rapport and staff attitude all have a strong influence on patient satisfaction.
Reference:

ESRA1-0310
Case Reports
THE ULTRASOUND-GUIDED UNILATERAL PARAVERTEBRAL BLOCK: A SUITABLE ALTERNATIVE FOR HERNIA REPAIR SURGERY. CASE REPORT
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Background and aims: Surgical treatment for inguinal hernia is the most commonly performed general surgical procedure in clinical practice. Despite high frequency of this procedure, it can occur perioperative complications, including severe that often depend on the clinical condition of the patient. The anesthetic technique must be appropriate to the clinical characteristics of the patient and for the needs of the surgeon. The ultrasound-guided unilateral paravertebral block (US-guided UPB) can be a viable alternative, due to hemodynamic stability that it provides.
Methods: After IRB approval and written patient consent statement, we visited the L’Aquila Acamedic Hospital a 62 year old male (80 kg, 175 cm, BMI 26, 12), for a large inguinal hernia. He was suffering from severe coronary artery disease (CAD), not controlled hypertension, insulin-dependent diabetes mellitus and chronic obstructive pulmonary disease. Before surgical procedure, it was performed a multi-segmental (from T9-T10 to T11) unilateral US-guided UPB, associated with sedation by propofol in continuous intravenous infusion (3mg/kg/h).
Results: During all peri-operative period there were no related complications. The patient had an excellent control of post-operative pain (NRS 3) and after 12 hours he was discharged from the hospital.
Conclusions: The combination of US-guide UB with a sedation, allows to ensure a good analgo-sedation, with the possibility for the surgeon to operate also on deeper levels. The hemodynamic stability provided, is important to prevent the break of a clinical precarious balance, especially in the patient with severe CAD, with a better analgesia compared to the other standard techniques, as demonstrated by Wassef et al.

ESRA1-0312
Case Reports
SUCCESSFUL EPIDURAL ANAESTHESIA WITH CONSCIOUS SEDATION FOR A POST-TRAUMATIC LOWER LIMB FREE TISSUE TRANSFER RECONSTRUCTIVE PROCEDURE IN A SUPER OBSESE PATIENT (BMI 54)
Fendius A., Athanasoglou V., Pederson B.
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Background and aims: Epidural central neuraxial anaesthesia (CNA) is recognised as being of benefit in reconstructive lower limb surgery. Frequently, due to unpredictably long duration of free flap procedures, epidural anaesthesia (EA) is combined with general anaesthesia (GA). We present a case performed under EA and sedation (EA+Sed) for a patient with a Body Mass Index (BMI) 54 and obstructive sleep apnoea (OSA).
Methods: To avoid respiratory complications related to GA and systemic opioid use, we used EA+Sed as the anaesthetic technique. Conscious sedation was maintained with a target-controlled infusion of 1% propofol with plasma concentration target (Cpt) between 0.3 and 0.9 mcg/mL.
Results: The patient tolerated the prolonged procedure very well, with no respiratory, haemodynamic or metabolic adverse events. Importantly the patient was asked partway through to reposition herself to keep her upper body comfortable and relieve pressure areas, and was able to comply. On admission to the High Dependency Unit for overnight monitoring, she was, self-ventilating, pain free and ‘bright and alert’ and drinking shortly afterwards. The patient made a good recovery.
Conclusions: This technique offers significant advantages from free flap physiology and patients’ mental and physical recovery perspectives, though it has its own challenges. We advocate it as a technique of choice for post-traumatic orthoplastic lower limb surgery in suitable patients. There are significant advantages to the use of this technique in OSA patients. As far as we know this is the first case of a super obese patient undergoing lower limb free tissue transfer with EA+Sed.

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ESRA1-0320
Miscellaneous

DELAYS IN NECK OF FEMUR FRACTURE REPAIRS - REASONS?
Mohd Yusof M.1 1Anaesthesia, Chesterfield Royal Hospital, Nottingham, United Kingdom.

Background and aims: NICE recommends that neck of femur fractures should be repaired within 36 hours. We investigated that incidence of any delays and reasons for those delays in Chesterfield Royal Hospital.

Methods: Retrospective analysis of patients admitted with neck of femur fractures during August and September 2013.

Results: A third of patients did not meet the 36-hour target, with the main reason being lack of space on the trauma list.

Conclusions: Further comprehensive planning and discussions should take place to meet targets.

ESRA1-0321
Case Reports

SEVERE HYPOTENSION AFTER SPINAL ANESTHESIA: COULD AORTIC DISSECTION BE A DIFFERENTIAL DIAGNOSIS?
Cunha M.M.1, Tarroso M.J.1, Costa G.1, Pires A.C.1, Moura F.1 1Anaesthesiology, Centro Hospitalar Tâmega e Sousa, Penafiel, Portugal.

Background and aims: Hypotension is a common side effect of spinal anesthesia. It represents a normal physiologic response to sympathetic block. This complication usually has efficient treatment. However, decreased preload and stroke volume in a patient with silent aortic dissection may trigger hemodynamic compromise and cardiac arrest.

Methods: We present a case of a 79-year-old female, ASA III, with arterial hypertension, atrial fibrillation and chronic depression. She was scheduled for surgical treatment of a femoral fracture. After administration of 0.1 mg fentanyl, we performed a spinal block with 10 mg levo-bupivacaine 0.5%. Patient developed severe hypotension with tachycardia and hypoxemia resistant to phenylephrine and amiodarone. Patient was intubated and noradrenaline infusion at 0.33mcg/Kg/min was initiated.

Results: Surgical procedure was cancelled and the patient was transferred to Intensive Care Unit for further treatment. During investigation echocardiogram revealed normal sized cardiac chambers and small dilatation of ascending aorta. Since the patient showed no clinical improvement, an axial tomography was performed and confirmed aortic dissection (Stanford type B) was identified. After clinical decision, surgical correction was considered but the patient clinical state deteriorated rapidly.

Conclusions: Aortic dissection is a serious condition in which there is a separation of the layers within the aortic wall. Patients usually present with sudden severe chest pain. In this case, the patient was asymptomatic. Diagnosis was only suspected after sustained hemodynamic imbalance caused by spinal anesthesia. Hypotension is a frequent side effect but, if severe and sustained, more unusual diagnosis must be considered.

ESRA1-0322
Peripheral Nerve Blocks

COMPARISON BETWEEN SINGLE-SHOT FEMORAL NERVE BLOCK AND EPIDURAL TECHNIQUES FOR TOTAL KNEE ARTHROPLASTY: A RANDOMIZED CONTROLLED TRIAL
Cunha M.M.1, Preto C.1, Tarroso M.J.1, Costa G.1, Cardoso H.1, Moura F.1 1Anaesthesiology, Centro Hospitalar Tâmega e Sousa, Penafiel, Portugal.

Background and aims: Femoral nerve block has demonstrated to be similar to epidural analgesia with better adverse effect profile after total knee arthroplasty (TKA). PROSPECT guidelines do not recommend epidural analgesia as the first choice for patients undergoing TKA. One meta-analysis concluded that there was no further advantage in adding a sciatic nerve block or in having a continuous femoral infusion technique. The aim of this study was to compare epidural analgesia to single-shot femoral nerve block for TKA.

Methods: Thirty three patients were included in this randomized controlled trial. All patients received spinal anesthesia for surgery. An epidural catheter was placed preoperatively for postoperative analgesia in group A. An ultrasound-guided single-shot femoral nerve block was performed preoperatively in group B with 20 ml of ropivacaine 7.5 mg/mL. Pain scores and side effects were recorded 24 and 48 hours after surgery.

Results: Pain scores during movement were higher in group B (median numeric pain scale 24 hours 2[0–7] vs 4[0–8], P = 0.024; 48 hours 2.5[0–8] vs 4[1–6], P = 0.373). Group B had significantly higher rescue analgesic consumption at 24 hours evaluation (P < 0.001). This group had a better side-effect profile with less pruritus, nausea and vomiting, especially at 24 hour evaluation (P < 0.05). Patients from both groups did not differ significantly in surgery expectations and satisfaction.

Conclusions: Despite current recommendation for single-shot femoral nerve block, we found that these patients have significantly higher pain scores at 24 hours. This analytic technique had a better side effect profile but it was not as effective as epidural catheter for TKA. However, these should be confirmed in larger trials.

ESRA1-0324
Case Reports

PRE-OPERATIVE EPIDURAL PLACEMENT COMPLICATED BY SUBDURAL BLOCK
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Background and aims: Subdural block placement is a rare, but documented complication of attempted epidural placement. Classically, these blocks are described as a delayed sensory block reaching the cervical level after lumbar injection of local anesthetic with an associated decrease in blood pressure.

Methods: 49-year-old male presented for VATs removal of right upper lobe nodule. His past medical history was significant for seizures and thyromma resection complicated by deep venous thrombosis. The patient was consented for pre-operative thoracic epidural placement for post-operative pain management.

Results: Epidural placement was performed in sterile fashion in sitting position at T7-8 level via a right paramedian approach. Using a loss of resistance to air technique the epidural space was identified. An epidural catheter was threaded easily. 1ml of 1% lidocaine was injected through the catheter. Immediately the patient complained of right arm and leg weakness. Vital signs were notable for hypertension. Epidural catheter was removed. Within five minutes the patient’s symptoms began resolving. His exam was normal by the time he went for emergent head CT scan, which was normal. MRI brain and MR Arteriogram head and neck were also performed, which were negative for acute embolic, ischemic or hemorrhagic stroke or other intracranial injury.

Conclusions: Our patient did have some typical characteristics of the subdural block. Fortunately, the patient did not develop intracranial extension of the block, respiratory impairment or change in consciousness. The onset was immediate and the resolution of symptoms fast. Interestingly, the patient developed hypertension, rather than hypotension, which has traditionally been described.

ESRA1-0325
Case Reports

SUCCESSFUL PROLONGED SURGICAL ANAESTHESIA WITH VERTICAL INFRA-CLAVICULAR BLOCK WITHOUT SEDATION: THE IMPORTANCE OF PATIENT CHOICE AND CHALLENGES IT POSES FOR THE ANAESTHETIST
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Background and aims: Discussing anaesthetic options with patients and respecting their choice is of paramount importance but may pose challenges for the anaesthetist. We report a case where a patient insisted on regional anaesthesia (RA) without sedation for pronged surgery.

Methods: A 48-year old man presented for a complex forearm reconstruction. He refused general anaesthesia (GA) and sedation because of previous ‘very traumatic experience’, prolonged recovery and severe sore throat after GA. He was also ‘very disappointed’ that his wishes were been ‘listened to’ previously. The challenges for the anaesthetist were to choose the appropriate block and ensure it was successful as a solo technique for prolonged surgery under tourniquet.

Results: A peripheral nerve stimulator guided vertical infra-clavicular block (VIB) was performed with 30 ml 0.75% ropivacaine, providing excellent...
surgical anaesthesia for an over 5 h operation and postoperative analgesia. The patient was extremely satisfied and volunteered for postoperative videointerview. According to him, he ‘immediately’ felt well after surgery, was not ‘put down from the anaesthetic’, neither needed postoperative opiates nor experienced cognitive side-effects, and could eat and drink straightaway.

Conclusions: The advantages of VIB, sometimes called a ‘spinal of the arm’ include lower likelihood of tourniquet pain during surgery, faster onset, better surgical effectiveness and fewer adverse events. VIB is a feasible option as the sole technique for prolonged upper limb surgery under tourniquet and provides excellent patient satisfaction. Whilst patient choice of RA should be respected, other methods of distraction or relaxation during RA might be available in future for patients declining sedation during effective RA.

ESRA1-0326
Peripheral Nerve Blocks

INTERSCALENE BRACHIAL Plexus Block for Surgical Repair of a Clavicular Fracture: Anesthetic Option

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Background and aims: The sensory innervation of the clavicle remains controversial. The supraclavicular, subclavian, and long thoracic/suprascapular nerves, alone or together, may be responsible for pain transmission after clavicular fracture and surgery. Peripheral nerve blocks used to anesthetize the clavicle include superficial cervical plexus block (SCPB), interscalene brachial plexus block (ISPB), and combined SCPB - ISPB. We describe a case where the correction of clavicular fracture was performed under ISPB.

Methods: A 39 year old man, ASA-II (Smoking), proposed for surgical repair of clavicular fracture (Fig 1). Medical history and preoperative laboratory test showed no alterations.

Results: ISSPB was performed with peripheral nerve stimulation using 300 mg of mepivacaine (20 ml), 50 mg of levobupivacaine (10 ml) and 150 mcg of clonidine (1 ml). After checking adequate sensory block the surgical procedure was started and lasted about 1 h.

When surgical retractors were placed in medial clavicular region a slight discomfort was felt, having the patient been sedated with 40 mg of propofol and 0.75 mg of alfentanil for an adequate surgical anestesia.

Conclusions: The innervation of the clavicle remains a challenge for their surgical approach with peripheral nerve blocks. In this case, above a good anesthetic level, a light sedation was needed for the medial clavicular approach, which may indicate that besides the ISPB, the patient may benefit from both SCPB.

ESRA1-0328
Chronic Pain Management

ENDOMETRIOSIS INFLUENCES ON THE PERCEPTION OF SOCIAL ASPECTS IN WOMEN FOLLOWED UP IN THE OUTPATIENT PAIN HCFMRP - USP, BRAZIL

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Background and aims: The symptoms associated with endometriosis and chronic pelvic pain can impact on the welfare of the physical, emotional and social health, so it is essential evaluate women’s complaints, and give you time to express their concerns and anxieties, the order to individualize the experience of pain. Due to its chronic and progressive condition, endometriosis causes symptoms that impair daily life of women suffering from this painful condition. Therefore, our objective was to investigate the social meanings of chronic pain on the lives of women affected by endometriosis.

Methods: This is a qualitative study based on interviews with focus groups, where women collectively expose their pain experience. The study sample consists of women with endometriosis and chronic pelvic pain, which were selected by surgical confirmation and frequent monitoring, for at least six months, in the hospital's outpatient clinic.

Results: The analysis of the transcripts revealed four emergent themes, in other words, they arose during the focus sessions, related to the social impact of pain in women affected by endometriosis, which are: 1) uncertainty and discouragement before the work activity; 2) social isolation; 3) emotional and sexual embattlements; 4) environmental degradation family.

Conclusions: Regarding social perspective, our findings found that women with chronic pain showed discouragement, insecurity, inferiority, unwillingness to leave home and also it difficult to relate to people who were not part of your routine.

ESRA1-0329
Obstetric

FAILURE OF NEURAXIAL BLOCKADE IN CAESAREAN DELIVERY ANAESTHESIA: RETROSPECTIVE STUDY OF INCIDENCE AND ATTITUDES AFTER FAILURE

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Background and aims: The neuraxial blockade (NAB) is preferred over general anaesthesia (GA) for caesarean surgery (CS) and it’s failure represents an increased risk. The aim of this study was to identify the most frequent attitudes after NAB’s failure in CS.

Methods: Retrospective study performed in 1380 pregnant women undergoing elective or urgent CS under NAB. Women submitted to epidural block (EB), single shot subarachnoid block (ssSAB) and subarachnoid block under sequential technique (SABst) were included. Caesareans performed under GA as first choice were excluded. We considered NAB’s failure when there was conversion to GA, sedation or local anesthetic administration in anesthetic dose through an epidural catheter (LAADEC) after SABst. Descriptive analyses, t-test and Chi² test were performed.

Results: The incidence of NAB’s failure was 5.6% in elective CS and 14.6% in urgent CS. In urgent caesareans, the EB was the most used NAB (73.8%), and the technique with more failure (17.2% vs 7.4%, p <0.001). In elective caesareans, the SAB was the most used NAB (97.3%), and the technique with more failure (5.7% vs. 0%, p = 0.394). The most common attitude after NAB’s failure, in urgent caesareans, was the conversion to GA (55.6%), followed by sedation (37.8%) and LAADEC after SABst (5.2%). For elective caesareans, was the LAADEC after SABst (64%), followed by conversion to GA (20%) and sedation (16%).
Conclusions: The incidence of NAB’s failure was higher in urgent caesareans. The conversion to GA was the most frequent attitude in urgent caesareans and LAAADEC after SABst in elective caesareans.

ESRA1-0331
Case Reports

PALMITOLEYLAMIDINA IN NEUROPATHIC OCULAR PAIN
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Background and aims: The Palmitoleylamidina (PEA) is a synthetic component to normalize the degranulation of mast cells. There is wide clinical experience with PEA and neuropathic pain related to low back and sciatic pain, but it is nothing related to ophthalmologic postoperative mixed pain.

Methods: A 51-year-old fit and healthy male presented for open reduction of a left shoulder fracture. An awake, ultrasound-guided, ISBPB was performed with 1% lidocaine infusion at 14 mL per hour via the catheter with propofol sedation achieving a T10 dermatomal level. Surgical anesthesia was achieved with a 15 ml of 0.375% levo-bupivacaine prior to induction of general anaesthesia in 300 mg of methadone, tramadol and atropine.

Results: The conversion to GA was the most frequent attitude in urgent caesareans and LAAADEC after SABst in elective caesareans.

Conclusions: In patients with morbid obesity, asthma and chronic pain, a regional technique can be highly advantageous. In this patient, we successfully utilized caudal catheter as our primary anesthetic and analgesic.

ESRA1-0334
Peripheral Nerve Blocks

A PROSPECTIVE, RANDOMIZED COMPARISON BETWEEN LATERAL AND POSTERIOR PARASAGITTAL IN-PLANE TECHNIQUE ULTRASOUND-GUIDED INFRACLAVICULAR BRACHIAL PlexUS BLOCK
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Background and aims: Current approach to ultrasound-guided infraclavicular brachial plexus block ie. lateral parasagittal in-plane technique is less popular due to the steep angle of needle trajectory to the ultrasound beam which can severely limit needle visualization. Recently, a new posterior approach was introduced. This prospective, randomized study compared the lateral and posterior parasagittal in-plane technique ultrasound-guided infraclavicular block for upper limb surgery.

Methods: After obtaining approval from the Medical Ethics Committee, University of Malaya Medical Centre (IRB reference no. 949.14 dated 17 October 2012), patients scheduled for upper limb surgery were randomized to receive an ultrasound-guided infraclavicular block either by lateral (n = 23) or posterior (n = 23) parasagittal in-plane approach. The main endpoint was the success rate. Other endpoints were the performance time (sum of imaging and needling time), total anesthesia-related time (sum of performance and onset time), quality of anesthesia and presence of any complications. An additional cadaveric study was also conducted to complement the findings.

Results: Both techniques, lateral vs posterior parasagittal had comparable success rate, 91.3% vs 95.0%. There were no differences in needling, performance, onset and total anesthesia related times found between the two groups. No differences in terms of adverse events were observed. Both techniques showed similar trend of nerve blockade in terms of sensory and motor blocks profile. In the cadaveric study, both techniques showed similar distribution and spread pattern of the methylene blue stain.

Conclusions: The posterior parasagittal in-plane technique ultrasound-guided infraclavicular block did not offer significant advantages over the lateral parasagittal in-plane technique.
2. Air embolism: never described in shoulder surgery.
3. Carotid sinus stimulation during traction: possibly related to the head harness used.
4. The Bezold-Jarisch reflex: a triad of bradycardia, hypotension and bradypnoea characterized by profound vagotonia and syncopa.

The latter was felt to be the most likely explanation. In order to decrease risk we suggest that:
- Shoulder surgery in the deckchair position be treated as intermediate risk surgery and staffed accordingly.
- A head support be used rather than a harness.
- Hypotension should be treated with ephedrine and a vagolytic, to avoid an exaggerated Bezold-Jarisch reflex.

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**ESRA-03400**

Postoperative Pain Management

**THE ANTINOCEPTIVE EFFECT OF LIGHT EMITTING DIODE IRRADIATION ON INCISED WOUND IS VIA INHIBITION OF CYCLOXYGENASE-2 ACTIVITY**

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**Background and aims:** Light emitting diode (LED) phototherapy has attracted attention for reducing pain and inducing tissue repair through several mechanisms. Optimal postsurgical pain therapy remains a challenge for physicians. The analgesic effect of LED on incised wound has not been examined. In this study, we examined the analgesic effect of LED therapy on incised pain and the change of COX-2 and PGE2 after LED therapy.

**Methods:** The animal protocols were approved by the Institutional Review Board of I-Shou University, Kaohsiung, Taiwan. The rats were randomly assigned to the following groups. Rats received LED therapy 6 days before incision (LI group) or 6 days after incision (IL group) or from 3 days before to 3 days after incision (LIL group) and skin incision only (I group). Thermal hyperalgesia and mechanical alldynia were tested 1 day after incision in LI and I groups or after LED therapy in the other groups; skin tissues were collected for RNA and protein analysis (COX-2 and PGE2 [6 groups]) after behavior test. The RNA and protein analysis are performed by real time quantitative PCR and western blot.

**Results:** Significant thermal hyperalgesia (lower thermal withdrawal latency) was noted in I group compared with the other three LED-treated groups. The expression of COX-2 and PGE2 were significantly decreased in the three LED-treated groups compared with I group.

**Conclusions:** We concluded LED therapy could relieve thermal hyperalgesia on incisional wound and the analgesic effect is possibly produced by inhibiting the expression of COX-2 and PGE2.

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**ESRA-0342**

Case Reports

**SYSTEMIC TOXICITY BY LOCAL ANESTHETIC IN PEDIATRIC PATIENT—CASE REPORT**

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**Background and aims:** The systemic toxicity of local anesthetic (LA) is rare, potentially fatal and the main causes are inadvertent subarachnoid or intravascular injection, overdose and systemic absorption. There are serious situations, whose signs and symptoms arise from non-specific and/or late form. The aim of this presentation is to give emphasis on signs and symptoms of this rare complication and method of operation in these cases.

**Methods:** A boy, 12 years old, ASA I was proposed for surgical correction of pectus excavatus. General balanced anesthesia and thoracic epidural block was performed. Two bolus of ropivacaine 3.75 mg / ml were administered. In the immediate postoperative period was extubated and taken to the Intermediate Care Unit of Pediatrics (UCIPed), conscious, pain free under epidural ropivacaine infusion. After 18h, showed sudden change of consciousness and apnea, the situation reversed with manual inflator. This was followed by a state of disorientation, hallucinations, nystagmus, visual changes, excessive sweating, vomiting and hypertension. The situation gradually reversed upon discontinuation of epidural infusion. Requested observation Anesthesiology found that the catheter was intravascular.

**Results:** The Protocol of toxicity AL hospital was activated - the suitcase was moved to UCIPed. The clinical situation was in reverse and it was decided to postpone the infusion. After 12 hours without new episodes, the protocol has been disabled.

**Conclusions:** Faced with this epidiural complication, early recognition and immediate action are essential. Specific treatment includes intravenous lipid emulsion.

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**ESRA-0346**

Peripheral Nerve Blocks

**COURSE PARTICIPANTS’ PERSPECTIVE ON USE OF FRESH CADAVERS AS A TEACHING TOOL FOR ULTRASOUND-GUIDED REGIONAL ANAESTHESIA**

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**Background and aims:** Teaching the practical skills of ultrasound-guided regional anaesthesia (UGRA) is challenging. To enhance learning, the closest anatomical are fresh human cadavers, allowing block practice without risk to patients. The aim of this study was to assess the satisfaction with fresh cadavers as a teaching tool for UGRA compared to anasthetists’ experience of live patients.

**Methods:** Part of our UGRA course involves participants practicing peripheral nerve blocks on fresh cadavers under expert supervision. Participants and faculty attending the course in November 2012 and July 2013 completed a 10-item questionnaire. Agreement with each statement was indicated on a 5-point Likert scale.

**Results:** Questionnaires from 53 anaesthetists were analysed. A summary of the results is shown in Table 1. Overall satisfaction was high; of all responses, 484 out of 530 items (91%) agreed or strongly agreed with the statements. There was no difference in the answers to the any question between the faculty and candidates (p=0.2, Mann-Whitney U test).

**Conclusions:** We found high levels of satisfaction with the use of fresh cadavers to teach UGRA. Both experienced faculty members and less experienced participants agreed they offered realistic scanning and needling conditions, similar to UGRA in live patients. This study supports the use of fresh cadavers in the teaching of peripheral nerve blocks.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response range*</th>
<th>Agree/strongly agree n (%)</th>
</tr>
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<tbody>
<tr>
<td>The look and feel of tissues on fresh cadavers (tactile feedback) was similar to live human tissue</td>
<td>2-5</td>
<td>45 (85)</td>
</tr>
<tr>
<td>It was easy to scan the tissue on fresh cadavers using ultrasound</td>
<td>2-5</td>
<td>46 (87)</td>
</tr>
<tr>
<td>Anatomic structures are clearly visualised (muscles, tendons, nerves) in fresh cadavers</td>
<td>2-5</td>
<td>48 (91)</td>
</tr>
<tr>
<td>Image quality during scanning on fresh cadavers was realistic and similar to human model</td>
<td>2-5</td>
<td>42 (79)</td>
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<tr>
<td>It was easy to manipulate the needle in the tissue of fresh cadavers</td>
<td>2-5</td>
<td>47 (89)</td>
</tr>
<tr>
<td>Needle visibility in the tissues of fresh cadavers is good</td>
<td>2-5</td>
<td>52 (98)</td>
</tr>
<tr>
<td>It was easier to inject normal saline around the nerve in fresh cadavers</td>
<td>3-5</td>
<td>50 (94)</td>
</tr>
<tr>
<td>It was easy to assess perineural spread of LA (saline) in fresh cadaver tissues</td>
<td>3-5</td>
<td>51 (96)</td>
</tr>
<tr>
<td>Fresh cadavers give a realistic setting for performing/learning nerve blocks</td>
<td>2-5</td>
<td>51 (96)</td>
</tr>
<tr>
<td>Fresh cadavers are an effective way of learning nerve blocks using ultrasound</td>
<td>3-5</td>
<td>52 (98)</td>
</tr>
</tbody>
</table>

* 1=strongly disagree; 2=strongly agree; 3=undecided; 4=agree; 5 strongly agree
the use of fresh cadavers as a teaching tool for ultrasound-guided nerve blocks.

ESRA1-0347
Postoperative Pain Management

COMPARISON OF ANALGESIC EFFICACY OF PREPERITONEAL CONTINUOUS INFUSION CATHETER WITH EPIDURAL ANALGESIA FOR UPPER ABDOMINAL SURGERY WITH SUBCOSTAL APPROACH
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Background and aims: Thoracic epidural analgesia (EA) has been considered the gold standard in providing pain relief after abdominal surgery.

Continuous wound infiltration (CWI) of local anesthetics, using a catheter placed in the preperitoneal space has been compared with EA for abdominal surgery in many studies obtaining different results.

Methods: All patients gave written consent to use their medical records for investigations purposes.

We reviewed 32 patients that underwent cholecystectomy or splenectomy performed by subcostal incision between years 2012-2013.

Data about age, ASA classification, intra-operative and postoperative opioid consumption, pain 24 and 48 hours after surgery, postoperative nausea and vomiting, major complications and length of hospital stay were collected.

Results: 13 patients received postoperative analgesia with Levobupivacaine 0.375% via preperitoneal catheter placed by surgeons between parietal peritoneum and transversus abdominis fascia.

The 19 remaining patients had epidural analgesia via a catheter placed T7-T9 with a continuous infusion of Levobupivacaine 0.125%.

Groups were comparable in terms of age and ASA classification.

All patients received a Sevoflurane and fentanyl based general anesthesia.

There was no significant differences on opioid requirement in postoperative care unit (PACU), VAS score 24 and 48 h after surgery, nausea and vomiting, complications or length of hospital stay.

Conclusions:
- CWI of local anesthetics may be an effective alternative to epidural infusions for providing postoperative analgesia after upper abdominal surgery.
- The CWI based analgesia has the advantage over the EA of being placed after surgery, so it can be a good alternative method when open surgery was not planned.

ESRA1-0352
Peripheral Nerve Blocks

ILIOINGUINAL NERVE BLOCK - ANAESTHETIC TECHNIQUE FOR OPEN INGUINAL HERNIA REPAIR
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Background and aims: Open inguinal hernia repair is a commonly used surgical procedure. It's associated with moderate postoperative acute pain and to the chronification of this process. The anaesthetic choice depends on a variety of factors, but the PROSPECT group recommends peripheral nerve blocks, such as the ilioinguinal nerve block, as a single anaesthetic technique.

Methods: The authors present 10 selected patients who underwent open inguinal hernia repair under ilioinguinal anaesthetic block associated with mild sedation. With ultrasound guidance, it was administered 0.3 ml per kg of 0.25% levobupivacaine, and intravenous paracetamol added.

Results: At the recovery room, there was no need of additional analgesic drugs. There were no complications of the procedure.

Conclusions: Despite underused, peripheral nerve anaesthetic blocks diminish postoperative acute pain, postoperative systemic analgesic consumption and nausea and vomiting incidence. On open inguinal hernia repair, the ultrasound guided ilioinguinal nerve block offered adequate anaesthetic conditions, excellent analgesic effect and a prompt recovery, without complications. With this report, the authors strengthen the evidence-based results and motivate other colleagues to the current practice of this technique, which is simple, safe and very well tolerated by the patients.

ESRA1-0356
Case Reports

THE ANAESTHETIST AND SONOPATHOLOGY
Frutuoso de Carvalho R1, Barros A.L1, Cordeiro L1, Silva A1, Segura E1, Assunção J.P1.1 Anaesthesiology, Centro Hospitalar Tondela-Viseu EPE, Viseu, Portugal.

Background and aims: Lately, ultrasonography has gained priority in anaesthesia, being as applied in regional anaesthesia, pain treatment, vascular assessment and in emergent situations. Nowadays, its use is focused on regional techniques, with the identification of vascular or nervous structures as the main goal of the anaesthetist. The more the anaesthetist manipulates the technique, the more he is aware of artefacts, anatomic variations and sonopathology as well.

Methods: The authors describe thyroid gland sonopathology detected during ultrasound guided interscalene anaesthetic blocks and central venous assessment.

Results: All patients were carefully studied, referenced to other specialties, being then confirmed thyroid gland pathology.

Conclusions: Being ultrasonography an useful, innocuous and portable technique, it may be used in routine practice of an anaesthetist. Although there are few reports of atypical findings during ultrasound techniques in anaesthesia, the authors reassure the importance of the widening of the anaesthetist's knowledge on ultrasound artefacts and anatomic variations, making it possible to offer a diagnosis and a treatment, strengthening the importance of the anaesthetist on the perioperative scene.

ESRA1-0357
Postoperative Pain Management

ENHANCED RECOVERY WITH CONTINUOUS SELECTIVE SENSORY FEMORAL NERVE CATHETER FOR TOTAL KNEE ARTHROPLASTY
Thomas W1, Lo P1.1 Anaesthesics, Dudley Group of Hospitals NHS Foundation Trust, Birmingham, United Kingdom.

Background and aims: Continuous Femoral nerve block may provide superior analgesia after total knee arthroplasty but can produce muscular weakness of the quadriceps making postoperative mobilization difficult. In this prospective case series we evaluated the selective placement of femoral catheter nearer the sensory components of the nerve would reduce motor block making immediate postoperative ambulation possible.

Methods: 50 ASA I to III patients scheduled for primary total knee replacement received a femoral nerve catheter that was placed medially as anterior branch is given off on ultrasound imaging of the femoral nerve in the inguinal region and one shot sciatic block was given as part of the multimodal analgesia regimen. Spinal analgesia was administered for surgery with TCI propofol as sedation. 0.2% Ropivacaine infusion was started at 6 ml/hour after giving a bolus of 10 ml prior to completion of surgery. Multimodal analgesia with Oxycontin, oral morphine and NSAIDS were prescribed. The main outcomes looked at were the pain scores, postoperative oral morphine consumption. Time to first mobilization, ease of physiotherapy, complications were also noted.

Results: All patients who had the femoral catheter inserted and functioning were pain free during the postoperative period. Most patients were mobilised within 4 hours after surgery. In a few patients the catheter was misplaced or fell out. Majority of patients felt numbness but with good quadriceps control. Motor blockade preventing mobilization was noticed in less < 1% patients.

Conclusions: Selective sensory placement of femoral nerve catheter good pain scores and improves early mobilization in total knee arthroplasty.

ESRA1-0360
Peripheral Nerve Blocks

CAN A COMBINED SUPRASCAPULAR AND INFRACLAVICULAR NERVE BLOCK IMPROVE FOREARM POSITIONING IN DORSAL HAND SURGERY?
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Background and aims: Upper limb positioning for dorsal hand surgery involves shoulder abduction, elbow extension and forearm pronation. Patients subjected to a lateral and sagittal infraclavicular block (LSIB), exhibit forearm supination which hampers optimal positioning. We believed that this occurs due to external rotation of the shoulder caused by the infraspinatus muscle, innervated by the suprascapular nerve (SSN). We hypothesized that a SSN block (SSNB) would improve positioning. We aimed to record wrist angulation and evaluation of hand positioning with or without the SSNB.

Methods: This double-blinded study was approved by the regional ethical committee of North Norway. 30 patients (inclusion criteria 18–70 years, BMI 20–36 kg/m², ASA I-II) were randomized to SSBN (4 ml ropivacaine 5 mg/ml) + LSIB (31 ml ropivacaine 7.5 mg/ml) or SSNB (4 ml NaCl 9 mg/ml, placebo) + LSIB (31 ml ropivacaine 7.5 mg/ml). The SSN was identified supraclavicularly (Siegenthaler et al. 2012) using a 15–6 MHz linear ultrasound probe (Sonosite Edge), confirmed by a nerve stimulator (Stimuplex® HNS12). Patients lay supine with the shoulder abducted 75°, elbow fully extended and forearm pronated. Wrist angulation was measured using an electronic level during positioning before and 30 minutes after the block. The surgeons graded hand positioning right after the operation.

Results: Evaluation of the hand position was significantly better with the combined block (p=0.04). Wrist angulation was not significant different between the groups (p=0.25).

Conclusions: In dorsal hand surgery a combined SSNB and LSIB approach improved forearm positioning. A significant difference in wrist angulation measurements did not appear.

ESRA1-0361
Postoperative Pain Management

ENHANCED RECOVERY AFTER JOINT REPLACEMENT SURGERY: THE MILTON KEYNES EXPERIENCE

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Background and aims: This audit describes our results for an enhanced recovery program for joint replacement surgery based on the modification of the Caledonian Pathway. Patients receive an educational program from physiotherapists before admission, and are premedicated with gabapentin, dexamethasone, and transdermal fentanyl. IV transaxemic acid is administered at induction. Spinal anaesthetic block (SAB) is administered unless contraindicated. Postoperative analgesia consists of regular oxycodone with further doses for breakthrough pain and regular simple analgesics.

Methods: Retrospective data collection from electronic patient records was performed for 120 patients having undergone hip or knee replacement surgery in Milton Keynes Hospital over a 3 month period (Dec 2013-Feb 2014). The audit was registered with our audit department, who confirmed ethics committee approval was not required.

Results: 39% of operations were hip replacements, 61% were knee replacements. Mean patient age was 67. In 45% of cases, all premedications were administered as per protocol. In a further 33% all premedication other than transaxemic acid was given. 82% had SAB, 2% had lumbar plexus block. Postoperatively, oxycodone was the only opiate received by 94% of patients: 5% required no opiates. Mean pain score in the first 4 days post op was 1.8/10 in patients receiving SAB. 1.8/10 for patients having GA alone. Postoperative nausea and vomiting was experienced by 21% and 5% of patients respectively. Mean length of hospital stay was 4.06 days.

Conclusions: Implementing an enhanced recovery program for joint replacement surgery, including the use of regional anaesthesia, produces low postoperative pain scores, nausea/vomiting rates and length of stay.

ESRA1-0362
Postoperative Pain Management

MODELING THE TRAJECTORY OF ANALGESIC DEMAND OVER TIME AFTER TOTAL KNEE ARTHROPLASTY USING THE LATENT CURVE ANALYSIS

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Background and aims: Patient-controlled epidural analgesia (PCEA) is commonly used for pain relief after total knee arthroplasty (TKA). This study aimed to model the trajectory of analgesic demand over time after TKA and explore its influential factors using latent curve analysis.

Methods: Data were retrospectively collected from patients receiving unilateral or bilateral TKA and postoperative PCEA. PCEA demands during 12-hour intervals for 48 hours were directly retrieved from infusion pumps. Demographic variables and infusion pump settings were also collected. A latent curve analysis with two latent variables, the baseline (intercept) and trend (slope), was applied to model the changes in PCEA demand over time. The effects of influential factors on these two latent variables were estimated to inspect the interaction with time to alter the trajectory of PCEA demand.

Results: The difference in analgesic demand between the first and second 12-hour intervals was only 15% of that between the first and third 12-hour intervals. No significant difference was noted between the third and fourth 12-hour intervals. Age had a negative effect on the intercept parameter but body mass index and infusion rate exerted positive effects on it. Only gender significantly affected the slope parameter and males tended to have a smoother decreasing trend of analgesic demands over time. Patients receiving bilateral procedures did not consume more analgesics than their unilateral counterparts. Goodness of fit analysis indicated acceptable model fit to the observed data.

Conclusions: Latent curve analysis provided valuable information about how analgesic demand after TKA changed over time and how patient characteristics affected its trajectory.

ESRA1-0366
Chronic Pain Management

COMBINED STRATEGY OF SPINAL CORD STIMULATION, PERIPHERAL LOCOREGIONAL ANAESTHESIA AND PHARMACOLOGICAL THERAPY IN SYSTEMIC SCLEROSIS WITH CRITICAL ISCHEMIA OF THE LIMBS: A CASE REPORT

De Iaco M.1, Antiville M.G.2, Battellino M.2, Sarzi-Puttini P.C.2, Corona A.1, Catena E.1, Intensive Care Unit and Pain Service, Luigi Sacco Hospital Milano Italy, Milan, Italy, 1Rheumatology Unit, Luigi Sacco Hospital Milano Italy, Milan, Italy.

Background and aims: Systemic Sclerosis (SSc) is a connective tissue disease presenting with variable degrees of digital ischemia, from Raynaud’s Phenomenon (RP) to digital gangrene, and a spectrum of visceral manifestations, including pulmonary fibrosis and intestinal malabsorption. We report a case of SSc with severe vascular complications treated with a spinal cord stimulator (SCS) in combination with peripheral locoregional anesthesia and pharmacological therapy.

Methods: Case report.

Results: A 73-old woman with a 4-year history of limited SSc (I-II) with severe RP of the hands and critical leg ischemia related to both microcirculatory disease and peripheral arterial occlusive disease (Leriche-Fontaine stage IV) presented with intense pain, insufficiently responding to analgesics and intravenous prostaglandin. A Sinergy Versitted® (Medtronics®) SCS with 2 quadrupolar leads (C3-C5 and T9-T11) was subsequently implanted, which resulted in improvement of RP of the hands and significant relief of pain in the legs (10→4 on a Visual Analogic Scale); residual pain was treated with a 5% lidocaine patch (Neurodol®, Grunenthal®). Sufficient control of pain was obtained until progression of bilateral leg ischemia occurred three months later, which required the local infusion of ropivacaine through bilateral perineural catheters (Pajunk®). Further progression of left leg ischemia was eventually slowered, whereas right leg ischemia required amputation of the limb.

Conclusions: A combination of spinal cord stimulation and systemic and locoregional anaesthetics may be helpful in the management of severe pain in SSc patients with complex vascular complications.

ESRA1-0367
Peripheral Nerve Blocks

PROXIMAL APPROACHES TO SHOULDER BLOCK: TECHNICAL DESCRIPTION AND INITIAL EXPERIENCE

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Background and aims: Shoulder block (combined suprascapular and axillary nerve blocks) is one of the phrenic nerve sparing analgesic strategies offered to
patients undergoing arthroscopic shoulder surgery. Un-satisfactory performance of the shoulder block in previous studies may be either due to targeting of these nerves after the articular branches are given off. We wanted to develop a technique of targeting shoulder innervation proximally with an anterior approach.

Methods: Suprascapular, axillary, subscapular and lateral pectoral nerves were traced proximally in 3 human volunteers. The technique of anterior approach to suprascapular and axillary nerve blocks was combined with the PECS-1 block. The performance and characteristics of the anterior approach to suprascapular and axillary nerve block were recorded in a patient undergoing arthroscopic shoulder stabilization.

Results: The suprascapular nerve was noted to originate from the lateral edge of the brachial plexus in the supraclavicular region travelling posteriorly. The axillary nerve was visualized as a hypercohesive structure lateral to posterior cord in the infracavicular region at the level of coracoid process. The block was performed on a 24 year old male undergoing anterior shoulder stabilization with a single attempt (block performance time of 12 minutes) using the combined neurostimulation and US guidance. The sensory and motor blockade was limited to suprascapular, axillary and lateral pectoral nerve distribution. Time to first analgesia was 14 hours.

Conclusions: Proximal approaches to suprascapular and axillary nerves is feasible for arthroscopic shoulder surgery. Targeting shoulder innervation proximally may circumvent disadvantages of the traditional approaches of shoulder block and provide better coverage of shoulder innervation.

ESRA1-0374
Pediatric
TUNNELED CATHETERS IN THE PEDIATRIC POPULATION
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1Área de Anestesiologia, Centro Hospitalar de Lisboa Central-Hospital de Dona Estefânia, Lisboa, Portugal.

Background and aims: Continuous infusions of local anesthetics are widely used for analgesia in children. The use of tunneled catheters (TC) has the advantage that analgesia can be extended, may decrease the catheter dislodgement and the spread of infection.

The aim of the study was to demonstrate the efficacy and safety of TC in the management of pain in the pediatric population.

Methods: Retrospective study of patients who received TC during the year of 2013.

Twenty charts were analyzed regarding: age, ASA status, type of surgery, efficacy of pain management, catheter duration, drugs administered and complications.

Results: Three catheters were placed thoracic, 15 lombar and 2 in the sciatic nerve. Catheters remained in place for a median of 5,45 ± 4,94 days (range 1-20) and the longest duration was seen in the sciatic catheters. They were removed when pain no longer justified the use of the catheter or by the time of discharge (n=19) and one was accidentally dislodged.

No serious complications were acknowledged especially cardiorespiratory, infection or others. Almost all patients had their pain well controlled, in a multimodal scheme.

Two patients had nausea/vomiting, two had pruritus and three needed incremental doses of local anesthetic.

Conclusions: Even though our study has a small number of subjects, this technique proved to be effective and safe in patients with extended needs of analgesia with only minor complications that were not related directly with the tunnelization.

ESRA1-0375
Pediatric
COULD A TEST DOSE HELP US?
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1Área de Anestesiologia, Centro Hospitalar de Lisboa Central-Hospital de Dona Estefânia, Lisboa, Portugal.

Background and aims: Regional anesthesia is usually performed in children under general anesthesia (GA)/sedation. Inadvertent intravascular placement is a known complication of neuroaxial anesthesia/analgesia. If unrecognized may cause severe complications.

Methods: We report a case of a 1 month-year-old child in whom an intravascular placement of the catheter was noted.

Results: A child aged 1 month with the diagnosis of malrotation was presented for an exploratory laparotomy. A caudal epidural with catheter was performed. There was no gravity free flow of blood neither blood aspirated and a 0,2% ropivacaine bolus was administered. During the surgery heart rate increased intermittently and another local anesthetic (LA) bolus was administered through the catheter, preceded by negative aspiration. At the end of the surgery a ropivacaine perfusion was initiated. A systemic inadequate perfusion was perceived by low pulse oximetry and cold mottled skin.

We suspended the perfusion and performed another aspiration test which was positive this time. The catheter was removed and the child fully recovered with no sequelae.

Conclusions: The catheter was placed uneventfully, without suggestion of intravascular location. Migrations of catheters to blood vessels have been described and could be an explanation. During surgery tachycardia suggested that the catheter was not optimally placed and it could be already intravascular.

Since GA may mask the symptoms of intravascular injection of LA and it is difficult to assess motor block in infants, the use of a test dose does not guarantee the correct placement of a catheter and we don’t routinely perform it. Test dose in infants remains controversial.

ESRA1-0376
Case Report
SPINAL ANESTHESIA IN FORMERLY PREMATURE INFANTS: A CASE REPORT
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1Anesthesiology, CHLC EPE-Hospital Dona Estefânia, Lisboa, Portugal.

Background and aims: Spinal anesthesia (SA) in preterm infants has important advantages when compared with general anesthesia. In the current literature, there are reports of successful use of SA for infraumbilical and upper abdominal surgery in preterm neonates and former preterm.

Methods: We report a case of spinal anesthesia in a former preterm infant. An informed written consent was obtained from parents.

Results: We present a case of relapsed inguinal hernia successfully repaired under SA in a 7-months-old preterm male (gestational age of 24 weeks) with severe bronchopulmonary dysplasia. The SA was performed under spontaneous breathing with light sevoflurane sedation. After positioning the child in the sitting position with minimal neck extension and sterile preparation, 0,5mg/kg of 0,5% Levobupivacaine was injected. The surgery was initiated after confirmation by pinprick that he didn’t feel pain. At the end of surgery an ultrasound guided ilioinguinal and iliohypogastric nerve block was performed using 2ml. 0,125% levobupivacaine for postoperative analgesia. The surgery and the preoperative period were uneventful.

Conclusions: Preterm infants have a higher risk of postoperative apnea and bradycardia after general anesthesia until a post conception age of 60 weeks. The present case illustrates the feasibility and effectiveness of SA in a former preterm infant, with no occurrence of complications. SA may be a challenging technique that demands knowledge and experience because of the specificities of this block in this special population.

ESRA1-0381
Central Nerve Blocks
DOES PERIOPERATIVE HYPOTENSION INFLUENCE THE LENGTH OF STAY IN ELECTIVE TOTAL HIP REPLACEMENT PATIENTS? A SINGLE CENTRE OBSERVATIONAL STUDY
Varadran R.1, Bowen R.1, Packianathanwan B.1
1Anaesthetics, Hull Royal Infirmary, Hull, United Kingdom.

Background and aims: Enhanced recovery programmes have been implemented in many UK centres with a view to reducing hospital inpatient stay post operatively. Particularly the length of hospital stays for elective hip and knee arthroplasties, with total hip replacement (THR) surgery patients averaging 4.6 days.1 We implemented an ERAS pathway in July 2011 but would like to identify any perioperative factors such as bleeding and hypotension delaying the discharge of elective primary THR.

Methods: After obtaining Trust Clinical Governance approval, data was consecutively collated from 83 ASA I-II patients who had elective primary
Patients ranged between 41 and 85 years. Hypotension and dizziness were present in 22% of study population associated with either a drop in BP/hemoglobin concentration or both in those patients. The length of hospital stay was significantly affected by hypotension and syncope post op (P<0.05), however the mode of anesthesia delaying the length of stay remains inconclusive.

Conclusions: Post-operative complications significantly impact the length of stay in elective THR patients, particularly when multiple co-morbidities are combined with perioperative hypotension or a drop in hemoglobin postoperatively. Most patients had a 50% reduction in pre op systolic BP intra-operatively, regardless of anaesthetic technique which delayed the recovery. We advocate the pre-operative optimisation of patients and ensure adequate fluid resuscitation and/or transfusion post surgery in the recovery room.

ESRA Abstracts

ESRA1-0384
Postoperative Pain Management

REDUCTION IN OPIATE REQUIREMENT AFTER FRACTURED HIP SURGERY: A QUALITY IMPROVEMENT PROJECT
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Background and aims: NICE Guidelines highlight the importance of non-opioid analgesia for patients with hip fractures1. Recommendations prioritise regular paracetamol and nerve blocks, minimising opioid administration. Our performance was audited against these guidelines and a multidisciplinary strategy implemented, aiming to improve the overall provision of analgesia.

Methods: An audit demonstrated moderate compliance with NICE guidelines. This prompted the creation of local guidelines, alongside the ortho-geriatic team, recommending perioperative fascia iliaca block catheters, regular paracetamol and restricting opiates for breakthrough only.

A service evaluation was performed after 6 months to assess any demonstrable improvement in the analgesia service provided.

Results: There was an overall increase in the use of regional blocks (table 1).

<table>
<thead>
<tr>
<th>TABLE 1. Anaesthetic techniques and intra-operative opiates</th>
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<tbody>
<tr>
<td>Initial Audit</td>
</tr>
<tr>
<td>GA &amp; Fascia Iliaca Block</td>
</tr>
<tr>
<td>Spinal +/- GA</td>
</tr>
<tr>
<td>IV Morphine</td>
</tr>
<tr>
<td>-Median dose (mg)</td>
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<tr>
<td>IV Fentanyl</td>
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<td>IV Alfentanil</td>
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</tbody>
</table>

† Intra-operative morphine use reduced from 27% to 10%, codeine administration from 64% to 25% (table 2).

<table>
<thead>
<tr>
<th>TABLE 2. Table 2. Opiate and Paracetamol usage post-op</th>
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</thead>
<tbody>
<tr>
<td>Initial Audit</td>
</tr>
<tr>
<td>Number Surveyed</td>
</tr>
<tr>
<td>Post op Codeine Use</td>
</tr>
<tr>
<td>-Median dose in 24 hrs (mg)</td>
</tr>
<tr>
<td>Post op Oramorph Use</td>
</tr>
<tr>
<td>Regular Paracetamol</td>
</tr>
<tr>
<td>Opiate WITHOUT</td>
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<td>6hrly paracetamol</td>
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</table>

Conclusions: This project highlights the improvement in our analgesia service following multidisciplinary intervention.

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ESRA1-0387
Peripheral Nerve Blocks

DESIGN AND IMPLEMENTATION OF A STICKER TO IMPROVE DOCUMENTATION OF PERIPHERAL NERVE BLOCKS - A QUALITY IMPROVEMENT PROJECT
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Background and aims: No standard exists for the documentation of peripheral nerve blocks (PNBs). This project sought to demonstrate the variability in documentation within our department and implement an easy-to-use sticker for the anaesthesia record in order to improve the standard of recorded information.

Methods: A review of anaesthesia records examined the documentation of PNBs. Combining this data with opinion gained from the literature, discussion with a medical defence representative and consultants with an interest in RA, a sticker was created that contained what was felt to be the most important data whilst maintaining ease of use and appropriate size. These stickers were piloted and a questionnaire circulated following this period.

Results: Review of 27 records highlighted significant inconsistencies and omissions in the information recorded.

Feedback on the sticker was positive. 100% of responders were happy to use a sticker for documentation and 50% felt that it would improve their standard of documentation. Comments noted that the sticker was useful and saved time. The paper on which the sticker was printed did prove incompatible with some ink pens.

Conclusions: This project highlights the inconsistencies and need for guidance for PNB documentation. The use of a sticker within our department was well-received. We intend to develop the sticker in response to feedback received and re-audit its use and standard of PNB documentation.

ESRA1-0389
Case Reports

CONTINUOUS SPINAL ANAESTHESIA BLOCK: WHEN A HIGH-RISK PATIENT NEEDS ABDOMINAL SURGERY
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Background and aims: In 1942, Virginia Aggar described 422 cases of continuous spinal anaesthesia (CSA) as a valuable anaesthetic technique for abdominal surgery in high risk patients, as it allows continuous analgesia with cardiovascular and respiratory stability. The authors present a clinical report of CSA in a patient with cardiac and airway challenges.

Methods: 74 years-old, male, ASA IV, presented for radical sigmoidectomy. His medical history included hypertension, dyslipidemia and C1 and C2 stable vertebral fractures, with chronic use of neck collar. In last 12 months, he suffered 2 acute coronary syndromes (one STEMI, complicated with ventricular fibrillation, and a non-STEMI, treated with a drug-eluting stent implantation and double antiaggregation, initiated 9 months before the rectal surgery). The patient evolved with stable angor and medium effort dyspnea.

Results: Cardiology assumed aspirin maintenance and clopidogrel 5 days suspension before surgery. As the neck collar couldn’t be removed, difficult airway was acceptable. At the OR, a CSA block was performed at the L3-4 interspace (epidural kit) and 5 mg of hyperbaric bupivacaine plus 2 µg of sufentanil were initially administered, with T6 level block achieved. Anaesthesia was maintained with a total of 9 mg of hyperbaric bupivacaine. Throughout the 3 hours of surgery, the patient remained stable and asymptomatic. At the end of surgery, the catheter was removed and postoperative analgesia relief was obtained using a bilateral TAP block with 150 mg of ropivacaine and intravenous morphine PCA.

The postoperative period was uneventful.

Conclusions: In selected patients purposed for abdominal surgery, CSA is a valuable alternative.

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ACUTE AORTIC DISSECTION FOLLOWING PREECLAMPSIA AFTER CESAREAN DELIVERY UNDER SPINAL ANESTHESIA

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Background and aims: Acute aortic dissection can occur in pregnancy associated with preeclampsia. It is rare but life threatening disease.

Methods: Case report.

Results: A 27-year-old primipara with preeclampsia was admitted at 37 weeks of gestation reporting a headache and a chest discomfort. Her physical examinations and laboratory tests were normal except for high blood pressure and tachycardia. Because of fetal distress, the patient underwent an emergency cesarean section under spinal anesthesia. In the immediate postpartum period, she complained of a severe chest pain. Transesophageal echocardiogram and computed tomography angiogram confirmed the presence of aortic dissection Stanford type A (from the right brachiocephalic artery to the abdominal aorta). The patient successfully had the repair of aortic dissection under general anesthesia.

Conclusions: Aortic dissection should be considered when a pregnant woman with preeclampsia has chest pain with sustained hypertension.

POSTOPERATIVE ANALGESIA AFTER TOTAL KNEE ARTHROPLASTY (TKA). COMBINATION OF CONTINUOUS FEMORAL BLOCK AND INTRAVENOUS PARECOXIB. A RANDOMIZED DOUBLE BLIND PROSPECTIVE CLINICAL STUDY

Background and aims: Postoperative pain after total knee arthroplasty (TKA) presents a great challenge. Subarachnoid anaesthesia provides analgesia for a limited period. The introduction of peripheral blocks and continuous catheters delivering local anaesthetics has become established for postoperative analgesia. Intravenous parecoxib may be used as part of a multimodal analgesia regime.

Methods: Ninety TKA patients were randomized into one of two groups. Prior to spinal anaesthesia with 15 mg of bupivacaine 0.5% a femoral nerve catheter was placed with neurostimulation guidance and 20 ml of ropivacaine 0.75% was injected. Postoperatively a continuous femoral nerve block (CFB) infusion of 0.2% ropivacaine was started at 10 ml/h. Group D received parecoxib and Group P placebo intravenously at T1: 20 min before the end of the procedure, T2: 12 hours, T3: 24 hours and T4: 36 hours postoperatively. Morphine PCA was available to all as rescue analgesia. Visual analogue scores (VAS) and morphine consumption were recorded at the above times

Results: VAS showed a statistically significant difference between the two groups at all time points. Statistical analysis was performed using the repeated measures ANOVA (p value = 0.007). Also the non parametric Mann-Whitney test revealed significant differences between the two groups at all times. There was difference in morphine consumption between the two groups but this was not statistically significant with ANOVA method (p value = 0.054) though showing a tendency to significance.

Conclusions: This study demonstrates that the addition of parecoxib to CFB provides improved postoperative analgesia as well as having opioid sparing effects following total knee arthroplasty.

EPIDURAL ANALGESIA FOR LABOUR IN PATIENTS WITH MULTIPLE SCLEROSIS

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Background and aims: Multiple sclerosis (MS) is a disease characterized by the existence of disseminated areas of demyelination in the central nervous system. It appears mainly in young adults (specially female), as periods of relapse and remission of neurological dysfunctions. From an anaesthetic point of view, these patients could get affected by surgery, anaesthetic technique and other factors like emotional stress. We try to analyse the clinical evolution of pregnant patients with MS who received epidural analgesia in our hospital.

Methods: A register of pregnant patients who received epidural analgesia for labour was created. To date, 6 cases have been collected. In all of them the same technique was performed: test dose with 3 ml of bupivacaine 0.25% with ephinephrine, bolus dose with levobupivacaine 0.125% at 0.3 ml/metamere and perfusion of levobupivacaine 0.125% plus fentanyl (2 mcg/ml) at 10 ml/h.

Results: In all cases the patients had been followed by neurologists during pregnancy with no presentation of any acute outbreak of disease. During labour, delivery and postpartum period no neurological complications were reported and an appropriate control of pain was achieved.

Conclusions: According to our study, the technique can be performed safely in the obstetric patient with a mild degree of MS with favourable neurological valuation. More studies with a larger number of cases must be done to obtain results applicable to general population.
Conclusions: In this pilot study lidocaine infusion appears to be a feasible alternative with analgesic effects similar to bupivacaine. A non-inferiority study should be done to confirm these results.

ESRA1-0405
Postoperative Pain Management

COMPARISON OF ANALGESIC EFFECTIVENESS OF DIFFERENT EPIDURAL SOLUTIONS FOR ANALGESIA AFTER TOTAL KNEE REPLACEMENT: THE UTILITY OF EPIDURAL FENTANYL

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Background and aims: Total knee replacement (TKR) is associated with severe postoperative pain. The purpose of the present study is to compare the efficacy of epidural Levobupivacaine at two different infusion rates and to analyze the effect of fentanyl addition to the solution, with regard to postoperative pain relief in a patient-controlled epidural analgesia setting.

Methods: A retrospective observational study was conducted including 170 patients who underwent surgery for TKR between 2010 and 2014, all of them receiving epidural analgesia. We compared 4 groups: levobupivacaine 0.125% at 6 ml/h, 0.125% levobupivacaine with fentanyl 2 microgram/ml at 6 ml/h, levobupivacaine 0.125% at 8 ml/h and levobupivacaine 0.125% with fentanyl 2 microgram/ml at 8 ml/h. The primary endpoint was numerical rating score for pain, at rest and on movement. ANOVA-test for sample analysis was applied.

Results: Patients who received an epidural solution including fentanyl felt less pain at rest 24 hours after intervention compared to those who received a pure local anesthetic; this difference was statistically significant. However, no statistically significant difference was found between the rate of infusion of the different types of postoperative anesthetic solution (6 ml/h versus 8 ml/h).

The lower levels of pain were obtained in the group of patients who received levobupivacaine 0.125% with fentanyl 2 microgram/ml at 8 ml/h, although these results were not statistically significant.

Conclusions: Adding fentanyl to the epidural mixture reduces basal and dynamic pain level in patients undergoing TKR 24 hours after intervention. There seem to be no differences between the rate of infusion of local anesthesia.

ESRA1-0407
Postoperative Pain Management

CONTINUOUS WOUND INFILTRATION WITH LOCAL ANAESTHETIC AFTER BREAST RECONSTRUCTION: THE MILTON KEYNES EXPERIENCE

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Background and aims: This audit assessed the efficacy of continuous wound infiltration with local anaesthetic for 48 hours after latissimus dorsi pedicle flap breast reconstruction as part of a multimodal approach to postoperative analgesia.

Methods: Details of post-operative analgesia and pain scores were obtained retrospectively from electronic patient records of patients having latissimus dorsi flap reconstruction following mastectomy between September 2010 and July 2013 at Milton Keynes Hospital. Our hospital’s clinical governance department confirmed that ethical approval for the audit was not required.

Results: 22 patients were identified. 7 patients received parenteral opioids in recovery. 14 patients received regular paracetamol and non steroidal anti-inflammatories. Only 2 patients required morphine PCA. 5 patients received oramorph; Of these, 4 received only 10 mg over the first 24 hours. One patient had a displaced wound infiltration catheter and received 40 mg of oramorph daily for 48 hours.

Table 1. shows mean postoperative morphine doses, Table 2 shows pain scores:

Conclusions: Our experience suggests that using continuous wound infiltration with local anaesthetic for breast reconstruction offers profound analgesia for a prolonged period when used as part of a multimodal pain management strategy. It is worth exploring this technique for other surgery types.

ESRA1-0408
Postoperative Pain Management

IMPACT OF DEPARTMENTAL ENHANCED RECOVERY PATHWAY GUIDELINES ON OUTCOMES FOLLOWING TOTAL KNEE ARTHROPLASTY: AN INSTITUTIONAL EXPERIENCE

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Background and aims: Locally agreed guidelines are essential for an enhanced recovery programme to be successful. We would like to report the impact of our local guidelines on postoperative analgesia, early mobilisation and length of hospital stay following total knee arthroplasty.

Methods: We collected data from randomly selected patients retrospectively who underwent total knee arthroplasty (to represent 25% of total procedures per annum) prior to introduction of local guidelines on anaesthetic and analgesic management (Group A) and compared with data from a similar proportion of patients collected prospectively after the introduction of guidelines (Group B).

In addition to demographics we collected data on anaesthetic techniques, pain scores, postoperative nausea and vomiting scores, time and success rate of first mobilisation and length of hospital stay. The data from pre-guidelines group is compared with post-guidelines group.

Results: We collected data from 106 patients in Group A and 99 patients in Group B. The groups were comparable for age, sex and ASA status. The mean time to first mobilisation was 25 hours in Group A, whereas all patients were mobilised within 16 hours in Group B.

Conclusions: Implementation of our local guidelines resulted in overall lower pain, nausea and vomiting scores leading to successful, early rehabilitation and shortened length of hospital stay following total knee arthroplasty.
ESRA Abstracts Regional Anesthesia and Pain Medicine • Volume 39, Number 5, Supplement 1, September-October 2014

ESRA1-0409
Chronic Pain Management

EFFICACY OF ULTRASOUND GUIDANCE FOR INTRA-ARTICULAR KNEE INJECTIONS
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Background and aims: Intra-articular injections are commonly recommended for the treatment of osteoarthritis pain (1,2). Various imaging modalities can be used to improve the accuracy. Ultrasonic guidance improves clinical outcomes and reduces injection pain and complications (1,2). The aim of this study was to evaluate the efficacy of ultrasound guided knee injections.

Methods: In this preliminary, prospective and observational study ten patients with arthritic knee pain were included. In our study, we conducted all injections with the patients in the supine position with the knee flexed. A suprapatellar approach was performed under ultrasound guidance.

In all patients, a mixture of steroids and local anesthetic was injected.

Demographic characteristics, joint effusion, improvement of joint pain and complications were recorded.

Results: The mean age was 73.7 years. Eight women and two men were included.

Both knees were treated in six patients, only left knee in three patients and only right in one patient. At six weeks, a clinically important improvement (greater than 50%) was observed in eight patients and no change was observed in two patients.

A severe effusion was observed in one patient. No patient suffered severe pain during injection. No complications were recorded.

Conclusions: The use of ultrasound guidance in intra-articular knee injections could improve the clinical efficacy of treatment. Furthermore, it helps to inject it into the intra-articular space accurately.

References

ESRA1-04100
Peripheral Nerve Blocks

THE CURRENT PRACTICE OF REGIONAL ANESTHESIA IN LATIN AMERICAN COUNTRIES

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Background and aims: We aimed to conduct a survey to profile the practice region of regional anesthesia in Latin America and determine the limitations on its use.

Methods: Upon institutional ethics committee approval, a link to an online survey was sent by e-mail to anesthetists from Argentina, Bolivia, Chile, Colombia, Panama, Paraguay, Peru and Uruguay. The survey was processed anonymously.

Results: A total of 1260 completed questionnaires were received.

The 97.4% of the anesthesiologists surveyed used regional anesthesia in clinical practice, 67.3% perform PNB regularly, 22.2% use continuous PNB techniques and 4.6% use stimulating catheters. The primary source of training was residency programs.

In all patients, a mixture of steroids and local anesthetic was injected.

Both knees were treated in six patients, only left knee in three patients and only right in one patient. At six weeks, a clinically important improvement (greater than 50%) was observed in eight patients and no change was observed in two patients.

A severe effusion was observed in one patient. No patient suffered severe pain during injection. No complications were recorded.

Conclusions: Regional anesthesia and PNB are commonly used among Latin American anesthesiologists. Considering that each country has its own utilization profile, real needs for clinical practice should guide training, especially in residency programs.

ESRA1-0412
Peripheral Nerve Blocks

INTRANEURAL VERSUS SUBPARANEURAL INJECTION FOR POPLITEAL SCIATIC NERVE BLOCK

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Background and aims: Quick onset and complete blockade of both the tibial and common peroneal nerves represents a challenge during US popliteal sciatic nerve block. The purpose of this study was to compare the characteristics of the intraneural versus subparaneural injection.

Methods: With ethical committee approval and written informed consent, 45 ASA physical status I-II patients scheduled for halux valgus repair were enrolled. All patients received an US-guided popliteal sciatic nerve block injecting 15 ml of Ropivacaine 1%. Randomly, one group received the intraneural injection (defined as the spread of nerve tissue more than 30% compared with the basal) (INTR A= 26 pt), while the second group received the subparaneural injection (SUB = 19 pt). Success rate was defined as the loss of pinprick sensation and the complete motor block of both the tibial and common peroneal nerves 40 after local anesthetic injection. Onset time and duration of the block were recorded.
Results: Success rate was 92% (24/26 pt) in group INTRA compare with 68% (13/19) in group SUB. Mean onset time was faster in group INTRA (11.09 ± 5.83 minutes) compared with group SUB (25.91 ± 11.58 minutes) (p > 0.00001), while duration was 16.20 ± 2.85 hours in Group INTRA, and 15.74 ± 3.80 hours in Group SUB respectively (p = 0.606). No neurological complications at 5 weeks follow up have been reported.

Conclusions: The preliminary results of this prospective, randomized, blinded evaluation showed that intraneural injection allowed a higher success rate with faster onset time of the popliteal sciatic nerve block compared to subpereaneural injection. Both techniques demonstrated similar long-duration of the block.

Ethical committee approval

ESRA1-0413
Peripheral Nerve Blocks

A COMPARISON OF THE DURATION OF BRACHIAL PLEXUS BLOCK BETWEEN ULTRASOUND GUIDED AND NERVE STIMULATOR TECHNIQUES IN ELECTIVE SHOULDER SURGERY

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Background and aims: Brachial plexus blockade provides safe and reliable anaesthesia and postoperative analgesia for upper limb surgery. Ultrasound guidance improves the quality and speed of block onset. This technique has become increasingly favored over the neurostimulation technique.

The aim of this study was to compare the duration of brachial plexus blockade between ultrasound guided (US) and nerve stimulator (NS) techniques.

Methods: A total of 46 subjects undergoing elective arthroscopic shoulder surgery were randomized to either the US or NS group for interscalene brachial plexus blockade. All received 30mls of 0.25% levobupivacaine. Duration of block, adjusted to the nearest fifteen minutes, was determined from follow up.

Results: Data was collected from 23 subjects from each group. In the US group, the duration of block ranged from 225 to 2160 minutes, with a mean of 596 minutes.

In the NS group, the duration of block ranged from 195 to 510 minutes, with a mean of 322 minutes. The mean difference between the two groups was 275 minutes.

The mean age of subjects in both groups was 43 years.

Conclusions: The duration of brachial plexus blockade following infiltration of 30mls of 0.25% levobupivacaine was significantly longer with the use of ultrasound guidance in comparison to the nerve stimulator technique.


FIGURE 1.

ESRA1-0414
Postoperative Pain Management

POSTOPERATIVE NAUSEA AND VOMITING RELATED TO THE ADMINISTRATION OF EPIDURAL FENTANYL AFTER TOTAL KNEE ARTHROPLASTY

Garcia Vitoria C.1, Martin Jarrarago I.2, Martinez Gil A.1, Barrachina Segura C.1, Alonso Cano C.1, Orubru Fuertes X.1, Crespo Gómez C.1, Assis Haddad K.1, Armero Ibáñez R.1, Solaz Roldán C.1 1Anesthesiology, Hospital Universitari Doctor Peset, Valencia, Spain.

Background and aims: Postoperative nausea and vomiting (PONV) are associated with the administration of opioids. The continuous infusion of local anaesthetics and opioids through the epidural catheter provides good levels of post-operative analgesia after total knee arthroplasty. The goal of our trial is to determine if the fentanyl addition to the continuous infusion of local anaesthetics increases the risk of PONV in the immediate post-operative period after total knee arthroplasty.

Methods: We fulfilled a retrospective observational study. We analyzed the incidence of PONV during the first 24 h of all the patients of our hospital that underwent a total knee arthroplasty during the period between 2010 and 2013 with a post-operative patient controlled epidural analgesia (PCEA).

194 patients were studied comparing the incidence of PONV during the first 24 hours in two groups: group L, undergoing PCEA with levobupivacaine 0.125%, and group LE, undergoing PCEA with levobupivacaine 0.125% with fentanyl 2 mcg/ml. The contrast of the hypothesis was made with the chi-square test using SPSS.

Results: There was no statistically significant relationship between the addition of fentanyl to the analgesic solution and the onset of PONV after the surgery of the total knee arthroplasty.

Conclusions: In our work, we found that the fentanyl addition to the continuous infusion of epidural levobupivacaine does not increase the incidence of PONV during the immediate post-operative period of the total knee arthroplasty.

ESRA1-0415
Pediatric

THORACIC EPIDURAL IN A SYNDROMIC INFANT - CASE REPORT

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Background and aims: Incidence of congenital diaphragmatic hernia is 1 in 2000-5000 births. Pulmonary hypoplasia, pulmonary hypertension and other malformations are important associated factors. The risk of opioid based analgesia in these cases makes the safety profile of a neuraxial block an attractive alternative, although regarded an advanced technique in infants.

Methods: Infant, 7-month-old, weighing 5.1 kg, ASA III, proposed for correction of diaphragmatic hernia. History of polynuformative syndrome, stenosis of pulmonary veins, pulmonary hypoplasia, interatral communication and history of repetitive respiratory infections. General anesthesia induction was attained with ketamine and remifentanil, maintained with sevoflurane. Thoracic epidural was performed at T10/T11 level, with saline drip method at the end of the procedure. An initial bolus was made with 2.5 cc ropivacaine 0.05% and maintained with ropivacaine 0.05% at 1 cc/h (0.1 mg/kg/h). Additional analgesia was achieved with 75 mg paracetamol. The infant was extubated and remained 48 h in the pediatric intensive care unit uneventfull.

Results: Existence of pulmonary vein stenosis and interatral communication, associated with conditions such as high airway pressure or hypoxia can lead to shunt inversion, which was diminished with the use of ketamine. The use of remifentanil allowed for effective intraoperative analgesia, reducing the possibility of postoperative side effects. Thoracic epidural allowed adequate postoperative analgesia without ventilatory or hemodynamic events.

Conclusions: The neuraxial block allowed adequate analgesia and avoidance of opioid side effects. Although an advanced technique, which should be performed by an experienced anesthesiologist, it appears a valid alternative in a surgery of moderate to severe aggressiveness, particularly in syndromic patients.
LATE ONSET LOCAL ANAESTHETIC SYSTEMIC TOXICITY (LAST) AFTER ENS GUIDED AXILLARY BRACHIAL Plexus BLOCK WITH MEPIVACaine 1.5%: SUCCESSFUL REVERSAL WITH EARLY 20% LIPID EMULSION THERAPY
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Background and aims: Few reports of systemic adverse effects are available following nerve blockade with mepivacaine. In this report, we describe neurological signs occurring 3 hour and half after administration of mepivacaine 360 mg for axillary brachial plexus block.

Methods: An 46-year-old lebanese male (ASA I,105 Kg,185 cm), scheduled for elective open reduction and fixation of a fracture of distal epiphysis of the right radius under axillary block. His medical history and laboratory tests were unremarkable. After premedication with ev midazolam 2.5 mg, we performed an ENS guided axillary plexus block with 24 ml of Mepivacaine 1.5% by the multiple injection technique. Anaesthesia proceeded uneventfully.3 hours and half after axillary block, he displayed dysarthria, mental confusion followed by a loss of verbal contact and agitation, tachycardia and hypertension.

Results: A presumptive diagnosis of LAST was made and he received ev midazolam 2.5 mg and 150 ml bolus of 20% Intralipid followed by an infusion of 0.25 mL/Kg per minute (total of 250 ml) that was discontinued because of the complete resolution of his neurological and cardiac signs. Neurological examinations and a magnetic resonance performed the day after surgery did not reveal any abnormality.

Conclusions: LAST remains a clinical significant problem especially when there is a late onset even probably for an unpredictable racial differences existing in the local anaesthetic hepatic metabolism This case suggests that early use of lipid emulsion may lead to a good outcome. We recommend the immediate availability of lipid emulsion at the ward after regional anaesthesia.
Results: a 51-year old lady suffering from diffuse, Scl70-positive SSc presented with severe RP and spontaneous digital amputations, despite treatment with nifedipine, iloprost infusions, and bosentan. In 2013 she complained of worsening RP with decreased grip strength and touch sensitivity without pain. We implanted a sensor-driven, PA-SCS (RestoreSensor™, Medtronic) with a 75-cm octal lead (Vectra™), tip placed at C5-C6. The stimulator could be programmed to either automatic position-adaptive stimulation (AdaptiveStim™) or manual adjustment of stimulation parameters. This resulted in increased grip strength and touch sensitivity, diminished skin coldness and severity of objective and subjective RP, the latter assessed both directly by the physician (left panel: before procedure; right panel: after procedure) and with a Visual-Analogic Scale (9 -> 3) by the patient. Worsening of RP repeatedly occurred with manual adjustments but not with the automatic stimulation alone.

Conclusions: PA-SCS is useful in severe SSc-related RP, which may be worsened by manual adjustments of stimulation; increased vasoconstriction is the likely mechanism.

FIGURE 1.

ESRA1-0432
Case Reports

FOOT DROP FOLLOWING SCIATIC NERVE BLOCK IN A PATIENT UNDERGOING EXCISION OF SYNOVIAL CYST AND OSTEOTOMY ON FIRST METATARSAL

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Background and aims: We are reporting a case of reversible peroneal nerve injury in a patient undergoing nerve blockage for postoperative analgesia for excision of synovial cyst and osteotomy on the first metatarsal.

Methods: A female patient of 16 year of age, ASA I, presented for surgery.

Anesthesia began with a midaxolam injection (2 mg) for mild sedation and reduced neurostimulation discomfort. With the patient in prone position, surface landmarks and an electrical stimulation were used to identify the sciatic nerve. The puncture point was located 8 cm above the popliteal crease, in a posterior approach. After motor response of dorsiflexion was obtained, with 0.2–0.4 mA and following negative aspiration, 150 mg of 0.5% Ropivacaine was injected.

Surgery was performed under general anesthesia with LMA. No pneumatic tourniquet was used. Surgery proceeded uneventful.

On the day after surgery, patient was discharged with no complains.

Results: Ten days after surgery, patient complained of inability to dorsiflex left foot or extends her toes. During the physical examination motor strength was 0/5 on dorsiflexion, 0/5 on toes extension and 1/5 on hallucis extension.

An EMG study was scheduled, having the neurological deficits disappeared on the 14th day postoperative, before this exam was performed.

Conclusions: Peripheral nerve blocks are a valuable tool and provide significant benefit for many patients. Although rare, neuropathic complications following nerve block may occur, they raise the question as to whether for a procedure implemented for benign pathology the risk/benefit ratio is acceptable.

This case report emphasizes daily sensory and motor evaluation following peripheral nerve blocks.

ESRA1-0433
Postoperative Pain Management

ANALYSIS OF POTENTIALLY PREVENTABLE CAUSES OF FAILED EPIDURAL ANALGESIA

Martínez Gil A.1, Alonso Cano C.1, García Vitoria C.1, Barrachina Segura C.1, Martín Jamargo J.1, Baldi Gozalez A.2, Higueras Castellanos R.1, Gandía Llepis J.1, Martínez González E.1, Solaz Roldán C.1,2 Anesthesiology, Hospital Universitari Doctor Peset, Valencia, Spain.

Background and aims: Pain after total knee replacement (TKR) surgery is intense and can condition the physiological and psychological status of patients, affecting clinical outcomes and increasing morbidity and hospitalization times. Reasons for inadequate anesthesia may include preventable complications of catheter malfunction. We want to study the causes of failure of continuous epidural analgesia (CEA) with the aim of improving the safety and efficacy of acute postoperative pain treatment in these patients.

Methods: We fulfilled a retrospective, observational study including 262 patients undergoing elective TKR -years 2010 to 2013- with posterior analgesia by patient-controlled continuous epidural infusion.

We registered the incidence of problems related to epidural anesthesia notified by nursing staff within first 48 hours after TKR: before analyzing data, those were divided in accidental catheter exit, pump handling problems, need to increase infusion rate in 26.87%, pump handling problems in 19.40%, poorly functioning epidural in 17.91%, need to increase infusion rate in 26.87%, pump handling problems in 19.40%, poorly functioning epidural in 17.91%, need to increase infusion rate in 5.97% of the cases.

Conclusions: The main preventable cause of failed epidural analgesia was accidental catheter exit, presented in 76.3% of all patients -relative frequency of 29.85%-; Pump handling appeared to be a significant problem as well -relative frequency of 19.40%-; These incidents could be avoided using standardized protocols for fixation and subsequent catheter care and pump handling.

ESRA1-0434
Miscellaneous

THE BUDDHA POSITION

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Background and aims: Effective yet efficiently and safely delivered spinal-epidural anaesthesia is the backbone of modern anaesthesia. Many techniques have been described such as the lateral position, Oxford position and sitting positions etc.

We have devised a new technique - the Buddha position - which fulfils all the criteria of modern anaesthesia, while at the same time, follows the simple rules of ergonomics making it patient-friendly, anaesthetist-friendly and theatre staff friendly.

Methods: Patient shifted to OT table in supine position, then sits on the operating table with either the legs straight forward or slightly bent or cross-legged; whatever is easier for the patient.

The remaining steps of spinal/epidural are as per standard technique.

Results: This method is has the following advantages:

1. Avoids hypotension & BP fluctuations:
   - The cross-legged position squeezes the lower limb veins which push the venous blood to upper half of body therefore no need for crystalloid pre loading.
   - Gradual changes of BP.

2. Patients feel empowered and in control as no-one is holding them in position.
   - No need to support patient - obese or parturient
   - Patient stabilisation during technique as natural consequence of the position
We would like to share this technique with our colleagues as we have found it extremely helpful, reliable, efficient, safe and effective.

### regional anaesthesia reduces opioid use in orthopaedic day case surgery

**Background and aims:** We looked to uncover the effect of regional anaesthesia on opioid requirements in the immediate peri-operative period in patients undergoing day-case orthopaedic surgery.

**Methods:** Orthopaedic theatre lists over six months were prospectively reviewed to identify day cases. Those under 18 years old; poor English comprehension or psychiatric issues were excluded. Consent was gained on the admission day. Anaesthetic technique, intra-operative and post-operative opioid administration was recorded. Opioids were converted to fentanyl equivalent quantities for comparison.

**Results:** 714 patients were eligible with a total of 633 followed up, recruitment rate 88.6%. Average age was 45 years (range 18-87). 244 (38.5%) received regional anaesthesia with or without general anaesthesia whilst 389 (61.5%) received general anaesthesia and subcutaneous or periarticular local anaesthetic infiltration.

The median fentanyl dose reduced from 150mcg in those not receiving regional anaesthesia to 75mcg in those who were. Only 25% of the regional anaesthesia group received >100mcg of fentanyl whereas 75% in the non-regional group required >100mcg of fentanyl.

**Conclusions:** Regional anaesthesia in this patient group demonstrated a reduced opioid requirement during the immediate peri-operative period. This is manifested in the 50% reduction of the median dose requirement.

**FIGURE 1.**

### Table tilt to improve success rates in spinal anaesthesia in the obstetric population

**Background and aims:** The sitting position is frequently used for patients undergoing spinal anaesthesia in obstetric practice. With increasing incidence of obesity in the obstetric population, performance of spinal block has become increasingly challenging.

We wish to describe a modification of the sitting position for the performance of spinal anaesthesia.

**Methods:** In order to improve success in performance of spinal anaesthesia we have devised a novel way to position our patients.

After instituting standard monitoring and establishment of intravenous access, the patient is made to sit on the operating table in the conventional way. The operating department practitioner then stands in front of the patient firmly supporting them whilst the operating table is tilted backwards by 15 degrees. The patient in response to the tilt, tries to balance themselves by leaning forwards. This leads to an improvement in the patients position and opens up the spinal lumbar spaces.

**Results:** The position described above is commonly practised in our institution. We have attained increased success rates in performance of spinal blocks in patients who are deemed to be difficult either due to due to other issues with positioning.

**Conclusions:** We have successfully performed spinal anaesthesia in patients who were in the modified sitting position. We have found this backward tilt extremely useful in the pregnant patient coming for caesarean section, who are sometimes unable to attain the flexed posture in the sitting position.

This modification of sitting position, could be a useful method in our opinion to improve success rates in spinal anaesthesia.

**FIGURE 1.**

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**ESRA Abstracts**

Regional Anesthesia and Pain Medicine • Volume 39, Number 5, Supplement 1, September-October 2014
Our regular intravenous set for gravity infusion (IVSGI) – Pearlround-NT-890- has space to store a volume of 23ml: extension-line (180cm-long) contains 13ml and drip-chamber (5cm-long), 10ml.

In our practice, nurse anesthetist usually prepares the analgesic regimen prescribed in a 50-100ml saline solution connected with an IVSGI to the patient. After administering to the patient, the IVSGI is usually removed. We recorded the volume of solution remaining at the IVSGI after being removed in 400 procedures.

Results: Our population received 16.33% fewer dose than the dose prescribed due to the volume remaining at the IVSGI (receiving from 100% to only 58%). Only 4.2% of patients received the complete dose of analgesic administered. This was possible because nurse used the same IVSGI to continue postoperative fluid therapy, or because after analgesic administration, nurse administered a new saline solution through the same IVSGI before removal.

Conclusions: Analgesic prescriptions may not fully reach the bloodstream of our patients due to technique error. Consequently we would be underdosing patients and contributing to the perpetuation of acute postoperative pain. To solve this particular issue it is necessary to purge the IVSGI after each dose, to ensure the complete administration of drugs.

ESRA1-0439
Miscellaneous
IS THERE HIGHER RISK OF COMPLICATIONS IN COLONOSCOPY WITH ANESTHESIA VERSUS WITHOUT ANESTHESIA? COHORT STUDY
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Background and aims: In the last few years the use of anesthesia assistance for endoscopic procedures has increased notably. Anesthesia provides comfort to the patient and can also improve the performance of colonoscopy. On the other hand, the use of anesthesia may cause adverse events. The complications are unusual but they are serious with high morbidity and mortality therefore their study is important.

To analyse the incidence of colonic perforation, aspiration pneumonia and splenic injury diagnosed within 30 days of the colonoscopy in a cohort of patients from Fuenlabrada Hospital.

Methods: Retrospective cohort study. Cohort of 18,833 patients older than 18 years scheduled for performing colonoscopy, with or without anesthesia, from Fuenlabrada Hospital between 2004 and 2014. Data collection was obtained through electronic medical records. As a factor study we define the use of anesthesia as the independent variable and the occurrence of complications as the dependent variable.

Results: From a total of 18,833 colonoscopies, 7,877 were performed with anesthesia services (41.8%). We identified 11 complications (0.06%): colonic perforation (n = 10), aspiration pneumonia (n = 1) and splenic injury (n = 0). The incidence of colonic perforation was 0.09% in colonoscopies without anesthesia versus 0.027% without anesthesia. Therefore, the relative risk (RR) of performing colonoscopy with anesthesia assistance and develop a colonic perforation is 3.24. The incidence of aspiration pneumonia was 0.005% in colonoscopies with anesthesia versus any without anesthesia.

Conclusions: The use of anesthesia assistance for colonoscopy may be associated with an increased risk of complications, especially, colonic perforation.

ESRA1-0440
Postoperative Pain Management
PRURITUS CAUSED BY EPIDURAL FENTANYL INFUSION AFTER TOTAL KNEE ARTHROPLASTHY
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The background and aims: The aim of this study was to retrospectively evaluate the incidence of pruritus in 145 patients who received epidural patient-controlled analgesia (EPCA).

Methods: We evaluated the incidence of pruritus in 145 patients who received 0.125% levobupivacaine + 2 microg/ml fentanyl epidural patient-controlled analgesia (group 1) and 55 patients who received 0.125% levobupivacaine EPCA alone (group 2). The incidence of pruritus was evaluated 24 h after surgery by blinded observers. The contrast of the hypothesis was done using the chi-square test. The possibility of presenting pruritus during the first 24 h after this surgery was also studied using confidence intervals.

Results: The total incidence of pruritus was significantly higher in Group 1 (20%) compared to Group 2 (3.6%). This difference was statistically significant (p < 0.05). By 95% of probability, the percentage of patients that may suffer pruritus in group 1 during this period after this surgery is related between 13% and 27% and in group 2 is related between 1 and 9%.

Conclusions: According to our results, we can conclude that the addition of fentanyl to the continuous infusion of epidural levobupivacaine significantly increased the incidence of pruritus during the immediate post-operative period of the total knee arthroplasty.

ESRA1-0444
Peripheral Nerve Blocks
FASCIA ILIACA BLOCK CATHETER INSERTION: EVIDENCE FOR THE TENDENCY TO INADVERTENTLY INSERT TOO DEEPLY
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Background and aims: Our hospital offers a fascia iliaca compartment block (FICB) service pre-operatively to all patients presenting with a fractured neck of femur. Last year we used ultrasound in 16 patients to demonstrate that the fascia iliaca compartment should usually be reached at a depth of 1.5cm. Many FICBs last year had been inserted too deeply (median depth 3.5cm). This year, with a new intake of anaesthetic registrars, we wanted to assess the ‘depth to space’ to see if they were reaching the fascia iliaca compartment at a similar depth.

Methods: All preoperative FICBs performed are recorded in a logbook, with ‘depth to space’ being one of the parameters. The depth to space is measured using cm-marked Tuohy needles. A total of 125 procedures were performed over 9 months since the new doctors commenced their posts in August 2013. These doctors received FICB training at the beginning of their posts.

Results: The median depth to space this year was 3.5cm (range 2–7cm). This is 2cm deeper than the median depth at which the fascia iliaca compartment is typically found using ultrasound. Pain scores or use of additional analgesia were not assessed.

Conclusions: Last year, we found the fascia iliaca compartment was never deeper than 2.5cm (median 1.5cm, range 1.2–2.5cm). This year, the median depth to space has been found to be 2cm deeper. This perhaps highlights the importance of adequate training for new doctors. Alternatively, the results might be explained by factors such as angle of needle entry, patient positioning, or body mass index.

ESRA1-0445
Case Reports
UNUSUAL PRESENTATION OF POST-LUMBAR PUNCTURE HEADACHE REQUIRING EPIDURAL BLOOD PATCH
Diaz Martínez J.C.1, Perez Millon V.1, Barroso Gonzalez A.1, Romero Avila P.1, Perez Moreno J.M.1, Delange Segura L.1 1Department of Anaesthesiology Reanimation and Pain Therapy, Hospital Regional Universitario Carlos Haya, Málaga, Spain.

Background and aims: Post-lumbar puncture headache (PLPH) is a well-known syndrome resulting from spinal fluid leakage and delayed closure of a dural defect. The main symptom of PLPH is headache in upright posture relieved by lying down. Headache usually appears a few hours after the procedure.

We present the case of a patient who required epidural blood patch (EBP) to treat a delayed onset PLPH.

Methods: 73-year-old patient presented a few months duration headache that started 14 days after receiving spinal anaesthesia required for an urologic surgery. Spinal anaesthesia was performed in the sitting position at L3-L4 space.
using a 25-gauge Quincke needle. Pain level was usually 8 at theVAS scale, and it was relieved when oral acetaminophen was taken (VAS-5) or by lying down (VAS-3). After late onset PLPH was diagnosed the treatment decided was the epidural blood patch. With the patient in the sitting position, the epidural space was located at L3-L4 space with an 18-gauge Touhy needle using loss of resistance to saline. A total of 15 ml of sterile autologous blood was injected.

Results: The patient presented a complete resolution of the symptoms and did not show any side effect after the EPB. The painful state remained completely resolved 4 and 8 weeks after the procedure.

Conclusions: Despite PLPH onset and recovery can be rapid, within a few days, it can also appear or be resolved after a few days or weeks. What is more, if it persists after four days, an epidural blood patch should be discussed as best treatment option.

ESRA1-04500 Obstetric

EPIDURAL ANALGESIA DURING LABOUR IN OBSTETRICAL PATIENTS: ULTRASOUND IMAGING TO LOCATE THE INTERSPINOUS SPACE DECREASES THE NUMBER OF ATTEMPTS WITHOUT INCREASING THE TIME

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Background and aims: The presence of predictive factors of difficulty for the epidural technique results in more time, attempts and complications. Unfortunately, due to anatomical and technical peculiarities, an ultrasound-guided technique is not possible.

Some authors propose a preprocedural ultrasoundography of the spine to measure the distance to the ligamentum flavum and visualize the neighboring structures. This requires experience and skill and has limitations.

We restricted our study to the application of ultrasound to locate the point of puncture between the spinous processes, a simple and rapid technique.

Methods: As a pilot study on 38 women at dilation phase of labour we study the location of the puncture site by clinical examination (palpation) in 17 women (PG) and by ultrasound imaging in 21 women (GUS), consecutively. The number of punctures (NP), puncture site location time (T1), catheterization time (T2), total time (T1) used for epidural anesthesia, and difficult technical score (DTS), were analysed.

Results: A decrease in NP in GUS2 in comparison to GP2 women (p=0.039) was found and no differences in T2 (p=.361) and TT (p=.0855) was detected in both groups. Attending to DTS two different subgroups were stratified as GUS1/GP1 (score<3) and GUS2/GP2 (score ≥3). Using non-parametric Mann-Whitney test no statistical differences were found in NP (p=0.3), T2 (p=0.9) and TT (p=0.67) between GUS1 and GP1.

Conclusions: This preliminary results from a pilot study suggest that using ultrasound imaging to locate optimal needle placement site reduce the puncture attempts for epidural analgesia in women with technical difficult prediction factors without increasing time.

ESRA1-0451 Peripheral Nerve Blocks

ULTRASOUND-GUIDED INTERNAL SAPHENOUS NERVE BLOCK FOR PAEDIATRIC THIRD TIBIAL DISTAL FRACTURES

Abujeta Soria R.1, Pérez Moreno JM.1, Sánchez González L.1, Pérez Millón V.1, Fernández Vilchez T.1, Carnoma Auróses L.1, 1Anestesiología Reanimación y Terapéutica del dolor, HRU, Málaga, Algeciras, Spain.

Background and aims: Regional anesthesia is an extremely effective therapeutic tool for pain relief; however, it exists the added problem in paediatrics of the anxiety generated among this population group about motor block associated with this technique. We report two cases of internal saphenous nerve block, which being pure sensory, did not affect the children’s movement capability, ensuring them comfort.

Methods: Two children (6 and 9 years old, and 26 and 36 kg of weight respectively), with no relevant medical history, visit the emergency unit with third tibial distal fractures, so they are proposed for closed reduction and immobilization with plaster in operating room. After intravenous anesthetic induction with propofol, laryngeal mask was placed and we maintain general anesthesia with sevoflurane at regular doses. Ultrasound-guided saphenous nerve block was performed with levobupivacaine 0.25%, 6 ml for the first case and 9 ml for the second one.

Results: The procedure was performed without any incident and no opioids were needed. No rescue analgesia was required during recovery, neither at the first 8 hours after their arrival to hospitalization room.

Conclusions: Many procedures that we perform in adults require sedation or general anesthesia to be performed in children. Regional anesthesia procedures that minimize motor block may be really useful to avoid opioids consumption and improve analgesia and welfare in paediatric patients.

ESRA1-0456 Pediatric

EFFECTS OF PREEMPTIVE EPIDURAL INFUSION ON POSTOPERATIVE PAIN IN PEDIATRIC PATIENTS

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Background and aims: Surgical trauma induces a local inflammatory reaction that can induce peripheral and central nerve sensitization. Preemptive analgesia can suppress the nociceptive stimuli and central sensitization. The continuous epidural infusion during the preoperative and postoperative periods may prevent central sensitization and also pain hypersensitivity in the postoperative period. This study investigated the effects of preemptive epidural analgesia on postoperative pain in pediatric patients.

Methods: A total of 60 children undergoing urological surgery were randomly assigned to either the preemptive epidural analgesia (Preempt EA, n=31) group or the postoperative epidural analgesia (Postop EA, n=29) group. Epidural infusion was started before the surgical incision in Preempt EA group and after the peritoneal closure in the Postop EA group. Postoperative pain was assessed with the FACES pain scale, and postoperative analgesia was evaluated 1 h and 24 h after surgery.

Results: There were no significant differences in pain scores between the groups. Distribution of the pain scores (FACES rating scale) between and within groups.

Conclusions: Our results suggest that preemptive epidural analgesia has no effect on pain intensity in pediatric patients.

TABLE 1.

<table>
<thead>
<tr>
<th>Preop EA (n=%)</th>
<th>Postop EA (n=%)</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (1 h postop)</td>
<td>0 (0%)</td>
<td>3 (9.7%)</td>
<td>1 (3.4%)</td>
</tr>
<tr>
<td>2 (6.5%)</td>
<td>1 (3.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 (54.8%)</td>
<td>12 (41.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 (29.0%)</td>
<td>12 (41.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 (0.0%)</td>
<td>2 (6.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 (0.0%)</td>
<td>1 (3.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (6.5%)</td>
<td>2 (6.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 (35.5%)</td>
<td>8 (27.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 (41.9%)</td>
<td>11 (37.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 (12.9%)</td>
<td>6 (20.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (3.2%)</td>
<td>2 (6.9%)</td>
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</table>

ESRA1-0457 Pediatric

DOES PERITONSILLAR INFILTRATION OF LIDOCAINE REDUCE POST-ADENOTONSILLECTOMY PAIN IN CHILDREN?

Miyazawa N.1,2,3, Wakamiya R.1,3, Ooyama N.1,2, Minoshima R.1, Matsuoka T.1, Shinto A.1,2,3,1,2,3 Anesthesiology, Tokyo Metropolitan Children's Medical Center, Tokyo, Japan.

Background and aims: Adenotonsillectomy (T&A) is common surgical procedures performed in children. Postoperative pain is severe, and providing
safe and effective perioperative analgesia is challenging. We hypothesized that local anesthesia around tonsillar capsule may improve postoperative analgesia. This study was aimed to evaluate lidocaine infiltration as postoperative pain management of T&A in children.

Methods: This study was approved by the ethics committee of our institute as a retrospective observational study. All children’s guardians were informed and consented to use the clinical records for medical research.

Two thousands sixty nine children ages 3 to 17 years, ASA-PS 1-2, undergoing elective T&A, were enrolled. Children were assigned into two groups; group L as lidocaine infiltration (n=145) and group C as control (n=124). In group L, 0.5% lidocaine with 1,200,000 epinephrine was infiltrated around tonsillar capsule before incision. Three consultant otolaryngologists were involved. Two of them used lidocaine and one did not.

We compared analgesics requirements within 24 hours after surgery, the amount of food intake and the Wong–Baker FACES pain rating scale (WBFS) following morning. Statistical analysis was performed with t-test and Mann–Whitney U-test using SPSS software (IBM, USA).

Results: Analgesics requirements were significantly less frequent in group L (p = 0.03). The amount of breakfast intake was significantly higher in group L (p = 0.001). There was no significant difference in the WBFS (p = 0.41).

Conclusions: In children undergoing T&A, lidocaine infiltration reduced analgesics requirements within 24 hours postoperatively, and improved breakfast intake following morning. However it did not minimize postoperative pain score.

ESRA1-0462
Obstetric

NEW TECHNIQUE OF SPINAL ANESTHESIA WITH EPIDURAL VOLUME EXTENSION (EVE) FOR CESAREAN SECTION

Sitkin S.1, Ronesson A.1, Savelieva I.2

Aim: Evaluate the efficacy and safety of the new methodology EVE, taking into account the intra-abdominal pressure (IAP).

Methods: Elective caesarean sections with a new technique EVE were performed on 24 pregnant. Evolutionary method EVA included the first stage - the insertion of an epidural catheter (L1-2), second stage - perform spinal anesthesia (L3-4). Normal saline was injected into the epidural space before performing spinal anesthesia. Volume of normal saline depends on the intra-abdominal pressure of pregnant (Table 1).

For spinal anesthesia we used heavy Bupivacaine 5–6 mg if women height was less than 165 cm and 7–8 mg at a height of 165 to 175 cm. All women received intravenous fentanyl (12.5 mcg).

Results: Level of sensory blockade was average Th4 ± 2. Hypotension was absent in all 24 pregnant women. The maximum level of motor blockade is not more than 2 points on the scale Bromage.

Conclusions: The new technique EVE is an effective and safe method of anesthesia for caesarean section.

ESRA1-0461
Case Reports

ACUTE SEVERE HEADACHE DURING CAUDAL EPIDURAL STEROID ADMINISTRATION. A CASE REPORT

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Anesthesia, Asklepieion Hospital, Athens, Greece.

Background and aims: Epidural steroids are commonly used in chronic pain management. After patient’s consent, we present a case of acute severe persistent headache during caudal betamethasone administration.

Methods: A 45-year-old female with fibromyalgia presented to our pain clinic, with symptoms of lumbosacral radiculopathy due to a herniated L5/S1 disk. A caudal epidural injection was decided using ropivacaine 0.15% plus 6 mg betamethasone. During injection of the first 10 ml the patient complained of severe headache and pressure in the ears, so the procedure was discontinued. There were no sensory/motor deficits and clinical examination was unremarkable. Five hours later the symptoms became milder and she required to be discharged home. She was prescribed NSAIDs and paracetamol.

Results: Two days later she complained of persistent non-postural headache and photophobia, not responding to treatment. Full work up was performed including head and lumbar MRI and CSF testing, with no remarkable findings. Codeine was added to treatment but symptoms persisted. Subsequently 5mg methylprednisolone q.d. were prescribed and symptoms gradually subsided. Ten days later the patient was symptom free.

The exact mechanism of neurologic findings cannot be explained with certainty, although they certainly seem secondary to the caudal epidural injection. The differential diagnosis included: pneumocephalus, accidental dural puncture, subdural spread, neuroaxial canal pressure increase, fibromyalgia associated headache and aseptic meningel irritation, with the latter matching mostly with our findings.

Conclusions: Many patients with headache after epidural injections will not fit clearly into any described category. High level of suspicion and prompt evaluation to exclude severe causes are required.

### TABLE 1. The volume of normal saline for EVE.

<table>
<thead>
<tr>
<th>IAP</th>
<th>Volume of saline (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤12</td>
<td>15 ml</td>
</tr>
<tr>
<td>13–15</td>
<td>10 ml</td>
</tr>
<tr>
<td>16–20</td>
<td>5 ml</td>
</tr>
</tbody>
</table>

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ESRA1-0463

Case Reports

SUBDURAL HEMATOMA FOLLOWING SPINAL ANESTHESIA - A RARE COMPLICATION

Perreira C.1, Costa A.1. Anesthesiology and Emergency, Centro Hospitalar Vila Nova de Gaia, Porto, Portugal.

Background and aims: Intracranial subdural hematoma is a rare but potentially fatal complication of dural puncture after spinal anaesthesia. We present a case report of a 48 year old healthy woman who underwent a laparoscopic hip surgery under spinal anesthesia. She was admitted 51 days later in the emergency department with intense headache and was diagnosed with a subacute subdural hematoma.

Methods: We reviewed clinical files and available literature.

Results: 48 year old woman previously healthy with no history of trauma, headache or coagulation abnormalities was admitted for laparoscopic hip surgery. Preoperative laboratory tests, including platelet count, prothrombin time, and activated prothrombinoplastin time were normal. Spinal anaesthesia was performed at the L3-L4 interspace using a 25-gauge Whitacre needle with a single attempt. The intraoperative course was uneventful. She was discharged home the following day, although she referred an intense holocranial headache. The headache lasted for about 8 days. It improved slightly with NSAID. Fourty seven days later she experienced again a severe generalized headache. The headache increased in severity until it was incapacitating. She was later admitted to the emergency department. There were no abnormalities on neurologic examination, as well as laboratory tests (including coagulation). She denied taking any anticoagulants or any history of trauma. The computed tomographic scan revealed a subacute subdural hematoma which was later surgical drained.

Conclusions: A regular follow-up of patients with headache after neuroaxial manipulation is of extreme importance as it helps to differentiate between a typical PDPH and a nonpostural headache. The latter one may herald more serious complications.

ESRA1-0464

Central Nerve Blocks

PATIENTS’ REPORTED OUTCOMES FOLLOWING EPIDURAL ANAESTHESIA AND SEDATION FOR ORTHOPLASTIC LOWER LIMB SURGERY IN COMPARISON WITH PREVIOUS EXPERIENCE OF GENERAL ANAESTHESIA FOR LOWER LIMB SURGERY

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Background and aims: Definitive treatment for lower limb osteomyelitis (LLOM) can require complex and prolonged orthoplastic surgery. Patients frequently report various negative consequences of general anaesthesia (GA) following previous operations.

We have growing experience in central neuroaxial anaesthesia with sedation for major LLM surgery. Operations are completed under epidural anaesthesia (EA+Sed); epidural analgesia continues postoperatively.

With very positive informal patients’ feedback, we undertook formal assessment of patients’ reported outcomes of EA+Sed in comparison with their previous GA experience.

Methods: With the institutional approval, 43 patients were invited to answer a standardised postoperative questionnaire following their orthoplastic surgery. All patients (100%) were ‘satisfied’ or ‘very satisfied’ with their EA+Sed.

Results: Thirty of the 35 (85.7%) patients with previous GA experience reported recovery from Epi+Sed as ‘quicker’, and 31 (88.6%) as ‘better’ or ‘much better’, compared to previous GA. Patients’ comments regarding Epi+Sed included such as: ‘very good pain relief’, ‘less drowsiness and nausea in recovery’, ‘no nausea, no sore throat, overall happier’, ‘not feeling drained or sick’, ‘I never felt better’, ‘...this is a huge improvement and the only way forward’.

All patients (100%) were ‘satisfied’ or ‘very satisfied’ with their EA+Sed experience and all but one (97.4%) would recommend this technique to others.

Conclusions: Patients’ reported outcomes following EA+Sed for major LLM orthopaedic surgery are very reassuring, especially in comparison with their previous GA experience. This should be taken into consideration when choosing an anaesthetic technique for this type of surgery.

ESRA1-0465

Pediatric

PRELIMINARY EXPERIENCE WITH ULTRASOUND GUIDED TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VERSUS WOUND INFILTRATION FOR UNILATERAL INGUINAL SURGERY IN PEDIATRIC PATIENTS

Kendigelen P.1, Tutuncu A.1, Erbabacan E.1, Kosgal G.1, Ekici B.1. 1Department of Anaesthesiology and Reanimation, Cerrahpasa Medical Faculty, Istanbul, Turkey.

Background and aims: Transversus abdominis block provides effective analgesia in adult patients for postoperative period. In this study we aimed to compare analgesic efficiency of ultrasound guided TAP block or local anesthetic infiltration in pediatric patients undergoing unilateral inguinal surgery. We present preliminary experience with the postoperative analgesic efficiency of TAP block versus wound infiltration in pediatric patients.

Methods: 60 patients, aged 6-12 years (ASA I-II) undergoing unilateral inguinal surgery were randomly divided into two groups. At the end of the surgery, in Group TAP (n=30), TAP block was performed unilaterally and 2mg/kg (0.25%) bupivacaine was injected (maximum 20ml volum). In Group infiltration (n=30); the surgeon performed a wound infiltration using 2mg/kg (0.5%) bupivacaine (infiltration group n=30). Patients were assessed in the recovery room, the day-stay unit (30 min to 2 h after surgery) and at 24 h for age appropriate numerical pain score, analgesic consumption, and any adverse effects.

Results: In 26 of 30 patients have received TAP blockade, who did not require any analgesic agents in the first 8-12 postoperative hours. These 4 patients required oral ibuprofen during the first 24 hours. No adverse effects related to TAP block were identified. In infiltration group, all patients(n=30) required narcotic analgesic for the initial 30 minutes and all of them needed more than one times additional analgesic agents within 24 hours.

Conclusions: Our preliminary experience suggest that TAP block provides effective analgesia following inguinal surgery in children.

ESRA1-0467

Postoperative Pain Management

HOW TO IMPROVE POSTOPERATIVE PAIN IN DONOR SKIN SITES AMONGST BURNED PATIENTS: COMBINED ULTRASOUND-GUIDED FEMORAL AND LATERAL FEMORO-CUTANEOUS NERVE BLOCKS

Ususa G.1, De Miguel M.2, Abhara L.2, Guilabert P.1, Martin N.1, Diez Y.2. 1Anaesthesia, Valle Hebron Hospital, Barcelona, Spain. 2Burned Center Anaesthesia Coordinator, Valle Hebron Hospital, Barcelona, Spain.

Background and aims: Donor skin pain is intense during early postoperative period in burned patients. Skin is usually harvested from medial and lateral areas of the thigh, inerverted from femoral and lateral femoro-cutaneous nerves (LFCN) respectively.

Our aim was to improve donor site postoperative pain by blocking both nerves.

Methods: 61 burned patients who underwent a wound debridement and skin auto-grafts from the thigh were included.

General anesthesia, spinal or periferal nerve blocks were chosen before ultrasound-guided femoral and LFC nerves blocks were performed (controlled by neurostimulation) with 15 ml of ropivacaine 0.6% and mepivacaine 0.8% (10 ml for femoral and 5 ml for LFC nerve).

Donor site pain was assessed at 4, 8 and 24 hours after the block with the VAS (verbal analogue scale). Analgesics requirements were recorded during the first 24 hours.

Data were analysed with Kruskal-Wallis and Mann-Whitney t test.

Results: Mean age was 45.97(42-49)yr, male/female 65.5%/34.4%, median donor area was 244,50 (332) cm2 and median TBSA (total burned surface area) was 46.5%.

The Median [interquartile range] VAS from donor site at 4, 8 and 24 hours was 0 [3], 0.5 [2] and 0 [1].

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There was a statistically significant difference from VAS at 4 hours being higher in the spinal group. 5 patients required morphine and 25 desketoprofet.

Conclusions: Combined ultrasound guided femoral and LFC nerves block is a simple, inexpensive, safe and efficient anesthetic choice for reducing pain in the thigh donor sites during the first 24 hours postoperative period.

ESRA1-0468
Chronic Pain Management

CHRONIC INGUINAL PAIN: ULTRASOUND GUIDED TREATMENT

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Background and aims: Chronic inguinal pain is a frequent complication of surgical procedures involving a lower abdominal incision (hernia repair, cesarean,...) (1,2). Our purpose is to describe and evaluate, ilioinguinal and iliohypogastric radio frequency neurolysis (RFN) and local injection, in our unit.

Methods: 7 patients (2012-2014) suffering from chronic inguinal pain refractory to specific medication were included. 6 patients had a history of surgical procedure.

Results: We performed a local infiltration in all patients (ultrasound guided, using ropivacaine 0,2% and Triamcinolone). 1 patient there was no improvement. 4 patients, the pain improved moderately, and 2 patients, the pain improved completely.

In the 5 patients whose chronic pain didn’t improve completely, we perform RFN (ultrasound guided, 120°, 45V, 2 Hz, 20ms, Cosman 64 Medical Inc.). 1 patient had complete improvement, 4 patients had a moderately improvement.

Conclusions: The ultrasound enables us to ensure that infiltration or RFN is performed adequately (between internal oblique muscle and transverse abdominal muscle). RFN appears to be significantly more effective than local nerve infiltrations, although we don’t have enough data to confirm it.

References:

ESRA1-0469
Miscellaneous

ULTRASONIC DEVICE TRACKING WITH DYNAMIC FOCUS TRACKING FOR REAL-TIME NEEDLE TIP IDENTIFICATION

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2Medical Physics and Bioengineering, University College London, London, United Kingdom.

Background and aims: Ultrasound imaging is the standard for guiding needles in a wide range of procedures, but identification of the needle tip position remains challenging, particularly with steep insertion angles. Ultrasound device tracking (UDT) is a novel method for identifying the needle tip position that involves receiving ultrasound pulses from the imaging probe with a fiber optic sensor integrated into the needle lumen. In this feasibility study, we investigated the use of ultrasound device tracking to guide insertions to the brachial plexus.

Methods: A fiber optic ultrasound sensor was integrated into the lumen of a 20 gauge needle. Imaging was performed with a programmable ultrasound, using custom software that allowed for synchronized acquisition of images and sensor data. The position of the needle tip was calculated in real-time, and the ultrasound transmit focus was dynamically and automatically adjusted to the most recent estimate of the needle tip depth. Multiple in-plane insertions to the brachial plexus were performed in the axilla of a swine ex vivo.

Results: The positions of the needle tip calculated with UDT were in good agreement with those observed on the ultrasound images. Robust estimates of the needle tip position were obtained for insertion angles greater than 45 degrees, at depths greater than 4 cm.

Conclusions: This study provided a preliminary indication that UDT with dynamic focus tracking is well suited to guiding needles during regional anesthesia and interventional pain management procedures. It sets the stage for new developments of this method for both in-plane and out-of-plane needle tracking.

ESRA1-0471
Peripheral Nerve Blocks

A CLINICAL STUDY COMPARING TWO ANAESTHETIC/ ANALGESIC TECHNIQUES FOR SHOULDER SURGERY INTRA- AND POST-OPERATIVE PAIN CONTROL: A COMPARISON OF BOTH TECHNIQUES IN REHABILITATION

Mayorga-Buiza M.1, Viegas-Gonzalez M.2, Jiménez-López I.1, Luengo M.1, Marenco M.1.1 Anesthesiology, University Virgen del Rocío Hospital, Seville, Spain.

Background and aims: Shoulder surgery post-operative pain may be very severe in many patients and may be exacerbated by rehabilitation manoeuvres.

To compare two pain control techniques.

Methods: Consecutive prospective study. ASA 1-II patients proposed for shoulder surgery / postoperative rehabilitation.


Rehabilitation: Group A: UGIB with 0.2 Ropivacaine. Group B: CSAB with 0.2 Ropivacaine.

MEASURES: All. Patient satisfaction. Surgery: Intra-operative remifentanil requirement (T0); pain in PACU (T1), at 6h (T2), 12h (T3) and 24h (T4), measured by resting/motion VAS; motor block: proximal/distal; sensory block (pinprick test); total morphine consumption.

Rehabilitation: VAS during rehabilitation manoeuvres and at T2.

Results: Surgery: 20 (12A/8B): T0 > higher remifentanil doses in Group B. Pain control similar except for some cases of severe pain in group B at T1. Morphine requirements > Group B. Distal motor and sensory block > Group A. Satisfaction similar.

Rehabilitation: 12 patients (7/5B). No significant differences. Higher satisfaction in group B due to lower distal blocking. Morphine consumption similar.

Conclusions: UGIB provides greater anesthesia/analgesia in the earlier hours compared to CSAB. It also allows catheters to be placed for continuous blocking.

CSAB gives lower distal motor and sensory blocking. This alternative is effective and safe in patients with respiratory problems.

No differences were observed during rehabilitation. Lower distal block levels (B) contributed to higher patient satisfaction.

ESRA1-0473
Peripheral Nerve Blocks

SINGLE-SHOT NERVE BLOCKS FOR POSTOPERATIVE PAIN CONTROL: 1-YEAR RESULTS

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Background and aims: Single-shot nerve blocks (SSNB) have been increasingly used for anesthesia and postoperative analgesia. We report our hospital experience using this technique and its effects on pain control.

Methods: During 2013, data from patients submitted to SSNB was collected daily. This included patient demographic characteristics, follow-up time, modalities of analgesia and side effects/complications. Pain was assessed through a Verbal Rating Scale (VRS) from 0 (no pain) to 4 (worst imaginable pain). Motor block was evaluated through a Modified Bromage scale (MBS) and sensory block (SB) with a scale from no paresthesia (S1) to paresthesia in the whole limb and abdomen/trunk (S4). Analgesia was complemented with "conventional analgesics", according to the department protocols. Local committee has authorized this study.

Results: 730 patients (62.9% women and 37.1% men) were followed, most of which were between 50 and 90 years-old and from Orthopedics (76.0%). The nerves more frequently blocked were the femoral, lateral femoral cutaneous and sciatic, followed by the axillary brachial plexus block. Patients were discharged when pain control and/or MBBS2 and/or SB52 were achieved, which
Of 143 respondents 5 did not utilise an ERAS protocol. Premedication in arthroplasty surgery.

CONTRIBUTION TO THE QUALITY OF LIFE IN PATIENTS UNDERGOING KNEE REPLACEMENT WITH ERAS (EULAR 2013) – POSTER SESSION

During the study period, 26,747 patients received obstetric anaesthesia. Data were prospectively gathered and analysed in digital clinical files. This online survey was to anaesthetists to assess the variability of premedication practices. We performed 30 cases following the new protocol and compared with the current protocol. Our data suggests that in our population, patients who have ACB performed prior to ACLR received general anaesthesia (GA).

METHODS: We carried out a retrospective data analysis from July 2012 to January 2014.

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Conclusions: ERAS is used with a wide spectrum of anaesthetic techniques and polypharmacy. The use of nerve blocks seems to decline even though their avoidance is not seen as relevant to outcome and mobilization occurs mostly the following day.

Further evidence is needed to determine which components make up the “perfect ERAS recipe” in arthroplasty surgery.

ESRA1-0475
MISCELLANEOUS

ENHANCED RECOVERY (ERAS) FOR ARTHROPLASTY SURGERY: MANY RECIPES, NO STANDARD

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Background and aims: ERAS programs for total hip (THR) and knee replacements (TKR) have been implemented across the UK to improve patient outcome and reduce length of stay. Individual components seem to vary widely.

Methods: This online survey was to anaesthetists to assess the variability of ERAS components across the UK.

Results: Of 143 respondents 5 did not utilise an ERAS protocol. Premedication were neuropathic drugs (67%), high-energy-drinks (40%), opioids (16%), none in 23%. Predominant anaesthesia modality was spinal anaesthesia with local infiltration (53% THR, 59% TKR). Intrathecal opioids were used in 40% and 33%, peripheral nerve blockade in 24% and 32% respectively. Commonest intraoperative drugs were tranexamic acid, paracetamol and dexamethasone (70-85%), NSAIDs (53%) and opioids (21%), Ketamine and Magnesium 16% each.

Postoperative drugs were regular oxycontin, neuropathics, NSAIDs and paracetamol (60-77%) with PRN opioids. Intra-articular LA infusion was used in 6% and 2% respectively. 49% of patients mobilise the same day, 2% in recovery.

Respondents felt that the most important aspect to improve patient outcome was to improve ERAS as a package, followed by early mobilization, low pain scores and anaesthetic technique and avoiding opioids and PNB least relevant.

Conclusions: ERAS is used with a wide spectrum of anaesthetic techniques and polypharmacy. The use of nerve blocks seems to decline even though their avoidance is not seen as relevant to outcome and mobilization occurs mostly the following day.

Further evidence is needed to determine which components make up the “perfect ERAS recipe” in arthroplasty surgery.

ESRA1-0476
OBSTETRIC

IMPLANTATION AND EVALUATION OF A REPORTING/ ACTION PROTOCOL/MONITORING SYSTEM FOR ACCIDENTAL DURAL PERFORATION INCIDENCE. SERIES OF 26747 EPIDURAL PATIENTS BETWEEN 2008 AND 2013

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Background and aims: Accidental dural perforation (ADP) is a potential complication of obstetric regional anaesthesia. Incidence in patients varies between 0.1 and 0.6% according to our series.

Methods: We developed a ADP identification/response/monitoring system based on patients’ digital clinical files. Data were prospectively gathered and analysed on all patients receiving obstetric anaesthesia, including all cases of ADP between 2008 and 2013.

Results: During the study period, 26,747 patients received obstetric anaesthesia. ADP occurred in 65 cases (ADP-rate of 0.25%). In 13 cases the damage was caused by the needle used. Epidural catheter was maintained for 42 hours in 52 patients. Persistent headache was reported in 4 patients, who required blood patching. In 4 of these patients the epidural catheter was left for longer than 24 hours. Other patients experienced mild headache, and there was no increase in mean hospital admission time. Two patients were readmitted for headache. Both had had catheters inserted at least 24 hours and 1 of them required blood patching.

Conclusions: The incidence of ADP tended to rise early on, balancing out in later years to levels reported in other series. We believe that the improvement is due to better understanding of and commitment to ADP identification and monitoring by professionals.

Our series shows a reduced incidence of PDPH when catheters are left in for at least 24 hours. This has in turn led to reduced demand for blood patches in patients.

We consider the practice to be a safe one with a very low incidence of complications and low mean hospital admission time.

ESRA1-0477
PERIPHERAL NERVE BLOCKS

ADDUCTOR CANAL BLOCK FOR ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Buddenberg B.1, Sebastian M.P.1, Solanpää L.1, Kaur N.1 1Anaesthetics, University College London Hospital, London, United Kingdom.

Background and aims: ACLR (Anterior cruciate ligament reconstruction) surgery is most often performed as a day case procedure but is associated with moderate to severe postoperative pain that may prevent same day discharge. Latest findings reveal that the Adductor canal block (ACB) used as a main sensory block has low incidence of motor weakness.

However, pain relief obtained with ACB after knee surgery is not yet well defined.

The aim of this audit was to investigate influence of ACB on intraoperative and postoperative analgesic requirement, length of stay in recovery, time until mobilisation and until discharge home in patients having ACLR.

Methods: We carried out a retrospective data analysis from July 2012 to January 2014.

We separate the data collected in two groups: The No Block group were patient with no ACB performed and the ACB group were patient with ultrasound-guided ACB performed prior to surgery.

Results: We collected a total of 24 patients. 13 in the No block group and 11 in the ACB group.

All of them received general anaesthesia (GA).

Postoperative analgesia requested, time to ready for discharge from recovery and for discharge home and time to mobilisation were less in ACB group, while time for first postoperative opioid consumption was longer.

Two patients in the No block group were re-admitted because of pain.

Conclusions: Our data suggests that in our population, patients who have ACB performed prior to GA for ACL reconstruction have reduced requirement for analgesia, have faster discharge from recovery and less admissions for pain.

ESRA1-0480
PERIPHERAL NERVE BLOCKS

USE OF SAPHENOUS AND POPLITEAL NERVE BLOCKS FOR UNICOMPARTMENTAL KNEE REPLACEMENTS – COMPARISON OF TWO TECHNIQUES

Lasota-Korba B.1, Hamza J.1 1Anaesthetics, Care UK, Bristol, United Kingdom.

Background and aims: Unicompartmental knee replacement (UKR) is an option to patients with osteoarthritis limited to one compartment of the knee. In our hospital, we have noticed increased number of this operations.

Over the last three years these procedures have been done under the same anaesthetic protocol as Total Knee Replacements (TKR). This involved the routine use of a urinary catheter as long acting intrathecal opioids were used to provide adequate pain control.

UKR is less aggressive operation than TKR and we decided to review our current protocol and to develop a new one aiming to achieve higher patient satisfaction, early mobilisation and discharge (same day if it is possible) avoiding urinary catheterisation.

Current TKR protocol included spinal anaesthesia with intrathecal opioids (fentanyl 10 mcg + morphine 150 mcg). The new management included: Spinal anaesthesia together with saphenous nerve block with 20 ml of 0.2% Ropivacaine and popliteal block with 20 ml of 0.1% of Ropivacaine.

Methods: We performed 30 cases following the new protocol and compared the opioid consumption in the first 24h and the incidence of PONV with 30 consecutive cases done according to the original (TKR) protocol.
We found that the new approach to the management of the UKR is as good as intrathecal opioids with the lower incidence of PONV in favour of the new protocol.

Conclusions: Prilocaine can be used to facilitate enhanced recovery after unicompartamental knee replacement.

ESRA1-0481
Peripheral Nerve Blocks

AUDIT OF INFORMED CONSENT OF PERIPHERAL NERVE BLOCKS

Sebastian M.P.1, Anwar R.1, West S.2, Kamming D.1 1Anaesthetics, University College London Hospital, London, United Kingdom.

Background and aims: Informed consent requires a description of the risks and benefits of the procedures and alternatives.

The adequacy of informed consent may influence the resolution of a malpractice claim, and the patient’s choice of anaesthetic technique for surgery.

However, the available literature is limited so the role in guiding discussions of risk with patients is unsatisfactory.

The aim of this audit was to determine whether risks/benefits of ultrasound-guided peripheral nerve blocks (USGPNB) were being routinely disclosed by anaesthetists in our hospital and identify possible improvement.

Methods: A retrospective data analysis of risk/benefits written as consent in the patient’s notes who had USGPNB performed in our hospital’s block room during one month was performed.

Results: 48 patients were identified and 33 sets of notes analysed (69%). 9 patients (27%) were informed about benefits (7 enhanced recovery, 9 analgesia improved, 6 reduced opioids consumption) and 21 patients (64%) were informed about risks (17 block failure, 14 nerve injury, 10 infection, 13 bleeding/bruising, 2 pneumothorax, 2 Horner’s syndrome, 1 compartment syndrome, 1 dysphonia, 1 phrenic nerve damage). No patients were informed about allergic reaction or local anaesthetic toxicity.

Conclusions: Candid disclosure and accurate quantification of risks is imperative to protecting patients and anaesthetists alike. Our audit has revealed that risks and benefits related to USGPNB disclosed by anaesthetists in our hospital were poor.

To improve the discussion and disclosure of risks/benefits by anaesthetists, we propose developing a consent checklist for USGPNB. However further studies in this area are required.

ESRA1-0482
Pediatric

BILATERAL INFRAOBITAL NERVE AND EXTERNAL NASAL BRANCH OF ANTERIOR ETHMOIDAL NERVE BLOCKS FOR NASAL FRACTURE IN A CHILD

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Background and aims: Nasal fracture repair often requires deep sedation or general anaesthesia in a child and postoperative period may be seriously irritating and painful. We present efficient perioperative pain management with bilateral infraorbital nerve and external nasal branch of anterior ethmoidal nerve blocks, in a child with nasal fracture.

Methods: Eight years-old, male child was scheduled for emergency nasal fracture repair. CT-scan revealed that anterior nasal septum was deviated to left and right portion had multiple fracture zones. The patient was otherwise healthy. The patient received midazolam 2mg, fentanyl 20mcg, and ketamine 20mg for sedo-analgesia. After patient was adequately sedated, bilateral infraorbital nerve and external nasal branch of anterior ethmoidal nerve blocks with %2 lidocaine was performed using 20mg and 10mg lidocaine for each nerve respectively. Then the fracture was replaced and Doyle splints were placed in the nasal passages. The patient received 15mg/kg paracetamol intravenously during the operation.

Results: The patient needed no further sedative or analgesic during the operation and transferred to the ward. The patient didn’t need any analgesics and didn’t have any complaint about the splints for 8 hours postoperatively.

Conclusions: Supplementing adequate sedation with sufficient pain management is a must for the management of a child with a nasal fracture. Although traditional anaesthesia education doesn’t include nerve blocks such as infraorbital nerve and external nasal branch of anterior ethmoidal nerve blocks, Such blocks in the armamentarium of an anaesthesiologist provides the art of clinical practice. We suggest that these blocks may offer a sufficient pain management during nasal fracture repair in pediatric patients.

ESRA1-0483
Case Reports

SUPERFICIAL CERVICAL PLEXUS BLOCK COMPLETELY ALLEViates PAIN OF DISTAL CLAVICLE FRACTURE, BUT ISB REQUIRED FOR PAIN FROM PLATE & SCREWS IN LATERAL END OF CLAVICLE

King K.1 1Anesthesiology, UPMC, Pittsburgh, USA.

Background and aims: Sensory innervation of the clavicle is poorly understood. This case demonstrates the differing requirement for distal clavicle fracture pain and ORIF postop pain. IRB approval and patient consent was obtained.

Methods: A 33 y/o male with his left clavicle fractured at 123mm of the 169mm bone, presented for distal clavicle ORIF. Preop pain was rated 4/10 at rest and worse with palpation over the closed-commminuted fracture. An USG-SCPB was planned. To avoid confusing the mechanism of pain relief, no procedural sedation was given. Block was performed with ropivacaine 0.5% (20ml). Excellent relief obtained, and mobility of shoulder improved due to lack of pain. No motor block of upper extremity occurred.

Clavicle ORIF with plate and screws performed under GETA. (See radiograph) Postoperatively, patient had pain level of 7/10 at a more lateral location.

FIGURE 1.

FIGURE 2.
USG-ISB performed with ropivacaine 0.5%(20ml) which relieved pain completely (0/10).

**Results:** SCPB relieved preoperative fracture pain, but postoperative pain from distal clavicle fixation required ISB.

**Conclusions:** While this case demonstrates that pain from distal clavicle fracture may be alleviated by SCPB (see sonogram), surgical invasion of the lateral end of the clavicle likely requires ISB for complete analgesia.

**ESRA1-0486 Obstetric**

### MATERNAL AND PERIPARTUM COMPLICATIONS IN TWIN PREGNANCY

**Borges R.1, Madeira D.1, Pinheiro F.1, Vale D.2, Santos Silva L.2, Costa C.1, Vilhena I.K.2  Anesthesiology, Coimbra University Hospital Centre, Coimbra, Portugal. 2Obstetrics, Coimbra University Hospital Centre, Coimbra, Portugal.**

**Background and aims:** Twin pregnancy represents a multidisciplinary challenge. The incidence of maternal complications (gestational hypertension, preeclampsia, gestational diabetes) is increased; the probably of peripartum complications is also higher. The epidural should be preferred for analgesia/anaesthesia.

The aim of this study is to determine the incidence of the most common maternal disturbances during twin pregnancy and during peripartum period in a tertiary centre.

**Methods:** Retrospective longitudinal descriptive study of women with twin pregnancy whose birth occurred between January/2012–December/2013. Demographic data, ASA, delivery, analgesia/anaesthesia and maternal morbidity were the studied variables. Descriptive analysis in Excel®.

**Results:** Within the time interval there were 5118 births, 190(3.7%) from multiple pregnancy. The mean maternal age was 32.7±o. (19–45). Forty women (42.6%) were ASA I, 48(51.1%) ASA II and 6(6.4%) ASA III.

There were 47(50%) vaginal deliveries and 47(50%) caesareans section; there were no cases of both vaginal and abdominal delivery.

The analgesia/anaesthesia option was epidural in 62 cases(66%), followed by combined spinal-epidural in 9 cases (9,6%).

The incidence of pregnancy related diseases were 18.1%: 3 cases of gestational hypertension,11 of preeclampsia and 8 of gestational diabetes. Five women(5.3%) had both hypertensive disease and gestational diabetes.

Intrapartum haemorrhage occurred in 3 cases and we had 3 cases of postpartum haemorrhage due to atony, corresponding to an incidence of hemorrhagic complications of 6.38%.

**Conclusions:** Multiple pregnancies corresponded to 3,7%of total births. There was a significant incidence of pathology of pregnancy and bleeding complications among this particular group of pregnant women. The epidural was the most frequent option for analgesia/anaesthesia.

**ESRA1-0491 Miscellaneous**

### COMPLICATIONS OF CAROTID ENDARTERECTOMY: 11 YEARS REVIEW

**Reis P.1, Mourão J.1, Lobo M.1, Afonso G.1 Aneestesiologia, Hospital de São João, Porto, Portugal.**

**Background and aims:** Regional Anesthesia (RA) for Carotid Endarterectomy (CE) is popular. Our objective was to study risk factors (including type of Anesthesia) for post-operative complications.

**Methods:** Retrospective study including all patients submitted to CE at our hospital between January 2000 and June 2011. We registered patient characteristics, surgical/anesthetic techniques and perioperative complications. Continuous variables were compared with Mann-Whitney test and categorical with Chi-square or Fisher-exact test.

**Results:** 737 patients were included. Complications were hemorrhota (6%), nerve damage (5%), medical (4%), ipsilateral stroke (3%), contralateral stroke (1%) and arterial thrombosis (1%). Twenty-six patients required reintervention: hemorrhota (3%), suspected thrombosis (1%). Having peripheral artery disease (PAD) (3 vs. 8%, p=0,008) or previous CE (3 vs. 9%, p=0,033) increased medical complications. Patients with Chronic Kidney Disease had post-operative hemorrhota more frequently: (5 vs. 17%, p=0,009). Intraoperative shunt use (ISU) was associated with ipsilateral stroke (3 vs. 13%, p=0,007) and contralateral stenosis ≥70% with contralateral stroke (1 vs. 3%, p=0,043).

In-hospital mortality was 9%. Age ≥70 years (5 vs. 12%, p=0,001), history of coronary artery disease (CAD) (6 vs. 16%, p<0,001), PAD (7 vs. 17%, p<0,001), ISU (8 vs. 21%, p=0,015) or general anesthesia (7 vs 14%, p=0,004) were associated with higher mortality. RA has consistently grown from 0% in 2000 to 93% in 2011 (p<0,001).

**Conclusions:** Complications were 18%, 4% requiring reintervention. ISU and contralateral stenosis ≥70% were associated with stroke. Patients ≥70 years, with CAD, PAD, ISU or general anesthesia had increased mortality. The majority of CE is now made under RA.

**ESRA1-0494 Miscellaneous**

### IN-HOSPITAL MORTALITY – THE INFLUENCE OF TIME-TO-SURGERY FOR PROXIMAL FEMORAL FRACTURE

**Maia D.1, Pereira N.1, Rebelo H.1  Anesthesiology, Centro Hospitalar de Vila Nova de Gaia/Espinho, Vila Nova de Gaia, Portugal.**

**Background and aims:** Femoral neck fractures are associated with 1-year mortality of 14-36%, and profound temporary and sometimes permanent impairment of quality of life.

The current literature suggests that early surgery influences mortality and functional recovery.

The aim of this study is to evaluate the impact of early surgery on in-hospital mortality.

**Methods:** Prospective, observational study, in Gaia/Espinho Hospital Centre, from 1st July 2012 to 30th June 2013.

The study included all patients admitted to the Emergency Department with proximal femoral fracture, submitted to surgery.

Clinical records were obtained from Medical System Support with data collection of date and time of admission and discharge. Registration of date and time of surgery was accessed from PICS®.

Early surgery was considered if surgery was performed until 48 hours after hospital admission.

Statistical analysis was performed with PASW®, using the chi-square test and the Student’s t test for independent samples (significance level of 0.05).

**Results:** Of the 246 patients included in the study, in-hospital mortality was 6%. Of individuals included, 59.3% were submitted to early surgery.

Using the chi-square test, we concluded, with a 95% confidence interval, that there’s no a relationship between early surgery and in-hospital mortality (p = 0.447).

However, we have realized that 8% patients who underwent late surgery died before discharge, v.s. 4.8% in early operated.

**Conclusions:** Early surgery of proximal femoral fracture showed no difference of statistical significance, in the in-hospital mortality compared with late surgery. However, there seems to be a trend toward a higher risk of in-hospital mortality in patients operated latter.

**ESRA1-0495 Miscellaneous**

### FEMORAL VASCULAR ULTRASOUND - A CENTRAL VENOUS ACCESS LESS ASSESSED

**Oliveira D.1, Zarif M.2 1Department of anesthesiology, Coimbra University Hospital Center; Coimbra, Portugal. 2Department of anesthesiology, Coimbra Hospital Center, Coimbra, Portugal.**

**Background and aims:** Real-time ultrasound(US) guidance reduces time to access, number of attempts and complications in central venous access but hasn’t been adequately assessed in femoral artery cannulation. Vascular accesses by anatomical references have elevated complications rates, with wide anatomical positional variability.Many ultrasound studies have showed how variable is the anatomical position of the internal jugular vein regarding the carotid artery, the same isn’t true for femoral vein and artery.The authors aim to identify by US guidance the position of the vein from the femoral artery in a group of 100 patients and possible anatomic variants.

**Methods:** Prospective study consisting in performing US study in the femoral region, a cross-sectional anatomical segment immediately above the bifurcation
of the femoral artery, in both members, in, in a orthopedic department. The only exclusion criterion was the presence of previous surgery in the evaluated region.

**Results:** Evaluated 100 patients with an average age of 62. Of the 200 scans performed in 1999 (99.5%) the femoral vein was in an infra-merdial position regarding the artery, results that are in agreement with the classical anatomy, in one case (0.5%) the femoral vein was in a superior-medial position. The average distance between the center of the artery and the femoral vein center is 1.12 cm.

**Conclusions:** Unlike what happens with the internal jugular vein versus carotid artery, femoral vein apparently maintain a more constant anatomical position with the femoral artery. This relationship seems to provide conditions for a lower rate of complications when using palpation of the femoral artery as only reference for femoral vascular access. This hypothesis needs to be confirmed by randomized studies.

**ESRA1-0496**

**Peripheral Nerve Blocks**

**CONTINUOUS SCIATIC NERVE BLOCK: LET’S MAKE A DIFFERENCE!!**

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1 Area de Anestesiologia, Centro Hospitalar de Lisboa Central, Lisboa, Portugal.

**Background and aims:** Sciatic nerve block (SNB) is an excellent technique for surgery involving lower extremity. This technique improve pain management and decreases the incidence of chronic pain, one of the more serious consequences of this type of injury.

**Methods:** We present a case of a 7-year-old child, admitted in hospital with a deep wound of the anterior surface in the right leg, in which we use a continuous SNB with excellent results.

**Results:** A 7-year-old healthy child, ASA I, was admitted to hospital with a deep wound of the anterior surface of the right leg, with section of the tibial muscles and adjacent vessels.

Emergency surgery with anastomosis of the vessels, and closure of sectioned muscles was performed, keeping fasciotomy to tibiotarsal joint. The patient was transferred to the ward, staying with a scheme of conventional intravenous analgesia, with VAS pain level between 4-8.

The 5th day of hospitalization, the patient undergoes new surgery for excision of necrotic muscle tissue under combined anesthesia. Anesthesia was induced with fentanyl and propofol, a laryngeal mask was placed, and maintenance with sevoflurane.

After induction, we performed ultrasound-guided SNB for popliteal approach with ropivacaine 0.375% (10 mL), and placed a perineural catheter for postoperative analgesia.

The patient returned to the ward with an infusion of ropivacaine 0.2% (3 mL/h), and remained stable with VAS pain level between 0-2. The catheter was removed after 6 days without any problems.

**Conclusions:** A continuous infusion of ropivacaine at the popliteal fossa, perineurally through the catheter is an effective method of decreasing postoperative pain and increasing patient’s well-being with good pain management.

**ESRA1-0497**

**Peripheral Nerve Blocks**

**TOPICAL ANESTHESIA VERSUS PERIBULLAR BLOCK FOR CATARACT SURGERY - EFFICACY AND COMPLICATIONS**

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**Background and aims:** Surgery to treat cataracts is very common and can be performed under different anesthetic techniques. At our center topical anesthesia with monitored anesthesia care (TA+MAC) and peribulbar block (PBB) are widely used in accordance with the preference of the patient, experience of anesthetic/surgical team and the existence of contraindications.

**Objective:** To evaluate TA+MAC and PBB and compare efficacy and complications.

**Methods:** Retrospective study of patients undergoing phacoemulsification with intraocular lens for cataracts treatment. We selected randomly 200 patients operated in 2013: 100 in TA+MAC and 100 under the PBB. Blocking was performed with 25G 25 mm needle and 3.5 to 5 ml ropivacaine 0.75% injection, followed by compression with the Honan balloon (pressure <30 mmHg) for 10–20 min.

It was evaluated on both groups: the need for sedation, opioids/NSAIDs, anti-emetics and antihypertensives, and anesthetic or surgical complications in the intra- and postoperative period. We carried out statistical analysis using Pearson chi-square test and logistic regression.

**Results:** It was found that the overall need for sedation, opioids/NSAIDs, anti-emetics and antihypertensives, was superior and statistically significant (p < 0.01) in group TA+MAC compared to PBB group. There were no reports of anesthetic or surgical complications in this sample.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>TA+MAC</th>
<th>PBB</th>
</tr>
</thead>
<tbody>
<tr>
<td>75±5±10</td>
<td>72±5±10,0</td>
<td></td>
</tr>
<tr>
<td>Sex (%)</td>
<td>75±0%±0,0</td>
<td>75±0%±0,0</td>
</tr>
<tr>
<td>ASA I/II/III</td>
<td>0,0%±65%±32,5%±2,5%</td>
<td>0,0%±67,5%±32,5%±0,0%</td>
</tr>
</tbody>
</table>

**Conclusions:** The differences found allow us to conclude that the efficacy of PBB was superior on this study, as implied less need for sedation, analgesia, anti-emetics and antihypertensive agents, for the same complications risk.
We conducted a retrospective study between January 2011 and January 2014, including all patients submitted to THR review surgery. Variables analyzed were gender, age, ASA Physical Status Classification, type of anesthesia, need for vaspessor support, red blood cell (RBC) transfusion, length of stay (LOS) in hospital and mortality.

**Results:** This study included 83 patients with an average of 73 years old. ASA Physical Status Classification type 3 was more frequent (52%). Neuraxial anesthesia was more commonly performed (54%). Vasopressor support was given in 33% and RBC transfusion in 27% of the patients. Median LOS was 14 days. General anesthesia seems to require more units of RBC transfusion (p=0.489) and a longer LOS in hospital (p=0.825), although not statistically significant.

Neuraxial anesthesia was performed in older patients (p=0.08) and required more vaspessor support (p=0.629).

**Conclusions:** In our study, no statistical differences were found between the type of anesthesia and ASA Physical Status Classification, need of vaspessor support, RBC transfusion and LOS in the hospital.

This may be interpreted by the small size of the sample. Prospective studies are needed to provide stronger evidence.

**ESRAI-0502**
**Peripheral Nerve Blocks**

**LOWER EXTREMIT Y BLOCKS – HOW ARE WE?**

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**Background and aims:** Regional analgesia techniques are popular as the sole technique for surgery, for combined analgesia and for post-operative and/or chronic pain management, as the effects tend to be limited to a desired part of the body, and side-effects are usually less than after general anesthesia.

Furthermore, ultrasound guidance has become a daily tool in the performance of many of these blocks.

To better know what we do concerning lower extremity blocks, and considering that our hospital is a teaching and pediatric hospital, we performed this retrospective study.

**Methods:** Retrospective study of the lower extremity blocks at the Dona Estefânia Hospital, Lisbon, Portugal, between 2012 and 2013, with regard to block, age, ASA score, surgical intervention, use of neurostimulator or ultrasound guidance and catheter placing.

**Results:** We retrieved 169 lower extremity blocks, results are as follows:

(Image "Results")

**Conclusions:** As our hospital is a teaching and pediatrics center, the number of performed blocks seems to be adequate for a correct learning curve for residents and specialists as well in this area, although there is not enough data in the literature to compare to.

The lack of data concerning complications and 7 day follow-up indicates a need for improvement in data registry, and limits the study’s adequateness.

A broader study might ensue from this retrospective analysis, allowing for a better registry and knowledge of what we do.

**ESRAI-0503**
**Case Reports**

**REDUCED SENSITIVITY OF LOCAL ANAESTHETICS IN EHLER’S DANLOS SYNDROME PARTURIENT: A CASE REPORT**

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**Background and aims:** Ehler’s Danlos Syndrome is a group of inherited connective tissue disorder due to a defect in collagen.

Although block failure with respect to local anesthesia for peripheral nerve blocks have been reported, there are no reports for block failure with regard to neuraxial blocks.

**Methods:** We describe a case of Ehler’s Danlos Syndrome here presenting for a caesarean section.

**Results:** The patient, a 32 year old female, with a known diagnosis of Ehlers Danlos Syndrome was posted for an elective caesarean section.

Her echocardiogram was normal and all the coagulation tests were within normal limits.

She had a caesarean section two years back, during which she received a spinal anaesthetic in a dose of 12.5mg of hyperbaric bupivacaine with 300mcg of diamorphine. Due to inadequate block height the spinal had to be repeated with a supplemental dose of 5mg of hyperbaric bupivacaine, after which adequate block height was achieved. She bled 1500ml during that operation.

For this caesarean also the plan to do a spinal anaesthetic was proposed. After instituting adequate monitoring and IV access in the operation theatre, the patient was given a spinal in sitting position with a dose of 13mg of hyperbaric bupivacaine and 300mcg of diamorphine. This time again the block height was inadequate. She needed a repeat spinal anaesthetic with a supplemental dose of 5mg hyperbaric bupivacaine. The adequate block height was achieved after these second spinal.

**Conclusions:** This case further supports the available evidence of local anaesthetic resistance in patients with Ehler’s Danlos.

**ESRA Abstracts**
**Regional Anesthesia and Pain Medicine**

**Volume 39, Number 5, Supplement 1, September-October 2014**
Methods: This is a prospective study including 40 patients into two groups. All ASA I and II patients candidates for surgery of the middle ear, between 18 and 60 years were included. In Group A, induction of anesthesia with propofol/fentanyl and maintenance intravenous (i.v.) fluids were used. In Group B, induction of anesthesia with propofol/fentanyl and maintenance intravenous (i.v.) fluids with addition of 75 μg of remifentanil. TIVA was maintained for the duration of surgery. The postoperative care was identical for both groups. No patient in either group received postoperative intravenous opioids. Results: ASA I and II patients were included into the study. No statistically significant difference was observed for both groups with respect to age, sex, body weight, time to extubation, mean arterial pressure, heart rate, and Spo2. TIVA is a suitable anesthetic technique for sinus surgery. Conclusions: TIVA is a safe and effective anesthetic technique for sinus surgery.

ESRA1-0505

Rapid Atrial Fibrillation Following Intercaraneal Block Containing Adrenaline

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Background and aims: Adrenaline is often used in regional anesthesia (RA) to prolong block duration and minimize systemic absorption of the local anesthetic (LA). However, this adjunct may result in unwanted tachycardia and hypertension.

Methods: We describe a case of a 64-year-old lady with hypertension, chronic atrial fibrillation (AF), a previous sensorimotor stroke and end-stage renal failure on haemodialysis complicated by tertiary hyperparathyroidism.

Results: The patient was admitted electively for an excision of a previously implanted parathyroid gland from her right deltoid. Because of her multiple comorbidities, the benefits of RA outweighed the risks of general anaesthesia. She was given an ultrasound-guided intercaraneal block with a mixture of 10 ml lignocaine 1.5% and 10 ml ropivacaine 1% with adrenaline 1:400,000 (i.e. total 50 mcg). Good ultrasonic images showing a first pass block needle insertion were obtained. There was no vascular puncture and no blood aspirated through the needle. Visualisation of the LA spread around the brachial plexus was satisfactory. Just after completion of the block, the patient developed fast AF rate 160/min without blood pressure compromise. She required multiple boluses of esmolol as well as digoxin to control the heart rate. We postulate that significant systemic absorption of the adrenaline may have precipitated the rapid ventricular response to atrial fibrillation despite no evidence of intravascular injection.

Conclusions: Even though rate-controlled AF is not a contraindication for the use of adrenaline in LA solutions, this report demonstrates that caution should be exercised when using additives which may have systemic effects.

ESRA1-0507

Postmodular Pain Management

Multimodal Analgesia for Laparoscopic Cholelithectomy: What Contribution Paredoxib?

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1Faculty of Medicine of Tunis, University of Tunis El Manar, Tunis, Tunisia.

Background and aims: Evaluation of the contribution of parecoxib in a multimodal analgesia protocol for laparoscopic cholecystectomy.

Methods: Prospective, randomized, double-blind, single-center. Inclusion criteria: all patients aged over 18 due to receive general anesthesia for laparoscopic cholecystectomy are measured at pre-anesthetic consultation and provided informed consent. Exclusion criteria: age under 18 years, allergic to NSAIDs or any component of Dynastat®, ulcer and pregnant women.

Exit criteria for the study: the conversion to laparotomy, intraoperative complications and improvement of SatO2. Postoperative evaluation revealed sensory and motor deficit in the lower limbs, limping gait, diminished knee and ankle jerk reflexes bilaterally. In the second case, the patient manifested with sensory-motor abnormalities in the upper limbs. The first case was associated with a Dandy-Walker syndrome.

Results: In the first case, an ultrasound-guided single-shot femoral block and popliteal-sciatic continuous block was performed, with administration of ropivacaine and methylprednisolone. In the second case, sciatic-popliteal block with neurostimulation was unsuccessfully attempted, followed by general anesthesia (induction with propofol and fentanyl, and maintenance with sevoflurane, fentanyl and O2/air). During the intervention peripheral O2 saturation (SatO2) remained between 90-92%.

Postoperative analgesia in the first case was performed with infusion of ropivacaine, combined with rescue endovenous analgesia. In the second case, endovenous bolus of paracetamol and tramadol were used.

Postoperative assessment showed evolution without neurological complications and improvement of SatO2.

Conclusions: Regional anesthesia in patients with neuropathy is controversial due to the possibility of neurological complications. The use of ultrasound reduces these risks.

The difficulty of performing regional anesthesia with neurostimulation may be due to decreased reflexes.

The use of muscle relaxants is controversial. Despite the possibility of malignant hyperthermia, sevoflurane was used unequivocally. Besides the analgesic efficacy, regional anesthesia prevents manipulation of the airway, which is often problematic in these patients.

ESRA1-0509
Peripheral Nerve Blocks

PERIPHERAL BLOCK IN CATARACT SURGERY - A RETROSPECTIVE STUDY

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Background and aims: Cataract affects a large number of patients, often elderly with multiple comorbidities. The surgery could be performed under different anaesthetic techniques. At our center topical anaesthesia with monitored anaesthesia care and peribulbar block (PBB) are widely used in accordance with the preference of the patient experience of anaesthetic/surgical team and the existence of contraindications.

Objective: To evaluate results of PBB, the level of effectiveness and complications.

Methods: Retrospective study of patients undergoing phacoemulsification with intraocular lens inserting for treatment of cataracts in PBB. We selected randomly 100 patients. The PBB was performed with 25G 25mm needle and 3.5 to 5 ml ropivacaine 0.75% injection, followed by compression with the Honan balloon (pressure <30mmHg) for 10-20 min. It was evaluated the instilled volume and the injection point: infra-internal quadrant (IIQ) or infra-external quadrant (IEQ). We evaluated the need for sedation, opioids/NSAIDs, antiemetics and antihypertensives, and anesthesia or surgical complications, intra/postoperative period.

Results:

<table>
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<th>TABLE 1.</th>
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<tr>
<td><strong>Age</strong></td>
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<td><strong>Sex F/M</strong></td>
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<td><strong>ASA I/II/III/IV/VI</strong></td>
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<tr>
<td><strong>PBB</strong></td>
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<td><strong>Volume</strong></td>
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<td><strong>Intraoperative period</strong></td>
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<td><strong>Analgesia</strong></td>
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<td><strong>Antihypertensive</strong></td>
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<td><strong>Complications</strong></td>
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<td><strong>Postoperative period</strong></td>
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<td><strong>Analgesia</strong></td>
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<td><strong>Antihypertensive</strong></td>
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<td><strong>Complications</strong></td>
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</table>

Conclusions: This case is characterized by patients with an average age of 72.025 years, ASA II/II. In only 7.5% of patients required additional analgesia was and there was no record of need for sedation, nausea/vomiting or complications. 5% of patients required antihypertensive.

We conclude that for most patients in this sample, PBB was effective as a single technique.

ESRA1-0511
Case Reports

HORNER’S SYNDROME FOLLOWING EPIDURAL ANALGESIA FOR LABOR DUE TO EPIDURAL PLICA MEDIANA DORSALIS

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Background and aims: We report a case of Horner syndrome (HS) following labor lumbar epidural analgesia due to epidural plica mediana dorsalis.

Methods: A 19-year-old primigravida, ASA I, 70Kg, 170-cm, presented in active labor. With the patient in sitting position, the epidural space was located at L3-L4 space and a 20-gauge-epidural-catheter was inserted and advanced 3cm in the epidural space. Test dose of 2ml-lidocaine 2% was injected. 5minutes later, 1ml-levonbupivacaine 0.125% plus 50mcg-fentanyl were injected. An epidural infusion of levobupivacaine 0.125% with fentanyl 1mcg/ml was started at a rate of 12ml/h.

30minutes after starting the epidural infusion, left sided ptosis-miosis-enophthalmos were noted: she developed left side HS, but also excellent ipsilateral sensory blockade to T2 to S3, without motor blockade; however she did not experience any sensory blockade on the right side. The rest of the examination was normal. No hemodynamic and respiratory side effects were found.

Results: Maneuvers to improve contralateral uniform neural blockade were unsuccessful. The epidural infusion was stopped, she was recumbent in a 45-degree right-lateral-decubitus position, and the symptoms and signs were gradually, spontaneously and completely resolved over the next 3hours without sequelae. An epidurogram was performed to ascertain the correct location of the catheter within the epidural space and presence of sagittal compartmentalization: these views showed left unilateral spread of the contrast medium.

Conclusions: This case report shows a very unusual reason for unilateral sensory blockade with epidural analgesia for labor, adding an ipsilateral horner’s syndrome.

The presence of a midline epidural septum should be considered in the differential diagnosis of unilateral epidural blockade.

ESRA1-0516
Postoperative Pain Management

PERIPHERAL NERVE BLOCK- OR INTRAVENOUS-PCA ANALGESIA FOR EARLY PHYSICAL REHABILITATION IN “FAST-TRACK” ORTHOPAEDIC SURGERY: WHAT IS OPTIMAL?

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Background and aims: “Fast-track” orthopaedic surgery characterized early physical rehabilitation (FR). Quality patient mobilization depends on pain therapy success and motor function preservation. Continuous regional (PNB) and intravenous (IV) patient-control analgesia (PCA) built current base of acute post-surgical pain management. Aim was to determine more effective PCA-analgesia (IV-PCA’s vs. PNB-PCA) for early FR in “fast-track” surgery.

Methods: Prospective, observer-blinded study included 29 adults (31-51 age; bought gender; ASA I/II) scheduled for knee ligament reconstruction. Intravenous (Group-IV-PCA: fentanyl 0.07 μg·kg⁻¹·h⁻¹)(N=10) or regional (Group-PNB-PCA: femoral block, 0.125% levobupivacaine, 10 ml h⁻¹)(N=19) PCA-analgesia (Group-IV-PCA: fentanyl, 0.05mg/30min/x8max; Group-PNB-PCA: 0.125% levobupivacaine, 8ml/30min/x8max) was established after surgery. Pain score was assessed during 24-hours after surgery (Figure 1). VAS ≤5 was accepted as satisfactory. Paracetamol 1g i.v. was added if VAS was >8. Early FR starts six-hours after surgery. Date was analysed by http://statpages.org.

Results: Regional- and intravenous-PCA analgesia provided equally effective analgesia during first 24-hours after surgery. Early FR was possible 6-hours after surgery in 89% Group-PNB-PCA (20% Group-IV-PCA)(P=0.001) due to significantly lower VAS 0.7+/−0.2 (Group-IV-PCA 3.0+/−0.2)(P=0.004). Residual motor block, presented in two patient (11%) with PNB-PCA, disabled the onset of FR. Additional analgesic dose was needed in 40% patients in Group-IV-PCA (11% PNB-PCA P=0.001).

Conclusions: PNB-PCA analgesia allows more successful pain-free early FR for orthopaedics “fast-track” surgery, in circumstances of adjustment anaesthetic dose to preserve motor functions.

ESRA1-0517
Case Reports

EPIDURAL HEMATOMA FOLLOWING THORACIC EPIDURAL ANESTHESIA IN A PATIENT WITH ADENOCARCINOMA OF THE STOMACH

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Background and aims: Thoracic epidural analgesia is of proven benefit for ASA III and IV patients undergoing upper abdominal surgery however, spinal
hematoma or bleeding in the spinal canal following such a block is catastrophic and can worsen postoperative outcome. We report a case of patient developing a spinal hematoma following epidural catheter insertion despite a normal coagulation profile.

Methods: A 40-year-old male ASA III male, weighing 40kg, a chronic smoker with COAD was scheduled to undergo radical gastrectomy for carcinoma stomach. The patient was icteric but had normal liver functions, a normal coagulogram with platelet count of 100,000/cmm preoperatively and low PEF (ineffectual cough). An awake thoracic epidural catheter insertion was planned at T7-8. Though not technically difficult, 3 attempts were needed by an experienced anaesthetist, the first resulted in a dural tap (T7-8), the second in aspiration of blood through the catheter (T8-9), the third (T9-10) was uneventful. Eight hours following the block the patient developed sensori-motor loss that rapidly progressed to paraplegia. During laminectomy epidural catheter was observed passing through friable tissue. Histopathology revealed mucin secretig signet cells nested in fat cells suggestive of metastasis of adenocarcinoma from the stomach.

Conclusions: In the absence of technical difficulty, evidence of excessive fragility of the dura (repeated dural/bloody tap) in a sick patient with a malignancy can caution the anaesthetist of the possibility of epidural metastasis and possible spinal hematoma.

ESRA1-0518
Peripheral Nerve Blocks

FOREARM NERVE CATHETERS FOR ANALGESIA AFTER FLEXOR TENDON TENOLYSIS
John J.1, Chandra P.2, Anaesthesics, Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, United Kingdom.

Background and aims: Flexor tendon sheath tenolysis in the hand is done to improve function of the fingers following contractures. Early active physiotherapy is essential to keep the flexor tendons moving reducing recurrent contractures. Postoperative pain limits flexion exercises. Single shot nerve blocks of the median and ulnar nerves do not provide analgesia beyond 12-24 hours. We describe 3 patients who received continuous median and ulnar perineural infusions.

Methods: All three patients received ultrasound guided single shot blocks of the median ulnar and radial nerve at the elbow with 5ml0.5%Bupivacaine each. A sterile forearm tourniquet was used for hemostasis. At the end of the operation a catheter was inserted close to the ulnar and median nerve at the midforearm level using ultrasound. The catheters were connected to a portable pump set to deliver 5ml/hr of 0.25%Bupivacaine infusion with a patient controlled bolus of 5ml as required. Infusion was continued for 3 days.

Results: None of the patients needed a GA. Postoperative VAS pain scores on movement remained less than 2/10 all throughout. Active flexion of the finger joints was possible throughout 3 days of the infusion. Flexion was maintained on the 4th day too after the catheters were removed. Surgical results remain excellent at 6 week follow up.

Conclusions: Continuous blockade of the median and ulnar nerves at midforearm level can provide high quality long term analgesia for the hand. Blocking at this level maintains motor power in the forearm flexors while providing complete sensory block to the hand thus enabling active physiotherapy.

ESRA1-0522
Chronic Pain Management

SUPRASCAPULAR NERVE BLOCK: COMPARISON OF LANDMARK TECHNIQUE AND US GUIDANCE
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Background and aims: Suprascapular nerve block with pulsed radiofrequency lesioning is used in the treatment of chronic shoulder pain. This block is performed with both the anatomic landmarks technique and ultrasound guidance. Our aim was to compare both of these techniques. Methods: The study is performed by checking retrospectively the data of the patients that suprascapular nerve block were performed by classical (Moore) technique and US guided between January 2010–January 2014. Application quantities, the pain scores and the range of motion (ROM) before and after the applications, the complications occurred during and after the applications and the requirement of second application are recorded. Results: The decrease in the VAS score in the 1st week was significantly (p<0.05) higher in the US-guided group compared to US not guided group. There was no significantly difference between two groups in the VAS scores decreases of 1st month and 3rd month compared to the baseline scores. The increase at the 1st week of flexion rate compared to baseline was significantly (p<0.05) higher at US guided group. There was no significantly difference between the two groups by means of the change in flexion rate at 1st month and 3rd month compared to baseline. There was a significantly (p<0.05) increase at abduction rate at the 1st week and 1st month compared to baseline. The US-guided block was applied on 5 patients, whom the classical technique block was failed. No complication was established. Conclusions: The success rate of application is increased with ultrasound guidance at suprascapular nerve block.

ESRA1-0524
Pediatric

ANALGESIC EFFICACY OF CAUDAL BLOCK VERSUS WOUND INFILTRATION WITH LEVOBUPIVACAINE AND STRESS RESPONSE IN CHILDREN FOLLOWING INGUINAL HERNIA REPAIR
Cinar S.O.1, Chtar 1, kemoglu S.3, tombul M.2, paksy 1, anesthesiology and reanimation, sisi efal hamalye teaching and training hospital, istanbul, Turkey.

Background and aims: To compare the analgesic effect between the caudal analgesia and wound infiltration and postoperative cortisol and prolactin levels.

Methods: We studied 64 children aged 2-10 years who were undergoing inguinal hernia repair. Anesthesia was carried out using the standard procedure. Patients were assigned to two groups. In group A (n = 32), 0.25 ml/kg levobupivacaine (5 mg/ml) was infiltrated. In group B (n = 32) 1ml/kg levobupivacaine was given via caudal route after induction of general anaesthesia. Mean arterial pressure, heart rate, objective pain score, adverse effects and the number of rescue analgesics were recorded for 24 h. Blood samples were withdrawn following induction of anaesthesia and at 40 min after the end of surgery for measurement of blood cortisol and prolactin levels.

Results: Mean arterial pressure, heart rate were significantly higher in infilgration group (p<0.05). There is no demonstrable difference in rescue analgesia or objective pain scores when comparing two groups (p<0.05). Postoperative plasma cortisol and prolactin levels were significantly higher in two groups than preoperative plasma cortisol and prolactin levels (P < 0.001). Although there were no difference in these parameters between two groups (p<0.05).

Conclusions: We find the analgesic efficacy of wound infiltration comparable to caudal block. This study suggests that local anaesthetic infiltration with levobupivacaine is useful, lower risk and less time-consuming for analgesia in children following inguinal hernia repair.

ESRA1-0528
Miscellaneous

THE ROLE OF DIABETES ON ARTERIAL PATENCY AND BLOOD FLOW FOLLOWING RADIAL ARTERY CANNULATION
Kim C.1, Kim E.1, Soh S.1, Koo B.N.1, 1Department of Anesthesiology, Yonsei University College of Medicine, Seoul, Korea.

Background and aims: Artery cannulations are essential for close hemodynamic monitoring, blood gas analysis throughout intraoperative and perioperative period. Among various arteries, radial artery is the most common site for cannulation for its ease of accessibility, cannulation and low risk of related complications. But, it could be hard to access, even lead to distortion in arterial patency and blood flow especially among patients with underlying artherosclerosis or other vascular disease, such as diabetes. This study focused on evaluating the role of diabetes on arterial patency and blood flow following radial artery cannulation during general anesthesia using Doppler ultrasound.

Methods: Forty patients scheduled for elective surgery in needs for radial artery cannulation were enrolled; 20 diabetes, 20 non-diabetes. Ultrasound-guided radial artery cannulation was performed using the transverse image
technique with a 20-G cannula. Arterial diameter, peak systolic velocity, end-diastolic velocity, resistance index and mean volume flow were measured using doppler ultrasound at five points in both radial and ulnar arteries: before anesthesia; 5 min after intubation; immediately after cannulation; 20 min after cannular removal; and 24 hr after cannulation.

Results: After radial artery cannulation, ulnar diameters and blood flow were significantly increased, and persisted until 5 min after cannulation in both diabetes, and non-diabetes group. Radial blood flow was decreased immediately after cannulation and recovered to pre-cannulation values 5 min after cannulation. There were no statistical differences between groups at each time point.

Conclusions: Radial artery cannulation causes compensatory increase in ulnar artery blood flow, and the presence of underlying diabetes has minimal effect on this change.

ESRA1-0530
Central Nerve Blocks

KNOWLEDGE AND PRACTICE OF DISINFECTANT USE PRIOR TO CENTRAL NEURAL BLOCKADE - AN AUDIT OF CURRENT PRACTICE

Liyanage M.1, Brayshaw S.1 1Anaesthetics, Broomfield Hospital, Chelmsford, United Kingdom.

Background and aims: The aim of this audit was to determine the current practice of skin disinfection for central neural blocks among Anaesthetists and Operating Department Practitioners (ODPs) and knowledge about the adverse effects.

Methods: Two separate questionnaires were administered to anaesthetists and ODPs consisting of mainly yes or no responses to a series of question. The questions were self explanatory and dealt with their personal practice of skin disinfection for central neural blocks.

Results: A total of 45 Anaesthetists (57% of the department) and 26 ODPs (65%) of the department) responded.

Out of the 45 anaesthetists, there were 22 consultants, 16 trainees and 7 specialty doctors. 24 (53%) of these anaesthetists had more than 10 years experience.

The responses to the questions were

<table>
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<tr>
<th>Question</th>
<th>Anaesthetists (n=45)</th>
<th>ODPs (n=26)</th>
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<tbody>
<tr>
<td>Knowledge that the solution used is 0.5% Chlorhexidine</td>
<td>33 (73%)</td>
<td>20 (77%)</td>
</tr>
<tr>
<td>When do you clean the skin?</td>
<td>32 (71%)</td>
<td>14 (54%)</td>
</tr>
<tr>
<td>Do you wait for the skin to dry before proceeding?</td>
<td>Yes - 41 (91%)</td>
<td>Yes - 30 (71%)</td>
</tr>
<tr>
<td>Would you remove gloves contaminated with chlorhexidine?</td>
<td>Yes - 32 (69%)</td>
<td>Yes - 14 (53%)</td>
</tr>
<tr>
<td>Do you keep the pot containing chlorhexidine in the sterile field after cleaning?</td>
<td>Yes - 14 (28%)</td>
<td>No - 31 (72%)</td>
</tr>
<tr>
<td>Do you know of serious adverse effects of chlorhexidine?</td>
<td>Yes - 22 (49%)</td>
<td>Yes - 20 (77%)</td>
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Conclusions: A majority of Anaesthetists and ODPs were aware of the possibility of arachnoiditis associated with Chlorhexidine. However there are deficiencies in the knowledge of the percentage of chlorhexidine used in skin disinfection.

ESRA1-0532
Chronic Pain Management

FOLLOW-UP OF 341 PATIENTS WITH LOW BACK PAIN AFTER CAUDAL EPIDURAL INJECTION WITH OR WITHOUT ORAL PREGABALIN

Amaoutakis E.1, Michaloliakou C.2, Kastrinaki K.2, Gkliatsis E.1, Janets A.2, Michaloliakou M.2, Makris A.1 (Anesthesia, Asklepieion Hospital, Athens, Greece; 2Anesthesia and Pain Clinic, Metaxa Cancer Hospital, Piraeus, Greece).

Background and aims: Low back pain (LBP) is associated with several disabilities. Caudal epidural injection (CEI) of steroids and local anesthetics is commonly used for pain relief and improvement of mobility. We reviewed our cases looking in indications of treatment and multiple clinical outcomes.

Methods: We conducted a retrospective study (January 2012- March 2014) of 341 patients, aged 24-83 years-old with pain lasting more than 6 weeks, not responding to oral treatment. We obtained an ethics committee approval. Before our intervention, patients were assessed regarding the NRS score, DN4 Questionnaire (Treede classification), Oswestry Disability Index (ODI), opioid intake and side effects. The assessment was repeated at T2 (2 weeks), T4 (4 weeks), T6 (6 months) and T12 (12 months).

Patients received 4ml ropivacaine 0,2%, fentanyl 50μg, betamethasone 6mg, clonidine 75μg, diluted in N/S; total volume 30-40 ml. When DN4>24 oral pregabalin (75-300mg daily) was added. Number of injections: 3 (interval 2 weeks).

Results: In 40,7% of patients DN4>24:
- Significant reduction in NRS and in ODI scores (≥50%) at T2, T4, T6, T12 in up to 70% patients.
- Pain relief remained satisfactory throughout T12 in 83% patients receiving pregabalin and 65% of the other cases.

Conclusions: CEI is a safe, easy, low cost technique with immediate and long-term effects as an outpatient procedure. Addition of pregabalin enhances pain relief.

ESRA1-0534
Case Reports

ADRENALECTOMY FOR CUSHING’S SYNDROME IN PREGNANCY

Assis Haddad K.1, Gaviria Jaramillo C.1, Martinez González E.1, Hernández Cádiz M.1.2, Martínez Gil A.2, García Vitoria C.1, Alonso Cano C.1, Baldó Gómez J.1, Rodríguez Gimillo P.2, Anesthesiology, Hospital Universitario Dr Peset, Valencia, Spain; 2Anesthesiology, Hospital General Universitario, Valencia, Spain.

Background and aims: Introduction.

The coexistence of Cushing’s syndrome (CS) and pregnancy is rare. The treatment of choice is surgical with the exception on the third trimester because an increase in morbimortality where metyrapone is indicated.

Methods: Clinical Case.

A 21 years-old woman and 27 week pregnant with history of gestational diabetes and hypertension was hospitalized for pneumonia. The clinical exam exhibited peripheral edema, moon facies, purple abdominal stretch marks, acne and hirsutism.

Analysis confirmed an ACTH-independent CS. The MRI showed a left adrenal heterogeneous mass.

Results: She was scheduled for laparoscopic left adrenalectomy because there was no improvement with metyrapone. Epidural catheter was placed for intraoperative analgesia to limit the use of opioids.

We did a rapid sequence intubation. There was no significant bleeding nor surgical incidences. The postoperative period didn’t show complications.

Natural delivery at 33 weeks: a boy with no signs of virilization.

Conclusions: The CS in pregnancy requires treatment regardless the cause. Because treatment with metyrapone failed and the suspicion of carcinoma was present, surgical management was decided.

This patients are an anesthetic challenge because of the own changes in pregnancy and the associated risk of intervention.

ESRA1-0535
Central Nerve Blocks

THE EFFECT OF PATIENT POSITION ON POSTDURAL PUNCTURE HEADACHE

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Background and aims: We aimed to investigate the association between postdural puncture headache and the position in which spinal anesthesia was performed.

Methods: Records of patients who underwent caesarean section between January, 2013 and November, 2013 with spinal anesthesia were examined retrospectively. Patients older than 18 were included in the study. Failed spinal anesthesia and conversion to general anesthesia was the exclusion criteria. Patient characteristics, comorbid diseases, position of patients while performing spinal anesthesia and the numbers of spinal puncture attempts were recorded.

Results: Total 149 records of patients who met the inclusion criteria were analysed (sitting position n=72 and lateral position n=77). Postdural puncture headache developed 18.3 % (n=11) in the sitting position and 14.8 % (n=9) in the lateral position. There was no difference between groups in terms of age, weight, height, American Society of Anesthesiologists (ASA) physical status, comorbid diseases, attempt numbers and frequency of postdural puncture headache (p>0.05). There was no correlation between postdural puncture headache occurrence and the patient position during spinal anesthesia performance (p>0.05).

Conclusions: We concluded that the patient position during spinal anesthesia performance did not affect the postdural puncture headache incidence.

ESRA1-0540
Peripheral Nerve Blocks

IMPROVEMENT IN EFFICIENCY AND THROUGHPUT IN THEATRES FOLLOWING INSTITUTION OF A BLOCK ROOM
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Background and aims: The benefits of regional anesthesia are becoming increasingly apparent, and include improved patient satisfaction, enhanced recovery and potentially decreased rates of recurrence of certain cancers. The introduction of a block room in our hospital aimed to increase the availability to patients of regional anesthesia by a skilled anesthetist, reduce failure rates, and provide improved training. We aimed to ascertain whether, in addition to these benefits, throughput in theatre is improved by a dedicated block room, potentially leading to significant time and cost savings. (Authorised by local ethics committee as service evaluation).

Methods: Data was collected during the month before and the month after institution of the block room, on the number of peripheral nerve blocks performed, the number of surgical cases completed, and the rate of late starts and late finishes in theatre.

Results: After institution of the block room there was an increase in the number of peripheral nerve blocks performed per week from 25 to 30. Mean time spent in the anaesthetic room was reduced from 44 to 27 minutes. As a result, there was an increase in the number of cases completed in orthopaedic and emergency theatres by 1 case per theatre per day, and the number of late starts and late finishes was reduced.

Conclusions: In addition to the known benefits of providing good quality regional anesthesia, a dedicated block room appears to improve efficiency and throughput in theatres, leading to an increased number of surgical cases completed.

ESRA1-0541
Postoperative Pain Management

EVALUATING MID-THORACIC EPIDURAL SPACE DEPTH IN A PORTUGUESE POPULATION
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Background and aims: Thoracic epidural anesthesia (TEA) has been established as a cornerstone in the peri/postoperative care after thoracic and major abdominal surgery providing most effective analgesia. Nevertheless, heavy handicaps are anticipated, such as technical difficulties, together with the fear of spinal cord injury and lack of training of MOST anesthesiologists in performing high thoracic epidurals.

Recently, ultrasonography has gained popularity as a reliable tool in the estimation of epidural space depth, but requires a long learning curve, is operator dependent, RISES COSTS and it’s time consuming.

Our aim is to find biometric parameters to accurately estimate the average distance skin-mid-thoracic epidural space (DSMTE) in an adult portuguese population.

Methods: The study included 157 patients (105 men and 52 women) submitted to combined anesthesia with TEA for lung / oesophageal resection with effective postoperative analgesia. Mann-Whitney, Kruskall-Wallis and Jonckeere-Terpstra tests were used, as applicable, to evaluate differences in DSMTES according to sex, height, and epidural space, and correlation coefficients were used to RATE COMBINA-

TIONS with age and weight.

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The DSMTES was of 7.5 (range 3.0-12.0) and it was higher among receptors can produce serotonin syndrome. Individual Literature review and clinical case description.

Methods: After obtaining approval from the Medical Ethics Committee, University Malaya Medical Centre (IRB reference no. 949.14 dated 17 October 2014), when spinal catheter was used initial dose of 1 ml of Heavy marcaine was injected to achieve block up to T5 level. When CSE was done for her second LSCS, 2 mls of Heavy marcaine was injected to achieve block up to T4.

Conclusions: Historically, obstetric patients with achondroplasia received general anesthetic, but nowadays regional anesthetic techniques using spinal catheters and combined spinal-epidural are used that allows greater titrability of the block. On the second occasion, the technique of CSE was preferred as the dose given in spinal this time was guided by the amount that was injected via spinal catheter in first pregnancy.

TABLE 1. Block performance data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean (SD)</th>
<th>Min - Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imaging time</td>
<td>0.29 (0.15)</td>
<td></td>
</tr>
<tr>
<td>Needling time</td>
<td>4.31 (1.00)</td>
<td></td>
</tr>
<tr>
<td>Performance time</td>
<td>5.03 (1.05)</td>
<td></td>
</tr>
<tr>
<td>Onset time, mean (SD)</td>
<td>22.46 (4.16)</td>
<td></td>
</tr>
<tr>
<td>Total anesthesia related time</td>
<td>27.50 (4.36)</td>
<td></td>
</tr>
</tbody>
</table>

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Conclusions: As part of a multimodal analgesic regime for patients under-
undergoing Ivanishevich varicocelectomy operation 20 ml 0.25% bupivacaine
administered by USG-TAP block, was shown to provide effective analgesia
in the postoperative period and a reduction in the need for opioids. Further
advanced studies are required to determine the appropriate local analgesic,
volume, concentration and correct timing of administration for TAP block
in varicocelectomy operations.

ESRA1-0559
Peripheral Nerve Blocks

AUDIT OF EFFECTIVENESS OF PARAVERTEBRAL CATHETERS IN PATIENTS WITH MULTIPLE RIB FRACTURES
Sheppard N.1, Varma M.1 1 Anaesthetics, Royal Victoria Infirmary, Newcastle
upon Tyne, United Kingdom.

Background and aims: Multiple rib fractures are painful and prevent deep
breathing and coughing. In addition opioid therapy can exacerbate this. Three
or more rib fractures are associated with an increased mortality and morbidity.
There is a 30% risk of pneumonia in the elderly with multiple rib fractures
which has been shown to be reduced by epidural analgesia. We wanted to au-
dit the efficacy of our paravertebral catheter service.

Paravertebral catheters are safe, have a low rate of complications, provide a
unilateral thoracic block and have been shown to be equivalent to epidurals in
unilateral rib fractures.

Methods: Referrals were made to our regional anaesthesia team over a
5 month period. The block was performed in either a block area or critical care.
Under ultrasound guidance (except one) a catheter was sited and connected to
an epidural pump infusion 0.25% Bupivacaine. Follow up was with the acute
pain team. Pre and post catheter pain scores were recorded.

Results: 16 Paravertebral catheters were sited, 7 on critical care patients and 9
on ward based. All received immediate pain relief and there were no immediate
complications. All patients had 3-9 rib fractures. Median pain scores pre block
were 10 and post 3. The mean improvement in pain score was 5.3. 11/16 patients
were very satisfied or satisfied and none of the remainder were dissatisfied.

Conclusions: We offer a limited service which is providing good analgesia for
multiple rib fractures and excellent patient satisfaction.

ESRA1-0560
Miscellaneous

MODIFICATION OF PERINEURAL CATHETER TIP TO REDUCE DISLOCATION WITHIN TISSUE
Fox B.1, Brandon P.1, Sujeeawan S.1, Laba D.2, Fawzy E.1 1 Anaesthetics, Queen
Elizabeth Hospital, King’s Lynn, United Kingdom, 2Anaesthetics, Norfolk and
Norwich Hospital, Norwich, United Kingdom.

Background and aims: Perineural catheters are commonly used for post op-
erative pain relief, however their distal tip can dislocate from the desired position
leading to suboptimal analgesia or even failure.1 We hypothesised that putting
small bars at the distal end of the catheter would reduce catheter dislocation.

Methods: We compared non-barbed catheters (18g Comtiplex, B Braun) to the
same make of catheter with bars made at the distal end (Figure 1). Catheters
were inserted into a porcine model and then a standardised force was applied,
starting at 0.4 Newtons and slowly increased up to 1.16 barbed and 16 non-
barbed catheters were compared. Parametric and non-parametric statistical tests
were used as appropriate.

FIGURE 1.

Results: 15 out of 16 non-barbed catheters came completely out of the model
as soon as force was applied. Not one of the barbed catheters came of the model
and 5 out of 16 did not move at all. Of those that did dislocate the mean distance
moved was 0.2 cm (0.12,0.28).

Conclusions: Our study showed that small modifications of a catheter can sig-
ificantly reduce dislocation. An important finding with this study was that two of
the barbed catheters snapped in the tissue. The safety implications of the is
are obvious and future work would include looking at the design so that we
achieve minimum dislocation with out causing harm.

References
1. Marhofer D, Marhofer A, Triffterer L, Weber M & Zeitlinger M. Disloca-
tion rates of perineural catheters: a volunteer study. British Journal of An-
aesthesia 2013; 111: 800-6

ESRA1-0561
Central Nerve Blocks

SPINAL VERSUS GENERAL ANAESTHESIA FOR AMBULATORY ARTHROSCOPIC KNEE SURGERY: RECOVERY TIMES AND PATIENT OUTCOME
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ology, Centro Hospitalar de Vila Nova de Gaia/Espinho, Vila Nova de Gaia,
Portugal.

Background and aims: Ambulatory surgery (AS) is becoming the paradigm
for minor surgery.

Adverse effects of anaesthesia influence patient outcome and satisfaction.
Theatre turnover and recovery times are relevant organizational issues.

This study aimed at assessing how regional anaesthesia affects patient out-
come and recovery times of AS.

Methods: An observational, cross-sectional, correlational retrospective study
was conducted; records of all patients submitted to arthroscopic knee AS in 2013
were analysed for anaesthesia, surgery and recovery times; anaesthesia
techniques; peri-operative adverse effects; 24h post-op patient questionaries.

Ethical approval for this study has been granted.

Results: 168 patients were analysed: mean age 50.4 years, 44% male and 96%
ASA status 1 or 2; 52% were operated under spinal anaesthesia (group S) and
48% under general anaesthesia (group G) with (22%) or without (26%) neuro-
muscular blockade (NMB). More patients in group S referred no pain (62% vs
51%) and normal mobility (58% vs 45%) 24h after surgery, as compared to
group G. Only 1 patient in each group referred PONV, and no patient referred
headache or drowsiness.

<table>
<thead>
<tr>
<th>Table 1. Anaesthesia and recovery times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaesthesia</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Spinal</td>
</tr>
<tr>
<td>General with NMB</td>
</tr>
<tr>
<td>General without NMB</td>
</tr>
</tbody>
</table>

Conclusions: Spinal anaesthesia proved to be a good option, enhancing anal-
gesia and early deambulation with only a slight increase in total time to dis-
charge. If conducted in an appropriate induction room, regional anaesthesia
might significantly shorten time in theatre before and after surgery, optimizing
the theatre turnover without decreasing patient safety.

ESRA1-0563
Chronic Pain Management

THE USE OF PREGABALIN IN PATIENTS SUFFERING FROM CHRONIC LOW BACK PAIN
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ens, Greece, 2Neurology, Evangelismos General Hospital, Athens, Greece.

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Background and aims: Chronic low back pain (CLBP) is a neuropathic component in up to 37% of patients. The aim of our retrospective study was to evaluate the therapeutic use of pregabalin in patients suffering from CLBP with a neuropathic component (DN4 score>4) and moderate to severe intensity (VAS>4).

Methods: Out of eighty patients (mean age 65.8 years) suffering from CLBP that were examined in our clinic, 28 (35%) met our inclusion criteria. Our standard treatment protocol for CLBP includes celecoxib and a paracetamol/tramadol combination, along with a protein-pump inhibitor. For patients whose pain had a neuropathic component (diagnosed with clinical examination and DN4 questionnaire use), pregabalin was added and titrated up to 300mgs. All patients were reassessed on the 1st, 2nd and 4th week after initial presentation.

Results: Eight (28.6%) of the patients achieved a reduction of the pain intensity by 30% within the first week, while an improvement of 60% was achieved in 22 (78.6%) patients within the first month. The commonest side effect was dizziness (reported in 3 patients). All side effects were reported as mild to moderate and subsided after the first 2 to 3 days after presentation. Interestingly, along with pain relief, the majority of the patients (n=25, 89.3%) reported a significant improvement in the quality of their sleep pattern.

Conclusions: Our data indicate that pregabalin is an important adjuvant drug in patients with CLBP. A randomized placebo controlled trial is needed to confirm the efficacy of pregabalin in CLBP with a neuropathic component.

ESRA1-0565
Postoperative Pain Management

AN EVALUATION OF THE EFFICACY OF PREGABALIN FOR PREVENTION OF CATHETER-RELATED BLADDER DISCOMFORT

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Background and aims: Catheter related bladder discomfort (CRBD) secondary to an indwelling urinary catheter can be very distressing and is often observed in patients awakening from anesthesia. The symptoms frequently continue through postoperative period with an incidence of side effects reported up to 47%. The aim of this study was to evaluate the efficacy of pregabalin as a treatment modality for CRBD.

Methods: After approval of the Institute’s Ethical Committee and written informed consent from the patients, 40 ASA physical status I and II patients of either sex, undergoing either nephrectomy or cholecystectomy were randomized into two groups of 20 patients each. Control group (C) placebo and pregabalin group (P) 50 mg pregabalin. Drugs were administrated orally 1 h before surgery. After induction of anesthesia, patients were catheterized with a 16Fr Foley catheter and the balloon was inflated with 10 ml normal saline. In the post anesthesia care unit the incidence and severity (mild, moderate and severe) of CRBD were assessed on arrival (0) and at 1, 2 and 6 h.

Results: Patient characteristics were similar between groups. Same type of general anesthesia was administered. Bladder catheter remained 24 to 36 h. The incidence and the severity of CRBD were reduced to P group compared to C group at all time points (p<0.05).

Conclusions: Oral administration of 50mg of pregabalin 1 h before surgery seems to reduce the incidence and severity of CRBD. Further studies are necessary to corroborate these results.

ESRA1-0567
Case Reports

SINGLE-SHOT PARAVERTEBRAL LAMINA BLOCK, AN ADJUNCT TO GENERAL ANAESTHESIA FOR BREAST CANCER SURGERY IN A LOW RESOURCE HOSPITAL IN NIGERIA - A CASE REPORT

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Background and aims: Thoracic paravertebral block can be employed as an alternative or an adjunct to general anesthesia for breast cancer surgery. There is no report of this new lamina technique for catheter placement in our environment. In low resource settings, potent opioids are lacking and the extended postoperative analgesia it provides makes this regional block an invaluable addition to an anesthetist’s armamentarium.

Methods: We describe this single-shot but titratable technique used as an adjunct to general anesthesia for modified radical mastectomy with axillary dissection for breast cancer.

Results: The total intraoperative opioid analgesic 50 mg pethidine was received at induction and the time to first request for rescue analgesic was 18 hours after surgery for which paracetamol 1g was adequate.

Conclusions: The patient described the anesthesia and pain control as completely satisfactory.

ESRA1-0568
Miscellaneous

AUDIT TO EVALUATE THE INCIDENCE OF CHRONIC PAIN AFTER SHOULDER SURGERY

Jose S.1, Mitra S.1 1Anaesthetics, Yobsby Gowyadd Betsi Caivaladur University Health Board, Bangor, United Kingdom.

Background and aims: Chronic pain is a debilitating condition which affects a small minority of population after any surgery. We performed literature search for published incidence of pain after shoulder surgery. Borgeat et al has published ‘Acute and non-acute complications associated with interscalene block and shoulder surgery: a prospective study’. We wanted to know what the new incidence of chronic pain was after 6 months.

Methods: We looked retrospectively at the data of shoulder surgery cases over an 18 month period from April 2012 to November 2013. A total of 310 cases of shoulder surgery were looked through theatre management computer section for breast cancer. A total of fourteen patients out of 310 were identified as has been referred to Chronic Pain clinic. All the case notes were reviewed for the nature of the pain and the causation.

Results: Three patients out of the fourteen are actually having chronic shoulder pain needing pain management intervention on the same side as the surgery, remaining eleven have chronic pain on other parts of the body like lumbar, lower limb etc. Of them one already had chronic shoulder pain preoperatively and now needing Suprascapular nerve block and heat therapy, one had persistent shoulder pain needing Depomedrone injection post surgically, one had chronic pain preoperatively and now even worse off post surgery and needing C-spine traction. All these three patients had interscalene block for their surgery.

Conclusions: Our data compares with Borgeat et al study with chronic pain complication post shoulder surgery with interscalene block. We looked at incidence of chronic pain from 0.33% to 0.66% in our institution which compares with 0.4% as stated in the paper. Though chronic pain is a rare complication of shoulder surgery and interscalene block, it is prudent to emphasise the risk and benefit of regional anaesthetic procedures clearly to our patients.

ESRA1-0569
Chronic Pain Management

INTRA-ARTICULAR BUPIVACAINE CAN REDUCE THE PAIN OF KNEE JOINT ASPIRATION IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Background and aims: Osteoarthritis (OA) is the most common joint disease in a large number of old people. Knee joint aspiration and injections are recommended treatments to reduce pain in patients with knee joint OA. Although there are some disagreements in the analgesic effects of peripерoperative use of intra-articular bupivacaine, there is no report of preventive effect of bupivacaine for reduction of knee joint pain due to aspiration/ injections.

Methods: 22 patients with bilateral grade 2 and 3 knee OA and no response to conservative treatments (life style change, oral analgesics and rehabilitation)
were enrolled. One knee considered randomly as case and the contralateral knee as control. Bilateral basal knee pain scores valued in Numeric Rating Scale (NRS). 4 ml of bupivacaine 0.5% and 4 ml NaCl10.9% were injected into the case and control knees respectively in a sterile manner. After 5 minutes, without removing the needle from the joint, synovial fluid was aspirated, and bilateral aspiration pain scores were measured. Afterward 40mg methylprednisolone was injected in both knees. Then bilateral pain scores were measured in 1, 6, and 24 hours and finally one week after aspiration. Paired t-test and Anova were used for data analysis.

Results: Patients aged 38 to 72 years old. Comparing with control knees, the mean NRS pain scores of control knees were lower with statistical significance at the time of aspiration, 1, 6, 24 hours and one week after aspiration (Table 1). Accepting a decrease of three points or more as clinical difference, there was significant difference in pain scores between case and control knees at the time of aspiration and one hour post-aspiration.

Conclusions: Intra articular bupivacaine significantly reduces the pain of knee joint aspiration/injection in patients with osteoarthritis.

<table>
<thead>
<tr>
<th>TABLE 1. NRS pain scores in patients undergoing bilateral knee joint aspiration</th>
<th>Mean ± SD</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal knee pain</td>
<td>5.43±1.1</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Case</td>
<td>5.68±1.28</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Control</td>
<td>0.5±0.59</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Aspiration pain</td>
<td>5.36±1.89</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Case</td>
<td>0.27±0.45</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Control</td>
<td>3.55±0.76</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>1 hour post-aspiration</td>
<td>1.14±0.66</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Case</td>
<td>3.59±0.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Control</td>
<td>0.77±0.52</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>6 hour post-aspiration</td>
<td>2.86±0.94</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Case</td>
<td>0.73±0.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Control</td>
<td>1.32±1.32</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>24 hour post-aspiration</td>
<td>0.73±0.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Case</td>
<td>1.32±1.32</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Control</td>
<td>3.55±0.76</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Due to effectiveness of thermocoagulation of the right side, it is also carried out on the left side in December 2013. At present a bilateral improvement persists, allowing for a reduction in pharmacological treatment.

Conclusions: Gasser’s ganglion thermocoagulation has been effective in control of the bilateral trigeminal neuralgia associated with multiple sclerosis achieving a VAS of 0.

ESRA1-0573
Case Reports
ULTRASOUND GUIDED COMBINED LOW DOSE INTERSCALENE AND INFRACLAVICULAR BLOCK FOR UPPER EXTREMITY SURGERY: 2 CASE REPORT
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Methods: Brachial plexus blockade preferred in upper extremity surgical procedures due to supply adequate anesthesia and postoperative analgesia. Multiple peripheral blocks in upper extremity surgery practice rarely performed due to potential systemic toxicity of local anesthetics. By using ultrasound guidance dose of local anesthetic may reduce. We report two patients who underwent upper extremity surgical procedure with low dose interscalene and infraclavicular block.

Results: CASE 1: 33 year old male with multiple fracture of right shoulder and right distal humerus. Planned for surgery of right humerus external fixation. The patient monitored(NIBP, ECG, sPO2), and sedated with midazolam 2mg. After maintaining aperic procedures, firstly interscalene block performed with 10cc %0,5 bupivacaine. 5mm peripheral nerve stimulating needle and peripheral nerve stimulator (Stimuplex, HNS11;Braun Melsungen) was used in the guidance of ultrasound(sonoic micromaxx). Than infraclavicular block was performed with 10cc %0,5, bupivacaine, 10mm peripheral nerve stimulating needle and peripheral nerve stimulator (Stimuplex, HNS11;Braun Melsungen) used in the guidance of ultrasound(sonoic micromaxx) with 10cc %0,5 bupivacaine. Thirty minutes after the block application sensorial block verified by pin prick test and than the surgery was started. The surgical procedure lasted approximately 115 minutes. The patient had not need analgesic within 8 hours after the surgical procedure.

CASE 2: 44 year old female with atrial fibrillation, metastatic breast carcinoma and pathological fracture of humerus planned for surgery of left humerus internal nail application. The patient monitored(ECG, sPO2,NIBP, IBP), and sedated with midazolam 2mg. After maintaining aperic procedures, firstly interscalene block performed with 10cc %0,5 bupivacaine. 5mm peripheral nerve stimulating needle and peripheral nerve stimulator (Stimuplex, HNS11;Braun Melsungen) was used in the guidance of ultrasound(sonoic micromaxx). Than infraclavicular block was performed with 10cc %0,5 bupivacaine, 10mm peripheral nerve stimulating needle and peripheral nerve stimulator (Stimuplex, HNS11;Braun Melsungen) used in the guidance of ultrasound(sonoic micromaxx). Thirty minutes after the block application sensorial block verified by pin prick test and than the surgery was started. The surgical procedure lasted approximately 80 minutes. The patient had not need analgesic within 15 hours after the surgical procedure.

Conclusions: Brachial plexus blockage is widely using in upper extremity surgical procedures. Multiple peripheral blocks in upper extremity surgery practice rarely performed due to potential systemic toxicity of local anesthetics. By using ultrasound guidance dose of local anesthetic may reduce. In our cases we used totally 20 cc %0,5 bupivacaine for surgical procedures in upper extremity that includes shoulder and elbow.

ESRA1-0576
Chronic Pain Management
POSTHERPETIC NEURALGIA – CASE REPORT
Frutusso de Carvalho R.1, Barros A.1, Cordeiro L.1, Loureiro M.C.1, Assunção J.P.1 2Anaesthesiology, Centro Hospitalar Tondela - Viseu EPE, Viseu, Portugal.
Background and aims: Postherpetic neuralgia (PHN) is a common manifestation of neuropathic pain (NP). Its treatment lies on effective pain control. New RCTs suggest the use of high-potency capsaicin (8%) topical patch (C8%) on special conditions. The authors describe a case of PHN with an atypical localization, treated with C8%, reinforcing its efficacy.

Methods: Woman, 76 years, referred to Pain Medicine Department (PMD) with uncontrolled pain after 2 months varicella-zoster affection of the upper limb.

On examination, she presented NP with Numeric Pain Rating Scale (NRS) 8/10 and Neurophatic Pain Diagnostic Questionnaire (DN4) 5/10, with quality of life (QL) disturbance.

PHN was diagnosed and followed NP first-line treatment (pregabalin) established by Neuropathic Pain Special Interest Group (NeuPSIG) of International Association for the Study of Pain (IASP).

After 7 months, the patient returned to PMD with NRS 8/10 and DN4 6/10. Having presented multiple drug intolerance, C8% treatment every 3 months was proposed, whilst maintaining pregabalin.

Results: After 3 treatments, NRS was 4/10 and DN4 4/10, without QL limitations, after which applications were ceased. 9 months into follow-up with C8% treatment, the patient maintained clinical improvement and no disability, NRS 2/10 and DN4 3/10, for which pregabalin was maintained.

Conclusions: After all lines of NP treatment suggested by NeuPSIG/IASP, pain control and QL improvement have been achieved with C8%. We suggest that C8% is a safe and well-tolerated drug with long-lasting pain relief, possibly to be included in first lines NP treatment, with multiple oral drug intake.

ESRA1-0577
Case Reports
CLUNEAL NERVE SYNDROME: DIAGNOSIS AND TREATMENT
Carneiro S.¹, Costa G.², Fernandes R.³, Loureiro R.¹, Sousa N.¹, Santos C.¹
Aguascal L.¹.¹ Anesthesiology, Unidade Local de Saúde EPE - Hospital Pedro Hispano, Matosinhos, Portugal.

Background and aims: Cluneal nerve syndrome (CNS) accounts for 10% of low back pain (LBP) and is frequently unrecognized. We describe a case of unilateral LBP treated with pulsed radiofrequency (PRF) and infiltration of the superior cluneal nerve (SCN).

Methods: A 56-year-old woman was referred to our pain medicine department due to left LBP radiating to the ipsilateral buttock for the preceding 6 months. The pain had mechanical characteristics and was exacerbated by prolonged sitting. The patient had a limping gait, asymmetric lower limbs, normal deep tendon reflexes, and tenderness to palpation of the iliac crest. The FABERE test and Lasègue sign were negative. MRI did not reveal any relevant abnormalities. Diagnostic and therapeutic nerve block with ropivacaine 0.2% (10ml) and methylprednisolone were performed with prompt pain relief. Two months afterward, PRF and ultrasound-guided infiltration were performed. The patient remained asymptomatic and was discharged a month later.

Results: Unilateral LBP, deep tenderness radiating to the ipsilateral buttock, and exacerbation by prolonged sitting are the clinical findings accompanying CNS. The medial branch of the SCN innervates a fan-shaped area of skin from the iliac crest, 7–8cm from the midline, and may be susceptible to compression related to tension of the thoracolumbar fascia or contraction of the back musculature.

Conclusions: The success of transient pain relief with the injection of local anesthetic and steroid combination is both a diagnostic criterion and has therapeutic advantages. Despite the absence of evidence in the literature supporting the use of PRF in the treatment of CNS, this case suggests it is beneficial.

ESRA1-0578
Postoperative Pain Management
THE DEVELOPMENT OF NURSING CARE PROTOCOLS AIMED AT ACHIEVING POST-THORACOTOMY PAIN MANAGEMENT
Kot E.¹, Alpar S.².¹ Nursing Faculty, Akdeniz University, Antalya, Turkey.

Background and aims: This prospective, double-blind, randomized study was aimed at determining the application and effectiveness of the Care Protocol aimed for post-thoracotomy pain management.

Methods: A total of 70 patients consisting of 35 patients in the control group and 35 in the study group were included in the study. The same analgesic medications were used for both groups. Additionally, the Care Protocol consisting of nonpharmacologic pain management methods was used among the study group patients along with Diclofenac 75 mg i.m., which is part of the routine management protocol and was administered to this group of patients during the first two postoperative hours regardless of the reported pain complaints or not. Pain severity was measured at the postoperative 2nd, 4th, 8th, 16th, 24th and 48th hours using ‘Verbal Category Scale’ and ‘Behavioral Pain Scale’ methods. Level of pain, respiratory function test results and analgesic consumption were evaluated.

Results: It was seen that demographic characteristics had a homogeneous distribution in both patient groups. Verbal and behavioral level of pain was markedly higher in the control group than in the study group and the difference between the two groups was significant (p<0.05). Analgesic requirement was lower in the study group than in the control group and this difference was statistically significant as well (p<0.05). In terms of respiratory function tests, the results of the patients in the study group were markedly higher compared to those of the control group patients and the difference was statistically significant (p<0.01).

Conclusions: As a result, the Care Protocol aimed for post thoracotomy pain management can be considered to be effective for pain relief.

ESRA1-0579
Chronic Pain Management
INFLUENCES OF ENDOMETRIOSIS THE ABILITY FUNCTIONAL (WORK) IN WOMEN FOLLOWED UP IN THE OUTPATIENT PAIN HCFMRP - USP, BRAZIL
Bruna M.¹, Francisco R.E.I.S.², Patrícia S.³, Mariana S.³, Cristiane C.² Departamento de Ginecologia e Obstetrícia, Faculdade de Medicina de Ribeirão Preto - University of São Paulo, Ribeirão Preto, Brazil.

Background and aims: The symptoms associated with endometriosis may have an impact on the welfare of the physical, emotional and social health of affected women, so it is essential evaluate women's complaints, and give you time to express their concerns and anxieties. Due to its chronic and progressive condition, endometriosis causes symptoms that impair daily life of women suffering from this painful condition, especially with regard to work, the financial issue. Thinking this scenario, our goal was to investigate how endometriosis could interfere the functional ability (work) of women living with chronic pain.

Methods: This is a qualitative study based on interviews with focus groups, where women collectively express their pain experience. The study sample consists of women with endometriosis and chronic pelvic pain, which were selected by surgical confirmation and frequent monitoring, for at least six months, in the hospital's outpatient clinic.

Results: The analysis of the transcripts revealed four emergent themes, in other words, that arose during the discussion sessions related to the social impact of pain in women affected by endometriosis, among them the issue related to work (functional ability) was the one that brought great repercussion during the focus groups.

Conclusions: With the issue of work, our results showed that women had insecurity to develop their assignments, inferiority toward coworkers, and often guilt and sadness because of financial dependence of a family member.

ESRA1-0580
Case Reports
INTERSCALENE BLOCK IN A PATIENT WITH A CONTRALATERAL PNEUMONECTOMY
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Background and aims: Hemidiaphragmatic paralysis after interscalene block (ISB) is routinely considered in planning anesthetic care. Although rare, ISB can lead to decline in respiratory function. (2,3) We present a case of respiratory compromise after ISB in a patient with previous contralateral pneumonectomy and discuss a successful non-invasive respiratory management.
Methods: A 77 year old woman (68 kg, 163 cm) ASA3, received an ISB catheter for left shoulder arthroplasty.

She had requested ISB for anesthesia because of her fears of GA. The catheter was placed uneventfully under US guidance between the anterior and middle scalene muscles (C5-C6); ropivacaine 15 mL 0.7%.

Results: Shortly after ISB, shortness of breath occurred; O2 sat, BP and ECG remained unchanged. Symptoms improved with a sitting position and anxiolyis (midazolam 2 mg). Examination revealed a barely visible scar from a right pneumonectomy for unilateral pulmonary aplasia in the distant past. Breast sounds were decreased over the right chest wall. Her pulmonary function test one year prior to thecurrent surgery demonstrated decreased FVC (1.28l or 46.9%) and FEV1 (0.97l or 46.9%). FEV1/FVC ratio of 90%. Surgery began uneventfully with IV sedation (propofol 1-3 mg/kg/h, O2 5 L/min via face mask, SpO2 95%, BP-HR unchanged), but was later complicated by difficulties in removing prior hardware, resulting in a blood loss of 700 ml and decreasing O2 sat (lowest 60%). Mask ventilation with 100% oxygen proved adequate (pCO2 - 46 mmHg, pO2 - 72 mmHg, SpO2 - 94%, pH - 7.357 and Hgb - 7.9 g/dL). Postoperatively, the patient was transported to the ICU, where non-invasive bi-level positive airway pressure (BiPap® Vision®; TV 300 mL, FiO2 50%, 22/min, EEP 5 mmHg, PIP 8 mmHg) was instituted until her uneventful recovery 12 hours after ISB.

Conclusions: ISB can result in respiratory demise in patients with lung disease; non-invasive management can be used to avoid intubation and mechanical ventilation until block wears off.

Methods: A prospective trial to know the efficacy and safety of this treatment in the low back pain. Patients were divided into general (Group G, n=50) and regional anesthesia group (Group R, n=26) groups. Patients included in the study. Patients were divided into general (Group G, n=50) and regional anesthesia group (Group R, n=26) groups. During the operation; heart rate (HR), mean arterial pressure (MAP), arterial O2 saturation (SpO2), central venous pressure (CVP), mixed venous oxygen saturation (SvO2), end tidal carbon dioxide (EtCO2), arterial blood gas values, haemoglobin (Hb), the amount of intravenous fluid replacement, blood losses, urine output of the patients were recorded. Continuous intraoperative SO2 were recorded by cerebral oximetry device (Fore-Sight). Postoperative complications, oxygen requirement and length of hospitalization were also recorded.

Results: After induction of anesthesia HR, MAP and SO2 values were significantly decreased in both of the groups but there was no statistically significant difference in comparison of the two groups. We observed faster recovery in SO2 reduction after cementing and turn off the tourniquet in Group G (p<0.05). The usage of total intravenous fluids and blood products were similar in two groups. Length of hospitalization was shorter in Group R (p<0.05).

Conclusions: Cerebral tissue oxygenation was higher among the patients in general anesthesia group, but this finding had no effect on early postoperative recovery and lengths of hospital stay. After application of cement, SO2 values were reduced in both of the groups. But, recovery from reduction of SO2 was faster in regional anesthesia group. Although the length of hospital stay was shorter in regional anesthesia group, this finding should be confirmed in larger studies.

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FIGURE 1.

ESRA1-0581 Chronic Pain Management

CAN EPIDURAL STEROID INJECTIONS IMPROVE LOW BACK PAIN CONTROL?

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Background and aims: Low back pain is one of the most prevalent painful diseases in the middle age patients. The treatment requires a complex multimodal approach, that include epidural steroid injections (ESIs). We developed a prospective trial to know the efficacy and safety of this treatment in the low back pain.

Methods: Seven patients diagnosed with a spinal disease were included in this trial. All of them received pharmacological treatment with a partial improvement, and a ESIs was developed. Demographical, clinical and epidemiological data were collected and analyzed with SSPS 16.00.

ESRA1-0584 Miscellaneous

SEDATION WITH LOCAL ANESTHESIA FOR DENTAL PROCEDURES - PATIENTS SATISFACTION ASSESSMENT

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Background and aims: The aim of the study was to access patient satisfaction with sedation and local anesthesia for dental procedures.

Methods: It was observational study of patients with severe anxiety or phobia classified by using Corach’s Dental Anxiety Scale, who received sedation with local anesthesia for dental procedure in one outpatient center, between May, 2010 and March, 2014. After providing informed consent, 70 patients, older than 18 with ASA status I or II, were included in the study. Ethical approval was granted. Sedation protocol included midazolam at initial dose of
0.05 mg/kg iv., followed by incremental dose of 1 mg midazolam each 30–60
minutes according to the patient status. Local anesthesia was performed by
using articaine with adrenaline. Patients were interviewed by phone on the first
postoperative day to rate their overall satisfaction on 5 point Likert scale by
using the terms: very satisfied, satisfied, neutral, unsatisfied, very unsatisfied.
Results: Patients were classified as ASA I (44) and ASA II (26), median age
was 47 (19-76), and 60% of patients were female. Procedures included implant
surgery (57%), extractions (14%), and others (28%). Mean total midazolam
dose required was 4.4 mg. The majority of patients were very satisfied
(84.3%) or satisfied (14.3%), and only 1 patient was unsatisfied (1.4%).

Conclusions: Sedation with local anesthesia appears to have high degree of pa-
tient satisfaction and may be considered as a method of choice for the treatment of
patients with dental phobia.

ESRA1-0588
Chronic Pain Management

EFFECTIVENESS OF THE REPETITION OF THE
THERMOCOAGULATION OF GASSER’S GANGLION
IN A MULTI-PATHOLOGICAL PATIENT WITH
TRIGEMINAL NEURALGIA

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Background and aims: 78-year-old patient. Ischemic heart disease, atrial fibrilla-
tion, hypertension, aortic stenosis, COPD, gastric ulcers, varicectomy, an-
teriacal prothesis, and coronary bypass.

Methods: Patient begins treatment in Pain Unit in 2007 for right trigeminal neu-
ralgia. Adjustments are initially carried out with various opioids/neuromodulation.

Results: January 2008, the patient is admitted for refractory pain. VAS 9; a
thermocoagulation of the Gasser’s ganglion is performed, maintaining a VAS
score 0 for 28 months.

In May of 2010, a new crisis occurs. After treatment modifications, local
infiltrations are carried out with little effect. A month later, patient is readmitted
again for uncontrollable pain. A 3th thermocoagulation has been scheduled in July
2010, with partial relief (25%) for 12 months.

August 2011, an intense pain crisis develops and a 4th thermocoagulation
is carried out with a resulting VAS 0 for 12 months.

July 2012 a new crisis develops with loss of speech, ability to swallow, and
signs of malnutrition. An infiltration is administered in September, and after
stabilization, a 4th thermocoagulation is performed in November with a VAS
0 for 4 months.

February 2013, pain returns requiring new infiltrations and transdermal cap-
saicin. Due to inability to control the pain, a 5th thermocoagulation is adminis-
tered in March of 2013, resulting in a VAS of 0 up to this day.

Conclusions: A multi-pathological patient with crisis of uncontrollable trigem-
inal neuralgia has been administered 5 Gasser’s ganglion thermocoagulations.
This technique has been effective in control of pain, with a variable duration of
effectiveness and without any sequel after repetition.

ESRA1-0590
Case Reports

CAUDAEOQUINA SYNDROME: IS EPIDURAL THE
CULPRIT? – CASE REPORT

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Background and aims: Cauda equina syndrome (CES) is a rare neurologic
condition, defined by lesion of the nervous endings of the cauda equina,
resulting in a set of signs and symptoms that characterize the syndrome.

Following diagnosis, emergency surgical treatment is required, in order to
try and avoid potential permanent neurological damage.

Methods: Female, 77 years, with a 40 year history of rheumatoid arthritis, ad-
mitted to perform an infracondal amputation of the right inferior limb due to
severe peripheral arterial disease. Lumbar epidural catheter was put in place the
day before surgery, and analgesia was administered, with no apparent complica-
tions. No complications occurred during the operative period.

Results: 30 hours following surgery, the patient suffered motor block onset of
the left inferior limb, bilateral sensitive block and sphincter incontinence. CES
was diagnosed on clinical grounds, and after debriefing, the doubt persisted
on the culprit of CES. Differential diagnosis was performed and degenerative
vs iatrogenic causes were questionable. Probable migration of the epidural cath-
ter was questioned due to patient movements and manipulation were deemed
possible but lumbar TC showed severe lumbar stenosis L4-L5. Emergency
laminctomy was performed.

5 months following surgery and corticoesteroid therapy, the patient has no
mentionable improvement or recovery.

Conclusions: Regional anesthesia is a frequent and useful technique with sev-
eral advantages, but complications, even with a low incidence should never be
forgotten, considering the seriousness and severity of the morbidity that follows.

ESRA1-0592
Case Reports

SEVERE PULMONARY HYPERTENSION: REGIONAL
ANESTHESIA FOR GYNECOLOGY SURGERY - CASE REPORT

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Background and aims: Pulmonary hypertension (PH) poses an increased
risk factor for perioperative morbidity and mortality. Some series report a peri-
operative mortality of 7-24%. Stress, pain, ventilation, surgery-related inflam-
mation may increase pulmonary artery resistance which may cause right
ventricle failure.

Complex human and technical resources are required for perioperative planning.

Methods: A 70 year old caucasian female with an endometrial carcinoma was
proposed for hysterectomy and oophorectomy. She presents multiple cardio-
vascular comorbidities (heart insufficiency NYHA II, hypocoagulation due to
atrial fibrillation, hypertension and non-insulin dependent diabetes), most nota-
bly severe PH due to an inoperable ostium secundum type interatrial communi-
cation with bidirectional shunt predominantly left-to-right. Echocardiography
showed signs of right chamber overload, moderate tricuspid valve regurgitation,
and an estimated systolic pressure in the pulmonary artery of 90-95 mmHg.

Results: In the operating room an arterial catheter was placed in addition to
standard monitoring. An epidural lumbar block was made with 75 mg of
ropivacaine (total dose) and 10 ug of sufentanil, with a slow infusion until T6
level was achieved. During surgery the patient remained hemodynamically sta-
ble (minimal average arterial tension of 80mmHg).

Surgery lasted for 1h30min, with no complications.

Conclusions: Regional anesthesia allowed maintenance of spontaneous ventila-
tion, avoiding the increase of pulmonary artery pressure induced by mechanical
ventilation. Continuous techniques, such as epidural block, allow dose
fractioning of the local anesthetic, reducing the risk of a significant drop in sys-
temic vascular resistance, coronary perfusion, right ventricle failure and postop-
erative pain control.

1. Anesthesiology Research and Practice. Volume 2012. Article ID 356982

ESRA1-0595
Pediatric

EFFECTIVENESS OF PAEDIATRIC ILIO-INGUINAL BLOCKS

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Background and aims: Iliocinguinal blocks are frequently performed in a paed-
iatric setting for post-operative analgesia. As paediatric anaesthetic practice is
increasingly focusing on day case surgeries, we performed an audit of the cur-
rent practice in a paediatric specialist hospital. Our aim was to examine the in-
dications for ilioinguinal blocks, the technique used, the doses given and the
failure rates noted.

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Methods: We examined the current practice in the anaesthetic department including the doses and concentrations of local anaesthetic given, the use of peri-operative opioids, the rate of block failure and the requirement for rescue analgesia in the recovery room.

Results: Our block failure rate, as determined by the need for rescue analgesia in the recovery room was less than 25%.

The majority of the failed blocks were performed for orchidopexy. A small minority of patients received intra-operative opioid analgesia. For block failure, opioids were the most common rescue analgesic drugs of choice. None of the children with ineffective blocks had received intra-operative opioid analgesia. All children received simple analgesia intra-operatively, namely paracetamol and diclofenac if there were no contraindications to the use of non-steroidal agents.

Conclusions: Most children received between 0.3 and 0.5 ml per kilogram of levobupivacaine for the ilioinguinal block. Less than ten percent of children received opiate intra-operatively. For cases with ineffective analgesia as defined by the requirement for rescue analgesia in the recovery room, doses of less than 0.5mls per kilogram were noted.

Ilioinguinal blocks remain a simple and effective method of providing analgesia for paediatric patients, with a resultant paucity of opioid analgesic use. Further evaluation of the optimal dose of local anaesthetic for effective analgesia should be performed.

ESRA1-0597
Obstetric

ASSESSMENT OF MATERNAL SATISFACTION WITH EPIDURAL ANALGESIA
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Background and aims: In the absence of obstetric and anesthetic contraindications, epidural analgesia has been considered the gold standard in achieving maternal pain relief during labour. In this study, we intend to measure global satisfaction and knowledge of the mothers regarding epidural analgesia.

Methods: An anonymous and voluntary questionnaire was conducted over one month, consisting of interviews to 29 obstetric patients who received epidural analgesia and had vaginal delivery.

Results: Concerning the method that the patients believe more effective in controlling pain during labour, 69% answered epidural analgesia. All respondents had prior knowledge of epidural analgesia, and 43% acquired that knowledge through labour preparation courses. In 93% of the cases, the epidural technique was explained to the parturient beforehand. The explanation was given by the anaesthesiologist in 41% of these cases. Regarding the possible complications associated with epidural analgesia, 37% replied headache and 23% believed that drugs could be harmful to the baby. The epidural catheter was considered to be introduced at the right moment in 68% of the cases. Global satisfaction was high/high in 83% of the respondents. In the future, 93% will require epidural analgesia and consider that the technique should be explained during prenatal visits.

Conclusions: Epidural analgesia is the technique most frequently used for labour analgesia in our department. Satisfaction is multidimensional and therefore difficult to define, assess and measure. We believe that this questionnaire is a useful tool to assess maternal satisfaction and adjust our approach to the needs of these patients. Global satisfaction and knowledge reported is very high.

ESRA1-0598
Postoperative Pain Management

PATIENT UNDERSTANDING ABOUT MANAGEMENT OF PERIOPERATIVE PAIN: DOES IT MATTER?
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Background and aims: Anxiety and concern about the experience of perioperative pain is common among adult surgical patients. Information contemplating pain management including analgesic techniques, as well as advantages and disadvantages, shall be provided to patients. This study was designed to evaluate the patient knowledge of pain management and type of information that he wants to know.

Methods: A prospective study was performed by an anaesthesiologist of Acute Pain Service. One-hundred adult patients answered an anonymous questionnaire on the first postoperative day.

Results: All patients reported the importance of perioperative pain control. 82% had pain and 18% of this had severe pain. 47% were informed about pain management. The information was provided, in 90%, by the anaesthesiologist. The majority of patients found relevant to have information about the pain management, with great importance to the drugs and techniques, as well as, contraindications and potential complications. 35% of the patient did not find necessary to had prior information, requesting only that all efforts were promoted in order to minimize perioperative pain.

Conclusions: Knowing about management of perioperative pain may help to treat pain more effectively. We believe that the information given to the patient should be an individual process, based on what patient wants to know and what he is ready for.

ESRA1-0599
Peripheral Nerve Blocks

EVALUATION OF AN ARTICULATED NEEDLE ALIGNMENT DEVICE IN A PERIPHERAL NERVE BLOCK TRAINING PHANTOM
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Background and aims: Continuous needle visualisation improves the safety profile and success of ultrasound guided regional anaesthesia (USGRA)[1,2]. Our articulated needle guide is designed to keep the needle in plane with the ultrasound beam improving needle visualisation. We assessed arm guide efficacy for needle visualisation when used by volunteers with previous USGRA experience (>10 blocks).

Methods: A 5 cm USG needle was guided under ultrasound visualisation to contact a metal rod 2cm deep in a porcine phantom shown in image 1 [2]. The task was performed freehand or with guide, the ultrasound transducer positioned first at 90° and then 60° to skin. The recorded ultrasound images were analysed by a blinded observer for percentage time of full needle visualisation and time to initially visualise needle (Lead in time).

Results: 10 volunteers participated.

FIGURE 1.

TABLE 1.

<table>
<thead>
<tr>
<th>Percentage needle visualisation (mean (sd))</th>
<th>Lead in time in seconds (mean (sd))</th>
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<tbody>
<tr>
<td>Arm guided</td>
<td>Free hand</td>
</tr>
<tr>
<td>90°</td>
<td>80.6 (25.0)*</td>
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<tr>
<td>60°</td>
<td>41.1 (30.6)</td>
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(*p<0.05, paired Student's t-test)
Conclusions: The arm guide improved needle visualisation at 90° but not at 60° where the guide inhibits probe movement in relation to the needle, potentially restricting visualisation. The arm guide maybe useful in the early training phase to support hand eye needle coordination but needs further development for use in clinical setting.

References:
2. Xu D et al., Reg Anas and Pain Mod, 2005;30:593-4

ESRA1-0600
Miscellaneous

ENHANCING RECOVERY WITH OPTIMAL MOBILISATION AFTER PRIMARY TOTAL HIP REPLACEMENT SURGERY
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Background and aims: Patients undergoing primary total hip replacement (THR) suffer from severe pain in the initial postoperative period. In our hospital various anaesthetic techniques were followed in their management. Our aim is to compare the outcome with each technique and standardise the practice to improve patient care.

Methods: Prospective study of 65 patients who underwent primary THR during 2011–12.
- Spinal with intrarticular infiltration: 36 patients
- Epidural: 6 patients
- GA with posterior lumbar plexus block: 23 patients.

The outcome measures investigated were,
1. Pain scores
2. Time taken to optimally mobilise
3. Length of hospital stay

Results: The demographics and duration of surgery matched in all the groups. 75% of patients who had spinal with intrarticular infiltration satisfied the physiotherapists discharge criteria within 4 days. But only 50% of the epidural group and 39% of the GA with posterior lumbar plexus group patients satisfied the same.

The mean length of stay in the spinal group was 5 days, whereas the epidural group and GA group patients stayed on an average of 7 days.

Conclusions: Patients who had spinal with intrarticular infiltration recovered well and got discharged early than the other groups.

The results were presented to the department and the practice was standardised to enhance the recovery in these patients.

ESRA1-0601
Postoperative Pain Management

IMPACT OF DIABETES MELLITUS ON NATURE AND QUALITY OF PERSISTENT PAIN AFTER TOTAL KNEE ARTHROPLASTY
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Background and aims: Persistent pain (PP) after total knee arthroplasty (TKA) concerns up to 44% of patients at 1 year and later, with 15% severe pain and around 6% of patients having neuropathic pain (Liu et al, RAPM 2012). Diabetes mellitus (DM) is a cause of neuropathic pain as well as an independent predictor of poor functional outcome after TKA (Singh & Lowallen, PLOS One 2013). The study examined the relationship between DM and persistent pain after TKA.

Methods: After ethical committee approval and informed consent, persistent pain at 6 months and later was questioned in a cohort of 200 consecutive patients undergoing TKA for Osteoarthritis. PP intensity and impact on life quality was questioned by brief pain inventory questionnaire and DN4 questionnaire for the presence of neuropathic component. For data analysis, patients were separated in two groups according the presence (DM+) or not (DM-) of diabetes mellitus. Statistical analysis used Mann–Whitney Rank Sum test and Fisher exact test, P <0.05 was considered as significant.

Results: 35 DM+ patients (4 insulin dependent) and 165 DM- patients were included with no demographic difference except for higher BMI in DM+ group.

Table 1:

<table>
<thead>
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<th>DM+ (n=35)</th>
<th>DM- (n=165)</th>
<th>P value</th>
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<tbody>
<tr>
<td>PP incidence</td>
<td>10 (50%)</td>
<td>43 (48%)</td>
<td>ns</td>
</tr>
<tr>
<td>pain at rest 50% patients, at most 90%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain score</td>
<td>3 (0–4)</td>
<td>2 (0–3)</td>
<td>0.595</td>
</tr>
</tbody>
</table>

Response rate for PP assessment at 9 months (IQR 7-12 months) was 55%. PP impact on mood, walking ability and sleep did not differ between DM+ and DM- groups. Incidence of analgesics intake 50% did not differ as well as analgesic efficacy to relieve PP (average 47%); tramadol intake was reported by 60% DM+ patients and 16% DM- patients (p=0.03).

Conclusions: DM patients are not at higher risk for PP after TKA as previously observed (Liu et al, RAPM 2012) and PP intensity and impact on daily life is similar to that of DM- patients. However, neuropathic component is more frequently reported in PP of DM+ patients.

ESRA1-0602
Central Nerve Blocks

INFLUENCE OF ANESTHETIC TECHNIQUE ON THE INCIDENCE OF POSTOPERATIVE COMPLICATIONS
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Background and aims: Outpatient surgical procedures increased significantly in recent decades, particularly inguinal hernia repair. Despite being a minimally invasive procedure, anesthetic and surgical complications may occur, which contribute to the morbidity of the patient.

The aim of this study was to evaluate the incidence of nausea and vomiting (PONV) at 24 hours and the presence of complications related to the anesthetic technique on the seventh day after surgery in regional anesthesia versus general anesthesia.

Methods: A retrospective study was conducted in 200 outpatient who underwent inguinal hernia repair, between April 2013 and March 2014.

Group A underwent subarachnoid block (n = 129) and group B general anesthesia (n=71). Postoperative follow-up was made by telephone contact after 24 hours and on day seven. Presence of complications, including PONV, headache, dizziness, epigastric pain, sore throat, muscle or at surgical wound were recorded.

Results: The incidence of PONV at 24 hours was lower in group A (4.7% versus 7%). In group B the most frequent complications were headache and upper abdominal pain and in group B were headache, PONV, dizziness and pain at surgical wound. None of the patients studied reported neck pain or muscle.

Conclusions: The group of regional anesthesia revealed a lower incidence of PONV compared to general anesthesia, as well as fewer complications on the seventh day after surgery. The results obtained allow considering regional anesthetic technique as favorable to increased quality, personalization and humanization in health care.

ESRA1-0603
Central Nerve Blocks

SPINAL ANESTHESIA VERSUS GENERAL ANESTHESIA FOR HERNIA REPAIR IN AMBULATORY SURGERY
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Background and aims: Inguinal hernia repair are often performed in outpatient day surgery, in Portugal 6694 were performed in the year of 2009. This is a surgery of short duration and low invasiveness, but has great socio-economic and quality of life impact.

The aim of this study was to assess the degree of patient satisfaction and analgesic efficacy on the seventh day after surgery between regional and general anesthesia efficacy.

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Methods: A retrospective study was conducted in 200 outpatients who underwent inguinal hernia repair, between April 2013 and March 2014. Two groups were formed, group A underwent spinal anesthesia (n = 129) and group B general anesthesia (n = 71).

Postoperative follow-up was made by telephone contact after seven days evaluating the satisfaction based on four categories (very good, good, average and bad) and analgesic efficacy by the numerical pain scale.

Results: It was found that the degree of satisfaction "very good" was higher in group A compared to group B (45.8% versus 36.6%, respectively). Neither group showed "bad" degree with the anesthetic/surgical procedure.

Regarding this analgesic efficacy was higher in group A compared to group B, no pain (62% versus 49.3%); mild pain (23.3% versus 29.6%); moderate pain (10.9% versus 19.7%); and severe pain (0% versus 1.4%).

Conclusions: Spinal anesthesia showed better satisfaction and pain control in the seventh day after ambulatory surgery, contributing to a better quality of recovery, revealing a good anesthetic technique compare to general anesthesia.

ESRA1-0604
Obstetric

STRIKING A BALANCE - TREATING HIGH PRESSURE HEADACHE AND PREVENTING LOW PRESSURE HEADACHE IN A PARTURIENT WITH IDIOPATHIC INTRACRANIAL HYPERTENSION

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Background and aims: Idiopathic intracranial hypertension (IIH) is predominantly seen in obese women of reproductive age presents as severe headache and papilloedema with no identifiable cause. We present a case of an obese pregnant lady with IIH managed in labour with CSF drainage and neuraxial labour analgesia.

Methods: 25 yr old lady, G2P1, BMI 43 diagnosed with IIH in early pregnancy was managed antenatally by therapeutic CSF drainage for alleviation of symptoms. After a multidisciplinary discussion, labour was induced at 38 weeks of gestation because of progressive worsening of her symptoms. Our aim was to avoid optic nerve damage and minimise the symptoms due to raised ICP. In established labour, we therapeutically drained 20 ml of CSF with a spinal needle prior to the insertion of epidural in a space below and provided combined spinal epidural analgesia. She had a normal vaginal delivery with no symptoms of raised ICP and did not develop post dural puncture headache (PDPH).

Results: We achieved a balance between alleviation of symptoms, prevention of complications of IIH and avoided PDPH by therapeutic CSF drainage and neuraxial analgesia and the mother experienced labour with maximal comfort.

Conclusions: Intrathecal catheters have been used for the dual need of labour analgesia and CSF drainage in parturients with IIH but with a risk of PDPH.

We successfully managed to prevent complication of IIH, provide labour analgesia without ensuing PDPH and achieve normal delivery.


ESRA1-0605
Miscellaneous

THE LEGACY OF ANDREAS VESALIUS: FOUNDERS OF MODERN ANATOMY

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Background and aims: The field of Regional Anesthesia and Pain Medicine has developed from a solid foundation in anatomy. Hence, on his 500th birthday, we reflect upon the work of the brilliant Belgian anatomist, Andreas Vesalius, who laid the base of modern clinical anatomy.

Methods: Vesalius was born during the Renaissance in 1514. Prior to the Renaissance, dissections of human cadavers were widely prohibited. Thus, Galen’s anatomical descriptions of animals served as the standard text. In medical schools, the occasional corpse was crudely dissected by barbers, and descriptions were hurriedly read by professors since the cadavers could not be preserved. Research was conducted merely to support scientific dogma.

Results: Vesalius was an anomaly by conducting dissections himself. In 1543, his work culminated into the landmark reference: De Humani Corporis Fabrica Libri Septem (The Structure of the Human Body). Despite the prevailing Galenist attitude that illustrations hindered the study of anatomy, Vesalius combined drawings with text to clearly depict the structure of nerves, veins, muscles, arteries and skeletons. Based on thorough dissections, his meticulous observations led him to uncover discrepancies between evidence-based dissections and teachings from traditional texts of Galen and others.

Conclusions: The Fabrica had more influence on the evolution of anatomy than any previously published medical book. Vesalius revolutionized the way anatomy was studied and demonstrated that scientific knowledge could be gained through careful observation.

FIGURE 1.

ESRA1-0606
Case Reports

TYING THE KNOT A NOVEL USE OF ULTRASOUND GUIDANCE IN A RARE DIFFICULT EPIDURAL CATHETER REMOVAL AFTER SUCCESSFUL USE FOR LABOR ANALGESIA AND CAESAREAN SECTION

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Background and aims: The incidence of difficult epidural catheter removal is extremely low. We describe a case of a successful removal of a knotted lumbar epidural catheter used for labor analgesia with saline expansion and ultrasound guidance.

Methods: CASE REPORT: A lumbar epidural catheter was inserted for labor analgesia in a 28 year-old gravida 4 para 2 38 4/7 weeks pregnant patient. The catheter was successfully used for throughout labor and eventual caesarean section without incident until its attempted removal at the Post Anesthesia Care Unit, where traction on the catheter was met with resistance. Continuous gentle traction was applied while the patient was placed in varying degrees of flexion and extension and infusion of saline. Ultrasound guidance aided in visualization of the entrapped catheter until its successful removal.

Results: The use of ultrasound guidance led to the successful removal of the trapped epidural catheter.

Conclusions: Given the ease of use of a portable ultrasound and its additional margin of safety when used, the technique described in this report can be attempted for future similar cases prior to planning invasive removal techniques.
Bupivacaine is a commonly used local anaesthetic following widespread worldwide expansion of this procedure performed by many specialists, with the plan for normal vaginal delivery. The patient had an early epidural sited to avoid exaggerated distress during labour augmentation. Unfortunately due to a pathological cardiotocogram (CTG), she had to undergo an emergency Caesarian section. This was performed under an epidural top up titrated to effect due to her size. As she was very distressed, small 10mg boluses of propofol had to be administered throughout the procedure to good effect.

Results: A healthy baby girl weighing 2.77kg was delivered, with an estimated blood loss of 600ml from the procedure. The patient did very well afterwards.

Conclusions: Patients with Noonan syndrome can be challenging to manage due to presence of congenital heart disease, learning difficulties, and small stature. It is therefore important to have a multidisciplinary team approach and a plan in place prior to any surgical procedure.

ESRA1-0622 Case Reports

BUPIVOCAINE INDUCED TOXICITY FOLLOWING SUBACROMIAL DECOMPRESSION: CASE REPORTS

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Background and aims: Arthroscopic shoulder surgery is typically performed as a day case, and patients are often discharged few hours postoperatively. Several techniques have been presented to control pain after shoulder arthroscopy, the two most widely used regional anaesthesia techniques being interscalene plexus block and subacromial infusion. In subacromial infusion technique, a local anaesthetic can be given directly to the site of injury. Bupivacaine is a widely used in subacromial infusions for pain relief after shoulder arthroscopy.

Methods: We are presenting a series of adverse toxic effects encountered after bupivacaine injection for pain relief following arthroscopic shoulder decompression and excision of distal clavicle.

Results: The subacromial space is highly vascular, and the pattern of blood supply was found to be constant in 60% of the shoulders dissected. During the process of subacromial decompression several of these vessels are affected which can lead to the systemic distribution of local anaesthesia with possibility of toxicity. In a recent study no significance of pain scores can be shown between 2.5 and 5.0 mg/ml while the plasma half life and concentration levels were found to be higher with the injection of the same volume of local anaesthesia with 2.5 and 5.0 mg/ml concentration.

Conclusions: Bupivacaine is a commonly used local anaesthetic following shoulder surgery. It is a potentially toxic compound and familiarity with toxic manifestations, antidotes is required by orthopaedic staff. As incidence of side effects is similar in both groups, bupivacaine 2.5mg/ml might be a preferable choice for use in arthroscopic shoulder subacromial decompression.

ESRA1-0639 Case Reports

LOW DOSE SPINAL ANAESTHESIA FOR A PEDIATRIC PATIENT WITH TAKAYASU ARTERITIS UNDERGOING ORTHOPAEDIC SURGERY: A CASE REPORT

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Background and aims: Takayasu’s arteritis (TAK) is arteritis, often granulomatous, predominantly affecting the aorta, its major branches and the pulmonary arteries. Onset usually occurs before the age of 50 years. TAK is one of the more common etiologies of renovascular hypertension in pediatric age group. Anaesthesia in patients with TAK is complicated with severe uncontrolled hypertension leading to end organ dysfunction, stenosis of major blood vessels affecting regional circulation, and difficulties in monitoring blood pressure. The anaesthetic approach for partrients with TAK has not been standardised yet. Although spinal anaesthesia is widely used in pediatric age group we have not seen any report concerning spinal anaesthesia for pediatric age with TAK.

Conclusions: Spinal anaesthesia is a safe and effective alternative to OSR. The overwhelming worldwide expansion of this procedure performed by many specialists (cardiology, cardiothoracic surgery, vascular surgery, radiology) has raised the need to consider its indications, limitations and complications. The latter interfere with the outcome.

Due to low frequency of TEVAR procedures in our hospital, and given the heterogeneous nature of anaesthetic and surgical teams with individual strategies while performing TEVAR at different units, there is a need to create protocols to promote patients’ safety and standardized procedures as well as a proper follow-up.
Methods: A 14 year old female child. She had aortic surgery (aortic aneurysm) when she was 3 year old. Growth hormone deficiency was detected 3 years ago and has been used somatropin. Core decompression operation planned by orthopaedic clinic for left femoral supracondylar avascular necrosis. Preoperative examination including haemogram, renal and liver function tests, coagulation profile were within normal limits. Electrocardiogram revealed normal sinus rhythm and long QT. Echocardiography revealed grade 1 mitral and aortic regurgitation and hypertrophic left ventricle. In the operation room the patient monitored including ECG, pulse oximeter, invasive arterial monitoring by right a. dorsalis pedis. Preoperative arterial blood pressure was 150/55 mmHg and spO2 98%. The patient was sedated with I.V. 1 mg midazolam. Under aseptic cautions, unilateral subarachnoid blockadge administered with 5 mg hyperbaric bupivacaine at L4-5 interspace using a 27-G spinal needle.

Results: The patient was comfortable and hemodynamically stable throughout 60 minute of surgery, which was uneventful.

Conclusions: We think that spinal anaesthesia may be an effective and safe technique and it may present a valid alternative to other anaesthetic approaches for children. Especially for maintaining stable hemodynamic parameters low doses of local anaesthetics can be used for spinal anaesthesia.

ESRA1-0662
Case Reports

WHEN COMBINING PECs I WITH SUPERFICIAL CERVICAL PLEXUS BLOCK SHOULD BE PERFECT, HOWEVER IT IS NOT ENOUGH!

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Background and aims: The insertion of venous central access with a subcutaneous port is a minimally invasive procedure. The usual anesthetic technique is CAM with subcutaneous lidocaine infiltration by the surgeon. However, this could be uncomfortable for the patient, as well as toxic dose of local anesthetic could be achieved.

The insertion of venous central access with a subcutaneous port is a minimally invasive procedure. The usual anesthetic technique is CAM with subcutaneous lidocaine infiltration by the surgeon. However, this could be uncomfortable for the patient, as well as toxic dose of local anesthetic could be achieved.

The authors present a selected case report that represents a pool of patients with unilateral PECs I and superficial cervical plexus ultrasound block (SCPUB) where combined for this procedure. The authors also demonstrate that these two blocks are insufficient for anesthesia of the area around nipple.

Methods: Female, 51 years old, medical history of rheumatoid arthritis, proposed for VCAS for chemotherapy (breast cancer).

Results: The PEC’s I and superficial cervical plexus ultrasound blocks were performed and was administered 20 mL plus 4 mL of mepivacaine 1.5%. During the procedure, the patient was uncomfortable only when the surgeon manipulates the area near the nipple. Subcutaneous infiltration of 4 mL 2% lidocaine solved the problem. The patient was stable during the procedure. And the patient was discharged at home 9 hours after the procedure without any complications.

Conclusions: As R. Blanco describes, PEC could be a valuable block for anterior thoracic procedures. Combined with SCPUB, these procedures could extend beyond clavicle without extra need for subcutaneous infiltration. However, anatomical innervation of the nipple could be challenging (supplied by branches of 4th intercostal nerve, and also 3th and 5th intercostal nerves).

ESRA1-0700
Case Reports

BILATERAL AURICULOTEMPORAL AND BILATERAL SUPERIOR TEMPORAL NEURALGIA IN THE SETTING OF CHRONIC MIGRAINE TREATED WITH PULSED RADIO FREQUENCY ABLATION: A CASE REPORT.

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Background and aims: A 56 y/o Caucasian female with bilateral Auriculotemporal neuralgia and bilateral Superior temporal neuralgia in the setting of chronic migraine successfully treated with pulsed Radio-frequency Ablation.

Methods: This patient presented in March, 2014 with a 33 year history of headaches which localized to her bilateral forehead and bilateral temples. She had previously achieved temporary relief from bilateral Supraorbital and Auriculotemporal nerve blocks, however botulinum toxin A for chronic migraine did not provide her any headache relief. After two successful diagnostic bilateral Auriculotemporal and Supraorbital nerve blocks with local anesthetic and corticosteroid, the patient underwent a bilateral Radio-frequency Ablation of her Auriculotemporal and Supraorbital nerves. Whereas the patient had previously experienced daily headaches, in the four months post-procedure, the patient reported only two headaches originating from her right temple, and her pain has remained significantly diminished.

Results: This is a unique case involving pulsed Radio-frequency Ablation for treatment of bilateral Auriculotemporal and bilateral Supraorbital neuralgia. The patient has been able to increase the time she spends with her children and improve her quality of life. At 4 month follow-up, the patient's pain level remains significantly decreased in the distribution of the ablated Bilateral Auriculotemporal and Supraorbital nerves.

Conclusions: Pulsed Radio-frequency Ablation is a useful modality for the treatment of bilateral Supraorbital neuralgia and bilateral Auriculotemporal neuralgia, and may have efficacy in reducing the intensity and frequency of chronic migraine exacerbations.

ESRA1-0707
Case Reports

PHRENIC NERVE BLOCK: NON-INVASIVE VENTILATION AS A RESCUE THERAPY

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Background and aims: Although regional anesthesia has several benefits, interscalene block may reach the phrenic nerve, worsening the ventilatory dynamics in patients whose ventilation is dependent of diaphragmatic function.

Methods: Our case reports a 76 year-old male, with chronic obstructive pulmonary disease (COPD), aortic stenosis, hypertension and dyslipidemia, admitted for surgical correction of a proximal epiphysis fracture of the right humerus.

A regional anesthetic plane was chosen with patient’s agreement. Besides the standard monitoring, it was placed an arterial line and several arterial blood samples (ABS) and spirometries were taken.

A neck ultrasound scanning identifying the brachial plexus and the phrenic nerve was made. Lidocaine 2% 5 ml was injected in each root in an out-of-plane approach, and another 5 ml in superficial cervical plexus.

Results: Ipsilateral hemidiaphragmatic paresis was found in a thoracic ultrasound scanning. Another spirometry and ABS revealed a reduction in FVC, FEV1, FEV1/FVC, as well as in pO2 and SpO2. Due to ventilatory deterioration, it was started non-invasive ventilation (NIV) with an improvement in gas exchange, documented by ABS.

After the motor block reversal, patient recovered his diaphragmatic function and was put off NIV, without need of supplementary oxygen.

Conclusions: Classically interscalene block isn’t recommended in COPD patients, since it appears to inadvertently block the phrenic nerve in about 100%. Several studies failed to demonstrate a decrease in phrenic nerve block despite the use of ultrasound or low local anesthetic volume.

Despite the lack on the literature demonstrating the effectiveness of NIV associated with interscalene block, it seemed crucial in the ventilatory improvement of our patient.
L1 level would be effective in providing postoperative analgesia for these patients. Two cases with this approach are presented here.

Methods: We presents 2 patients: patient N°1: a 48 years old man (body mass index 27, ASA II) and Patient N° 2: a 51 years old woman (body mass index 24 ASA II) both diagnosed with hip impingement syndrome that resulted in chronic hip pain. The patients received preoperative L1 PVB with bupivacaine 1.5 mg/kg and lidocainc 2 mg/kg. Induction of the anesthesia was performed with propofol and maintained with sevofurane. The analgesic regimen during the whole perioperative consisted in fentanyl 200ug, dexketoprofeno 50 mg and metamizol 2gr. At discharge was indicated ibuprofen every 8hs and rescue of tramadol.

Results: The two patients tolerated the procedures well. The operating time was between 3 to 4hs. They were discharged home nearly pain free and able to ambulate with assistance around two hours later the surgery finished. The numbness lasted for 20hs; the sensory block recovered after approximately 36hrs and they remained pain free for 48hs. They did not need tramadol rescue.

Conclusions: Hip arthroscopy is gaining popularity in treatment of intra-articular pathology. The analgesic regimen needs to meet the goals of providing safe, effective analgesia, with minimal side effects and facilitate early ambulation with same-day discharge. We consider that L1 PVB inside a multimodal regimen could be a valid alternative for achieve these targets.

ESRA1-0719
Case Reports

POST-OPERATIVE DELIRIUM AFTER REGIONAL ANESTHESIA – CASE REPORT
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Background and aims: Post-Operative Delirium (POD) is a major adverse event characterized by generalized cerebral dysfunction triggered by a range of intra and postoperative factors, most prevalent in the elderly. The Confusion Assessment Method (CAM) is a standard evidence-based tool that has become widely accepted to identify and recognize POD.

Methods: Our case reports a 75 year-old male, physical status ASA II, with medical history of obesity and dyslipidemia. No previous mental disorders were recorded.

He was scheduled for knee arthroplasty. A sedation with midazolam 2 mg EV was performed to minimize discomfort during the execution of the following regional anesthesia techniques: ultrasound-guided continuous femoral block (20 ml Ropivacaine 0,2%); ultrasound-guided subgluteal sciatic nerve block (20 ml of Ropivacaine 0,75%); and Subarachnoid Block (10 mg Levobupivacaine 0,5% + 0,002 mg sufentanil).

Results: After sensitive and motor blockade were adequate, surgery started uneventful. Suddenly, 60 minutes after, the patient started suffering disorientation, agitation and persecutory delusion. Propofol 1% sedation bolus was administered, titrated according to need, without improvement.

In the post-anesthetic care unit the patient tested a positive CAM score (1 + 2 + 3 + 4). Treatment was promptly administered with Haloperidol 2mg EV, followed by 1 mg every 4 hours SOS, with reversal of the dysfunctional state during the following 24 hours.

Conclusions: It was very helpful in these cases because of its analgesic effect by acting along the cutaneous branches of the intercostal nerves. More studies are needed but this block is a safety technique for critical patients despite coagulation disorders, multi-organic failure, mechanical ventilation difficulty, etc. with a very low complication rate. and very high probability of success.

ESRA1-0742
Case Reports

NEW APPLICATIONS FOR THE NEW THORACIC WALL ULTRASOUND GUIDED BLOCKS THE RECENTLY DESCRIBED BLOCKS CAN BE USE FOR MORE PROCEDURES APPART FROM BREAST SURGERY
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Conclusions: It was very helpful in these cases because of its analgesic effect by acting along the cutaneous branches of the intercostal nerves. More studies are needed but this block is a safety technique for critical patients despite coagulation disorders, multi-organic failure, mechanical ventilation difficulty, etc. with a very low complication rate. and very high probability of success.

ESRA1-0741
Case Reports

THORACIC INTERFASCIAL BLOCK FOR CRITICAL PATIENT: TWO CASES NEW CUTANEOUS BLOCK OF THE INTERCOSTAL NERVES WITH CONTINUOUS INFUSION OF LOCAL ANESTHETIC FOR WEANING
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Conclusions: Some ultrasound-guided techniques for analgesia in breast surgery have been described recently. In our experience, these blocks provide a very good analgesia quality in the antero-lateral thoracic wall.

Methods: CASE 1: 31 year-old male, with community-acquired pneumonia complicated with multiorganic failure and respiratory distress. A pleural fistula generated a bilateral pneumothorax aggravating his management.

CASE 2: 60 year-old male (BMI = 50) needed ICU admission after a 4th floor fallen. He presented multiple rib fractures: 3th-11th in the right hemithorax and 3th-12th in the left. He presented serious difficulties for mechanical ventilation because of his complexion and high drugs doses were required.

In both cases, we introduced two catheters into the interfascial thoracic plane and connect them to an infuser pump with L-bupivacaine 0’125% at 8–10 ml per-hour rate.

Results: Intravenous drugs requirements were significantly decreased, improving mechanical ventilation and weaning. A great analgesia quality was also achieved allowing even extubation; improve patient management and discharge from ICU.
Background and aims: In the last years there have been described some new regional blocks of the thoracic wall for breast surgery. They are still in development but their easiness performing make it possible to use them for a great variety of procedures.

Methods: We present 6 cases of patients (previous informed consent obtained) in which one of this block was used in peculiar conditions. CASE 1: 40 year-old female scheduled for brachytherapy for breast cancer treatment under the serrato-intercostal block; CASE 2: 31 year-old male with shoulder chronic pain relieved after alcohol neurolysis of the medial pectoral nerve ultrasound-guided; CASE 3: 20 year-old female scheduled for sentinel node excision; CASE 4: breast cancer lumpectomy in a 49 year-old female with catamenial pneumothorax for breast cancer lumpectomy without general anesthesia; CASE 5: 71 year-old female with a LVEF 26% and dilated myocardiopathy who underwent for a radical mastectomy without general anesthesia.

Results: In all cases the block was successfully performed and also provided the expected results of pain relief, analgesia or anesthesia in each case. No adverse effects were reported.

Conclusions: We have long experience performing the thoracic wall blocks for breast surgery and we used it for these patients in order give them the best clinical management because of their added pathologies or special conditions. We hope these techniques become a popular regional block when more clinical trials are published and give them enough evidence.
Background and aims: Klippel-Trenaunay syndrome (KTS) is a rare disorder characterized by the triad of capillary or cavernous hemangiomas, venous varicosities or neurovascular malformations, and soft tissue or bone hypertrophy. We describe an ultrasound-guided causal analgesia management of a 3-year-old boy (16 kg) with KTS for inguinal hernia repair.

Methods: In this case hemangiomas detected in extremities, face, neck, shoulders and upper limb. Hemodynamic and laboratory findings were normal preoperatively. Thrombocytopenia was not observed. The oropharynx revealed markedly hypertrophied soft tissue, pharyngeal, and hypopharyngeal hemangiomas, and a Mallampati class 4 airway. Spinal and epidural hemangiomas were excluded based on a magnetic resonance imaging study before surgery.

The patient was monitored and sedation (0.05 mg / kg midazolam and 1 mg / kg ketamine IV) were given after lateral position. Under full aseptic conditions causal region was observed by ultrasound sonosite micromaxx) and real time location of the input with 22 G caudal needle. 16 mL(1 mL/kg) of 0.25% bupivacaine was given. Caudal space expanded and spread of local anesthetic to the level of L1 was seen with ultrasound real time. The surgery started after 20 minutes after block placement. Propofol is used 0.5–1 mg/kg iv for sedation during surgery . The patient was hemodinamically stabilized throughout the 45 minute of surgery which was uneventful. Postoperative visual analog score (VAS) was 1 after hour of surgery VAS score was 2 after 6–4 hours.

Results: Dose of 0.25% levobupicaine 0.125% with 10ug sufentanyl was given by the obstetric nurse according to our protocol. Immediately the patient complained of sensitive alteration on the left side of the face and a drooping of the right eyelid and anosmia was noticed. No further complaints or signs were appreciated, and an iatrogenic HS was diagnosed after neurological examination and complementary studies.

Conclusions: HS was diagnosed after neurological examination and complementary studies. A lumbar epidural catheter was placed at the L3-L4 interspace and a solution of 10 mL of 0.25% levobupicaine with 10ug of sufentanyl was prepared and administered with successful control of the pain.

One hour after the patient required further analgesia. 10 mL of levobupicaine 0.125% with 10ug sufentanyl was given by the obstetric nurse according to our protocol. Immediately the patient complained of sensitive alteration on the left side of the face and a drooping of the right eyelid and anosmia was noticed. No further complaints or signs were appreciated, and an iatrogenic HS was diagnosed after neurological examination and complementary studies.

Results: HS has an incidence between 0.4 and 4% in women in labour receiving EA. Although HS is generally transient and benign, there should be concerns for autonomic instability and respiratory arrest. It is thought to be due to the cephalad spread of local anaesthetic, that might be explained by the physiological and anatomical changes that occur during pregnancy.

Conclusions: HS may occasionally lead to serious complications. Further investigation as other causes must be excluded.
ESRA1-0776
Case Reports

TRANSVERSUS ABDOMINIS PLANE (TAP) AND RECTUS SHEATH BLOCK (RSB) IN ADDITION TO INTRATHECAL DIAMORPHINE FOR LAPAROSCOPIC COLORECTAL CANCER SURGERY: A CASE SERIES

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Background and aims: Reducing postoperative opioid consumption enables early nutrition and avoidance of paralytic ileus. We present a case series of laparoscopic colorectal surgery performed under TAP and RSB with intrathecal diamorphine to identify whether this technique is suitable for an enhanced recovery programme.

Methods: Six ASA I to III adult patients undergoing laparoscopic colorectal cancer surgery consented to receive TAP and RSB in addition to 500 micrograms intrathecal diamorphine and 0.5 ml 0.5% hyperbaric bupivacaine. Ultrasonography was used to perform TAP and RSB prior to surgery using 0.25% levobupivacaine, with 20 ml on each side for TAP block and 10 ml each side for RSB. No patient received more than 2 mg kg-1 levobupivacaine. One patient was excluded due to conversion to laparotomy. Postoperative pain was measured by morphine consumption via patient controlled analgesia (PCA) device commencing at the end of surgery for a 24 hour period.

Results: No patients required supplementary analgesia intraoperatively or in recovery and no complications arose from the analgesic technique. Those five patients that received TAP and RSB with intrathecal diamorphine had a median morphine consumption of 9 mg (range 0–26.9 mg). Three of the patients had discontinued their PCA at 24 hours. Median length of stay was 5 days (range 5–12 days), with delayed discharges due to non-medical reasons.

Conclusions: TAP and RSB in conjunction with intrathecal diamorphine is a safe technique for laparoscopic colorectal surgery. With relatively low morphine requirements in the immediate postoperative period, further evaluation of this technique may reveal that PCA is no longer required for this surgery.

ESRA1-0782
Case Reports

ULTRASOUND GUIDED PULSED RADIOFREQUENCY OF SACROILIAC JOINT IN PREGNANCY RELATED PELVIC GIRDLE PAIN: A CASE REPORT

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Background and aims: Ultrasound guided PRF (Pulsed Radiofrequency) of the sacroiliac joint was successfully carried out in a pregnant woman with posterior pelvic girdle pain at National Maternity Hospital, Dublin. Outcome measures were duration of analgesia, change in self-reported disabilities and any adverse events.

Methods: A 29 year old primiparous woman at 32 weeks of gestation was referred to the pain clinic with right sided posterior pelvic girdle pain. It was continuous, throbbing and radiated into the right buttock and the posterior aspect of the thigh. The pain started at 18 weeks of pregnancy. Her pain score in NRS was 8 and 10 at rest and movements, respectively. Paracetamol and physiotherapy including sacral belt provided no relief. She was very incapacitated and unable to perform and maintain her routine activities as measured by Oswestry Disability Index. Provocative tests for SI joint were positive on examination and also confirmed by sonopalpation. Patient was consented and Ultrasound guided PRF application to the SI joint was carried out following positive diagnostic block with 0.5% Levobupivacaine. An SMK-C10 needle with a 5 mm active tip was introduced into the joint (see figure). Sensory (50Hz, 0.3 V) and motor (2Hz, 1.2 V) testings were done prior to PRF. The procedure was performed with a pulse width of 20 ms, 42° C, at 2 Hz for 2 minutes at two levels, cranial and caudal.

Results: Two weeks after the procedure, the patient reported marked improvement of her pain. She was better able to perform and participate in her day to day activities. No adverse event was noted. She is followed up every 2 weeks in the clinic. Further report will follow.

Conclusions: Ultrasound guided PRF of SI joint may be an effective treatment option for severe pregnancy related pelvic girdle pain as this will avoid the potentially harmful effects of pain medications and ionising radiation.

ESRA1-0785
Case Reports

DERMATOSES OF PREGNANCY AND EPIDURAL ANALGESIA MANAGEMENT: A CASE REPORT

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Background and aims: Dermatoses of pregnancy represent a group of intensely pruritic skin conditions that occur only in the puerperal state. We describe a case of a woman in labour with a generalized rash who requested epidural analgesia.

Methods: A healthy 32-year-old woman, at 35 weeks of gestation, developed an extensive rash affecting affecting all of her body. A diagnosis of pruritic urticarial papules and plaques of pregnancy (PUPPP) was made considering her clinical symptoms. The condition had been treated with an anti-histaminic and a systemic corticosteroid for 2 days. However, at the time of labour, there were still skin lesions in the lumbar region. She was afebrile and there were no signs of skin infection. The patient was informed regarding the benefits and risks of epidural placement and written consent was obtained.

Results: We proceeded with the placement of an epidural catheter, with an aseptic technique, without immediate complications. The birth was uneventful and the patient was discharged 3 days after. A telephonic follow-up was made on the first and second weeks. By then the rash had completely disappeared and there were no symptoms regarding neuraxial complications.

Conclusions: PUPPP is considered the most common dermatoses of late pregnancy, with an estimated frequency of 0.5%. Although the close proximity of the lesions to the site of skin insertion is viewed as a relative contraindication to neuraxial anaesthesia, the ultimate decision is dependent on clinical judgment and individualized to each circumstance. Moreover, a meticulous sterile technique should always be used and a close vigilance should be warranted.
HIP FRACTURE SURGERY IN HIGH-RISK PATIENT: COMBINED PERIPHERAL NERVE BLOCK

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Background and aims: Hip fracture are common in elderly individuals. Advanced age (≥ 65 years), physical status according ASA ≥ III and deferring surgical treatment are predictors of increased perioperative mortality in hip fracture. Peripheral nerve block may be an excellent option compared to other anesthetic techniques allowing reduced interference with the cardiovascular and respiratory systems, a more prolonged pain control in the postoperative period, an earlier surgical treatment and early discharged.

Methods: An 88-yr-old men and 84-yr-old woman, ASA III, hypocoagulated due to atrial fibrillation, with hip fracture were proposed for Dynamic Hip Screw (DHS). Comorbidities relevant associated: extensive bilateral pulmonary fibrosis in male and decompensated congestive heart failure and pulmonary edema in female.

Results: In the male, a femoral and sciatic nerve blocks (subgluteal) were performed with 40 mL of 0.5% ropivacaine. In the female, a femoral and lateral femoral cutaneous nerve blocks were performed with 20 mL of 0.5% ropivacaine. In both cases, the block was made under an ultrasonographic guidance using high frequency linear probe and single-shot technique. During surgery, patients were sedated with propofol, while maintaining spontaneous ventilation. The periperaoperative course was uneventful.

Conclusions: General anesthesia with mechanical ventilation may induce the need for prolonged mechanical ventilation with unpredictable outcomes. Abnormal coagulation formally contraindicate neuraxial block and lumbar plexus block. Since the age and ASA status are factors that cannot be changed, an early surgical treatment may change the prognosis. Therefore, using peripheral nerve block may be a logical option for femur neck fracture treatment especially in high-risk patients.

CORTICOSTEROIDS AS A TREATMENT FOR CLUSTER HEADACHES IN THE ER

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Background and aims: A 60 year old male with a positive history of headaches was presented to our emergency department. He complained for headache localized on the right side of his head. His cephalalgia was accompanied by pain behind and around his right eye, tearing and nasal congestion. He reported repetitive pain episodes during the last month. During physical examination, dropping of the right lid, tearing, redness of the eye and swelling around it were observed. Brain CT did not show any pathological findings. A more detailed anamnesis revealed increased alcohol consumption.

Methods: The patients' findings were compatible with cluster cephalalgia. He was administered oxygen 100% for 15 mins and 500 mg methylprednisolone. Immediate pain remission was observed within 30 mins. Prednison administration was also recommended as prophylaxis for 10 days with an initial dose of 60 mg for the first 7 days followed by dose tapering.

Results: Cluster cephalalgia is a defined and treatable syndrome. Accurate anamnesis can lead to diagnosis and pain relief. Long term use of diuretics or lithium is also recommended.

Conclusions: Corticosteroids are used as a first line treatment in many conditions due to their anti-inflammatory action. In the case of cluster cephalalgia their administration during the acute phase and as prophylaxis has shown to be the most effective treatment.

EMERGENCY ASA IV HIPOCOAGULATED PATIENT-GENERAL ANESTHESIA VS REGIONAL ANESTHESIA

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Background and aims: Continuous increase of life span leads anesthesiologists to difficult decisions in the elaboration of the anesthetic plan. We report this difficulty in a hypocoagulated elderly patient with poor cardiac and respiratory function on emergency orthopedic trauma surgery context.

Methods: A 72-year-old obese man, ex-smoker and ex-mining worker was proposed for an emergency orthopedic surgery for exposed left ankle fracture. He had ischemic cardiomyopathy (ACS in 2007 and coronary stent antaggregated with Clopidigrel 75mg), AF hypocoagulated with Varfime (initial INR of 2.7;4); Class IV Cardiac Insufficiency (NYHA), Valvular Insufficiency and left ventricular hypokinesia (EF of 26%); Severe Obstructive Respiratory Failure and Pulmonary Hypertension. Facing the impossibility of delaying the surgery, the patient was evaluated by cardiology, pulmonology and anesthesiologists teams. INR was reduced to 1,52 after Pro-thrombin complex. He was monitored according to ASA standards and premedicated with Cefuroxime 1,5 g IV

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and Fentanyl 0.1 mg IV). Surgery took place under left femoral and sciatic nerve blocks with levobupivacaine 0.5% and mepivacaine 1.5% complemented with saphenous nerve block.

**Results:** All peripartum period progressed uneventfully. Effective postoperative analgesia. Followed by Acute Pain Team every day until discharge, with no complications described.

**Conclusions:** Elderly polymedicated patients with an impaired clinical status are near impossible to optimize in an emergency context. General Anesthesia mortality and morbidity high risks, with admission in the ICU are well known. Regional Anesthesia in an anticoagulated and hipoocoagulated patient imposes local or systemic complication risks. Anesthetic choice is a matter of “minor damage”, and should involve a multidisciplinary approach of the patient.

**ESRA1-0800**

**Case Reports**

**PECS AND SERRATUS PLANE BLOCK POST CHEST WALL TRAUMA**

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**Background and aims:** Pecs and serratus plane blocks provide effective chest wall analgesia following trauma.

**Methods:** A 20-year-old male motorcyclist sustained fractures of left femur, pubic ramus, right ulna and right-sided ribs 1-9 with pulmonary contusion and pneumothorax. Following 1 gm of paracetamol and 2.7 mg IV morphine, he had a pain score of 3/3 (abbreviated verbal rating scale) and could not deep breathe or cough. Thoracic epidural and paravertebral blockade were abandoned due to pain making positioning impossible. We deposited a mixture of 1% lidocaine/0.25% bupivacaine with adrenaline under ultrasound guidance between pectoralis major & minor (10 ml), pectoralis minor & serratus anterior (10ml) and latissimus dorsi & serratus anterior (5ml). Intercostal nerve blocks (5ml) were performed for ribs 5-9.

**Results:** His pain score decreased from 3/3 to 0/3 within 10 minutes. Respiratory rate decreased from 22/min to 12/min and he was able to cough and deep breathe. Analgesia lasted for 5 hours.

**Conclusions:** Pecs block and serratus plane block have been described as a mode of analgesia post surgery involving the breast and axilla. We used these blocks to provide analgesic rescue for upper rib fractures. Advantages included supine positioning and a superficial approach to easily recognizable structures using ultrasound. This may be an advantage compared to thoracic epidural or paravertebral blockade. Further studies of block efficacy and catheter infusion are required.

**Reference:** 1. Blanco R, Fajardo M, Parras Maldonado T. Ultrasound description of functional capacity. For 4 years, pain was managed with pregabalin, fentanyl 0.1 mg IV. Surgery took place under left femoral and sciatic nerve blocks with levobupivacaine 0.5% and mepivacaine 1.5% complemented with saphenous nerve block.

**Results:** In the first cycle of treatment no significant decrease in pain or allodynia was achieved, although the pain area was well reduced. Following 4 cycles, neuropathic pain was successfully managed with a 71% decrease in allodynia and 29% decrease in neuropathic pain, associated with an approximate 30% decrease in the area of pain and decreased number of episodes per day. Moreover, the functional capacity was recovered and quality of life improved.

**Conclusions:** We present a case which sustains the use of capsaicin 8% in the treatment of neuropathic pain other than the well-studied postherpetic neuralgia and HIV-related neuropathy. Our results further suggest a significant reduction of allodynia as the major effect of capsaicin 8%, which may relate to the important quality of life improvement.

**ESRA1-0802**

**Case Reports**

**HORNER’S SYNDROME DURING LABOR**

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**Background and aims:** The lumbar epidural-block is an effective technique often used in labor analgesia. The anesthesiologist should be prepared to recognize its complications.

We present a case of Horner’s syndrome after lumbar epidural-block for labor analgesia.

**Methods:**

**CASE REPORT:** Healthy primigravida (39 weeks) in early labor. An epidural catheter was placed at L2-L3, with saline loss of resistance and Tubby 18G needle, introducing 5 cm catheter into the epidural space, without complications. After that, 16 mg of ropivacaine 0.2% and sufentanil 0.01mg were uneventfully injected with analgesic efficacy.

Three hours later, 16 mg of ropivacaine 0.2% were reinjected without hemodynamic repercussion. Fifteen minutes after, the patient had facial asymmetry (left ptosis, miosis and conjunctival hyperemia) with an also asymmetric thermal-block (left C5 versus right T10).

The woman was asymptomatic and the cardiotocograph tracing still benign. We removed the catheter and inserted another one in L3-L4, which was uneventfully injected 4 hours later and more 3 times until the delivery.

Six hours after its onset, the Horner’s syndrome was totally reversed.

**Results:**

**Conclusions:** The Horner’s syndrome is characterized by miosis, ptosis, enophthalmos and anhidrosis. Occurs by disruption of the sympathetic innervation from the anterior horn of the spinal cord between C8 and T1. Anatomophysiological changes of pregnancy favor the cephalic distribution of local anesthetic, as may have occurred in this case. Another possibility is the subdural catheter migration.

Although usually benign and transient, the Horner’s syndrome can succeed an epidural-block and may precede more serious complications.

**ESRA1-0803**

**Case Reports**

**ABDUCENS NERVE PALSY FOLLOWING COMBINED SPINAL EPIDURAL ANAESTHESIA**

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**Background and aims:** The Abducens nerve palsy as a complication after dural puncture was first reported in 1967. It is the most common nerve affected possibly related to its long intracranial course. The reported incidence of isolated palsy after spinal anaesthesia varies from 1:300 to 1:8000.

**Methods:** A lady developed progressive headache after Combined Spinal Epidural for instrumental delivery. She received blood patch after failed conservative management. However headache returned after initial improvement. Later she developed double vision with uncrossed horizontal diplopia and a convergent squint on the left eye.

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**Results:** She was seen by Neurologist and Ophthalmologist. She was managed conservatively & reassured that diplopia will settle with time. Having missed the MRI appointment, she was followed up by telephone. We found that her diplopia and headache had settled completely.

CSF hypovolemia leading to caudal displacement of the brain causes a traction stress on the nerve is likely explanation.

Epidural blood patch within 24–48 hours has been advocated as a treatment which restores intracranial pressure.

80% will recover spontaneously between 2–8 months. After 8 months the palsy may be permanent.

**Conclusions:** The improper correction of intracranial pressure can be an explanation of persisting headache.

Early repeat blood patching should be considered in patients with post dural puncture headache especially if complicated by cranial nerve palsy.

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**ESRA1-0804**  
**Case Reports**

**CEREBRAL VENOUS SINUS THROMBOSIS AFTER REGIONAL ANAESTHESIA IN A PATIENT WITH SEVERE PREECLAMPSIA - A DIAGNOSTIC CHALLENGE**

Faisao A.1, Rodrigues A.2, Vilaça M.J.1, Coelho F.3, Reis E.1, Azevedo P.1, Esquivel M.1, Oliveira L.1 1Department of Anaesthesiology, Hospital Professor Doutor Fernando Fonseca, Amadora, Portugal. 2Department of Anesthesiology; Centro Hospitalar Lisboa Central, Lisboa, Portugal.

**Background and aims:** Cerebral venous sinus thrombosis is a rare condition, usually associated with coagulation disorders, inflammatory diseases, trauma, infection, pregnancy and postpartum period. The most common symptom is headache and without treatment cerebral venous thrombosis is a potentially life threatening condition.

**Aims:** to report the case of a woman with severe preeclampsia who developed cerebral venous sinus thrombosis after caesarean section under spinal anesthesia.

**Methods:** We review the patient’s clinical file and asked for patient consent.

**Results:** A 22-year-old primigravida with severe preeclampsia underwent caesarean section under spinal anesthesia at 36 weeks of pregnancy. Twenty-four hours after C-section she complained of positional frontal and occipital headache. She was under antihypertensive therapy and was treated as post-dural puncture headache (PDPH) with bed rest, hydration, simple analgesics and caffeine. After initial relief; on postoperative day 5 she complained of increasingly headache that no longer was affected by posture. The patient was referred to Neurology and a MRI venography showed a left lateral sinus thrombosis. A blood patch was performed for pain relief and LMWH at therapeutic dose was started. The patient was discharged with clinical and imagingologic improvement.

**Conclusions:** There are several causes of headache in the postpartum and cerebral venous sinus thrombosis is not among the most frequent. The diagnosis can be difficult especially if regional anesthesia was used and after diagnostic of preeclampsia, two of the leading causes of postpartum headache (3). This case emphasizes the importance of reviewing differential diagnosis of postpartum headache when treating persistent PDPH.

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**ESRA1-0809**  
**Case Reports**

**CONTINUOUS CAUDAL ANALGESIA IN PEDIATRICS: A CASE REPORT**

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**Background and aims:** Continuous caudal anesthesia (CCA) has been commonly used in pediatric practice. This technique has been applied to abdominal and chest surgery in young children providing safe and effective analgesia while decreasing the anesthetic requirement and the risk of nerve injury. However, the risks associated with placement of the caudal catheters (CC) and with the toxicity of anesthetics must be appreciated and all steps to maximize safety of the technique must be taken.

**Methods:** We report a case of continuous caudal analgesia in a former preterm infant.

**Results:** We present a case of radical left nephrectomy under combined epidural-general anesthesia in a 8-months old preterm male with bronchopulmonary dysplasia and large for gestational age (LGA). The caudal catheter placement was performed before the surgery, under general anesthesia. Preemptive analgesia with a single bolus injection of ropivacaine was performed. At the end of surgery, ropivacaine 0,05% was started for continuous analgesia, at a rate of 0,2mg/kg/h. The surgery and the perioperative period were uneventful. The catheter remain in place for 48 h. No respiratory or neurologic disorders, infections or other complications were recorded.

**Conclusions:** Caudal catheter placement (CCP) is easy and provides excellent analgesia without depressing respiration. In this report, we illustrate the overall feasibility and effectiveness of this technique in a former preterm infant. Caudal anesthesia may be a challenging technique in pediatric population that should be managed at centers with the appropriate resources and experience.

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**ESRA1-0810**  
**Case Reports**

**INTRATHECAL MAGNESIUM SULFATE – “A WAY TO GO LOW”: A CASE REPORT**

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**Background and aims:** Magnesium sulfate (MgSO4) shows analgesic properties, antagonizing N-Methyl-D-aspartate (NMDA) receptors in the central nervous system. Due to limited transfer across the blood–brain barrier, it has been suggested that intrathecal route would allow a more effective action at spinal cord NMDA receptors, enhancing the antinoceptive effects of opioids.

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**ESRA1-0807**  
**Case Reports**

**RENDU-OsLER-WeBER SYNDROME - ANAESTHETIC MANAGEMENT**

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**Background and aims:** Rendu-Osler-Weber Syndrome, also known as hereditary hemorrhagic telangiectasia (HHT), is a hereditary (autosomal dominant) fibrovascular dysplasia. It is manifested by mucocutaneous telangiectasias and arteriovenous malformations. Lesions can affect the nasopharynx, central nervous system, lungs, liver, gastrointestinal tract and the conjunctiva. Diagnosis of HHT is based clinically on the Curaçao criteria: epistaxis, telangiectasias, visceral lesions, family history.

**Methods:** The authors intend to describe and emphasize the characteristics of this pathology and describe the combined lumbar and sacral block as a valid anaesthetic approach.

**Results:** A 53-year-old female patient with HHT for 13 years, ASA IIe, was proposed for DHS due to trochanteric fracture. She presented multiple telangiectasies on her tongue, lips and hands; gastrointestinal arteriovenous malformations; positive family history. 2 weeks earlier she was submitted to a septoplasty. A combined lumbar and sacral plexus block was performed with neurostimulation (225ng meptivacain=1,5% and 115mg Ropivacain=0,56%). The procedure underwent with no complications. The patient remain nine hours in the PACU and had home-discharge within two days.

**Conclusions:** Anaesthetic management of patient with HHT is a challenge. There isn’t a standard approach. The patients should be carefully studied before surgery. NSAIDs, anticoagulants and platelet inhibitors must be avoided. General anesthesia with tracheal intubation or placement of a supraglottic device should be the less traumatic possible. Regional anesthesia is a valid anaesthetic option with good results. However, the use of neuroaxial anestesia remains controversial. In this patient, the paravertebral block was a good choice once it allowed to avoid both a general anesthesia and a neuroaxial block.
Methods: 76 year old male, ASA IV (type 2 Diabetes, Parkinson, ischemic stroke, cardiac insufficiency - NYHA grade IV, with severe systolic and diastolic compromise (estimated left ventricle ejection fraction of 15%) on non invasive positive-pressure ventilation and a recent pneumonia. The patient was scheduled to hip hemiarthroplasty under continuous spinal block. After ASA standard monitoring and light sedation, central and arterial lines were placed. The technique was performed with 18G Tuohy needle, at L4-L5 level and 3 cm introduction of a 20G catheter in subarachnoid space. A total dose of 5.25 mg of levobupivacaine, 2.5ug of sufentanil and 25 mg of MgSO4 50% was administered.

Results: During the procedure and postoperative period there was a remarkable hemodynamic stability with minimal blood loss and a significant increased duration of analgesia (>24 hours) with no further opioid consumption. No delay on the onset of sensory or motor blockade or undesirable side effects were observed.

Conclusions: Intrathecal MgSO4 could be a promising drug, due to a synergistic effect with opioids and local anaesthetics, prolonging duration of analgesia. Randomized controlled trials are required to determine minimal effective dosage and its safety profile.

ESRA1-0812
Case Reports

ANTEPARTUM ACUTE FACIAL PARALYSIS AND OBSTETRIC ANALGESIA: CASE-REPORT
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Background and aims: Bell’s palsy (BP) has an increased incidence during pregnancy. Its etiology is idiopathic but association has been found with hypertensive disorders in pregnant women. Maximal weakness could progress within three days, differential diagnosis is required and imaging is often precluded in obstetric population. Despite not being considered absolute contraindication for a neuroaxial technique, the decision is controversial and particularly the use of opioids. We present a successful case of epidural analgesia in a patient with antepartum acute diagnosis of BP.

Methods: 24 year-old primigravida, with the diagnosis of gestational hypertension, at 39 weeks of gestation, on active labor stage proposed for labor analgesia. Past medical history included sudden facial hemiparesis with onset two days before, diagnosed as BP after neurological observation and with indication for corticoid therapy in ambulatory. At physical examination we confirmed peripheral facial paralysis, without any other neurological signs, including headache or nausea. Clinical signs and medical history were presumptive of BP. Radiologic workup was not timely during the labor.

Results: We decided to proceed with epidural analgesia with levobupivacaine and sufentanil, which ensued without intercurrences. At 48h post-partum she was discharged home, without noticed intercurrences.

Conclusions: Antepartum acute BP poses an anesthetic challenge concerning neuroaxial analgesia for labor. Accurate clinical presumptive diagnosis could enable safe epidural analgesia for labor to pregnant women with acute BP.

ESRA1-0624
Central Nerve Blocks

EFFECTS OF DEXMEDETOMIDINE IN ELDERLY PATIENTS UNDERGOING TOTAL KNEE REPLACEMENT ARTHROPLASTY WITH SPINAL ANESTHESIA
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Background and aims: This study evaluated the effects of intravenous dexmedetomidine infusion on stress biomarkers, hemodynamic response and postoperative analgesia in elderly patients undergoing total knee replacement arthroplasty (TKRA).

Methods: Forty-five adult ASA I-II patients undergoing TKRA under spinal anesthesia were randomly allocated into three 15 patient groups: the control group (Group C) and the dexmedetomidine group (Group D) further subdivided into two groups (D1: unilateral TKRA and D2: bilateral TKRA). Group D was started dexmedetomidine infusion at 0.4 μg/kg/h prior to anesthesia which was increased to 0.6 μg/kg/h at surgical commencement. Hemodynamic parameters were recorded intraoperatively at 5-min intervals. Serum interleukin-6 (IL-6), cortisol, and glucose concentrations were measured preoperatively, and at 6 and 24 h postoperatively. Postoperative patient satisfaction, pain score, and analgesic requirement were also assessed.

Results: The time-dependent increase in serum IL-6 was significantly lower group D2 (6h: 35.8 ± 22.7 pg/mL, 24h: 50.7 ± 25.3 pg/mL) compared to group C (6h: 52.5 ± 23.5 pg/mL, 24h: 84.1 ± 32.2 pg/mL). Bradycardia occurred more frequently in group D1 and D2 than in group C (p<0.05). The analgesic requirement was higher at 6h postoperatively and the patient's satisfaction, lower in group C (p<0.05).

ESRA1-0624
Central Nerve Blocks

DEXMEDETOMIDINE VERSUS CLONIDINE AS AN ADJUNCT TO INTRATHecal SMALL DOSE ROPivACaine IN PATIENTS UNDERGOING TRANsUREThRAL RESECTION OF PROSTATE
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Background and aims: It is important to limit the cephalad spread of local anaesthetics above T10 dermatome during spinal anesthesia in patients undergoing transurethral resection of prostate (TURP). This can be achieved by using small dose of local anaesthetics in combination with intrathecal additives like alpha-2 agonists which improve the quality of block without altering the height of block. Present prospective, randomised and double blind study was designed to compare dexmedetomidine and clonidine when added to intrathecal ropivacaine for transurethral resection of prostate.

Methods: 50 patients of ASA grade I-III, scheduled for elective TURP, were allocated into two groups. Group I received 7.5 mg ropivacaine+15μg clonidine and Group II received 7.5 mg ropivacaine+5μg dexmedetomidine. Spinal anesthesia was achieved in sitting position after preloading the patients with 10ml/kg ringer lactate with patients. Onset, duration and peak sensory level, intensity of motor block and analgesic requirement were recorded. Data obtained was subjected to statistical analysis and p<0.05 was considered significant.

Results: Patients in both the groups had comparable baseline and demographic characteristics. Peak sensory block was similar in both the groups. Patients in Group II had faster onset and longer duration of sensory block. Intensity and duration of motor block was also greater in Group II. Quality of intraoperative and postoperative analgesia was better in Group II.

Conclusions: Intrathecal dexmedetomidine with ropivacaine provides faster onset better operating conditions and patient comfort in patients undergoing TURP. However, it is associated with delayed motor recovery.
Conclusions: Intravenous dexmedetomidine decreases the IL-6 in a dose dependent manner with no significant intraoperative hemodynamic changes or respiratory depression in elderly patients undergoing TKRA with spinal anesthesia.

ESRA1-0656
Central Nerve Blocks
AN AUDIT OF EPIDURAL ANALGESIA IN A PAEDIATRIC TEACHING HOSPITAL: TRENDS, COMPLICATIONS AND LESSONS LEARNT AFTER 720 CASES
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Background and aims: The incidence of complications related to epidural analgesia remains less well-defined in the paediatric population as compared to adults. A retrospective review of prospectively collected data was performed to review and quantify risks of both adverse events and complications related to epidural analgesia in our Singaporean paediatric population.

Methods: Data from the Acute Pain Service (APS) was prospectively collected over 16 years. Details included the age of the patients, level of insertion of the epidural catheter, adverse events and complications.

Results: A total of 720 epidurals were performed from 1 June 1997 to 31 May 2013. There were no deaths or major complications over 16 years. There were 5 instances of dural puncture (0.7%). The incidence of minor postoperative complications was 3% and the majority of postoperative events consisted of catheter related problems (n=161, 22.4%). Prolonged use of the catheter beyond 3 days is associated with a statistically significant increase in the frequency of skin infective / inflammatory changes (p<0.05).

Conclusions: Epidural analgesia is associated with a relatively low risk of complications and is largely safe in the paediatric population. Adverse events generally reflect inconveniences related to catheter problems and have minimal impact on the patient.

ESRA1-0759
Central Nerve Blocks
POST-DURAL PUNCTURE HEADACHE - THE REALITY OF A SECONDARY HOSPITAL
Vilaça M.1, Faisco A.1, Coelho E.1, Carmona C.1 1Anaesesthesia & Pain Medicine, Hospital Prof. Doctor Fernando Fonseca, Amandor, Portugal.

Background and aims: The post-dural puncture headache (PDPH) is an important iatrogenic complication that results from therapeutic or diagnostic procedures in which the dura mater is pierced. With anesthetic techniques, location of the headache, onset of symptoms after technique, relation to orthostatism and movement and associated symptoms.

Methods: Using the data collected by the postoperative group of our department we evaluate the post-operative surveys in which PDPH have been diagnosed. Patients were identified according to gender, age and associated pathology; the characteristics of the headache were studied, such as associated technique, location of the headache, onset of symptoms after technique, relation to orthostatism and movement and associated symptoms.

Results: Between January 2010 and June 2014, 418 cases were diagnosed initially as PDPH. Of those cases, 49 were later classified as unlikely diagnosis of PDPH, and the rest were characterized in terms of presentation of the headache. As expected a higher number of cases occurred in women than in men (86.4% vs 13.6%), with a mean age of 35.7 years old. Remarkably we also noticed that a higher number of cases occurred with small gauge needles (45% with 27 gauge needles).

Conclusions: We believe that our results reflect our obstetric anesthesia, due to the higher risk of this special population in developing PDPH.

ESRA1-0766
Central Nerve Blocks
THE INFLUENCE OF THE INSERTION DEPTH OF A LUMBAR EPIDURAL CATHETER ON ASYMMETRICAL SENSORY AND MOTOR BLOCK IN POSTOPERATIVE EPIDURAL ANALGESIA IN ORTHOPAEDIC PATIENTS
Souvatzis X.1, Diamantaki E.2, Adrianou A.1, Astyrakaki E.1, Papaioannou A.1 1Dept. of Anaesthesiology, University Hospital of Heraklion, Heraklion, Greece, 2Intensive Care Unit, University Hospital of Heraklion, Heraklion, Greece.

Background and aims: Inhomogeneous spread of local anaesthetics in the epidural space with consecutive asymmetric blockade might be caused by transforminal escape of the catheter tip. The aim of the present study was to investigate whether catheter insertion depth correlated with asymmetric blockade in postoperative epidural analgesia in orthopaedic patients.

Methods: This prospective, double-blind, randomized controlled trial was granted Ethics Committee approval. Patients were randomized to one of two groups: Insertion of the multi-orifice catheter in the lumbar epidural space four or seven cm beyond the needle tip. Postoperative patient-controlled epidural analgesia was provided with ropivacaine 2 mg/ml, as a background infusion 5 ml/h, bolus 2 ml, lockout-time 20 minutes. The extent of sensory blockade with cold and pinprick and of motor blockade using the modified Bromage scale was examined twelve hours postoperatively.

Results: Sixteen patients (62.5% female), aged 65.0±10.8 years, were studied. Catheter insertion depth was four cm in six and seven cm in ten patients. Asymmetric and unilateral blockade occurred in five and five patients, respectively, as estimated by cold, and four and six, respectively, when estimated by pinprick, and was not correlated to the study group (p=0.688, p=0.682). A side difference of at least one in motor block was observed in four patients without intergroup differences (p=0.604).

Conclusions: The preliminary results of this ongoing study did not show a correlation between catheter insertion depth and asymmetrical sensory or motor block, suggesting that other factors, e.g. anatomical barriers, may play an important role.
ESRA1-0775
Central Nerve Blocks
ACOUSTIC PUNCTURE ASSIST DEVICE (APAD): A NOVEL TECHNIQUE TO IDENTIFY THE EPIDURAL SPACE IN ADULTS. (CASE SERIES)

Background and aims: Acoustic puncture assist device (APAD) is designed to detect and signal, by tone, the loss of resistance during epidural procedure, and to confirm the correct position of the epidural catheter by pressure reading. We aimed to investigate if this device may increase the success rate of epidural anesthesia and decrease the rate of accidental dural tap.

Methods: Informed written consent was obtained from all patients. After the proper set up of APAD, it was connected to the epidural needle by normal saline prefilled extension tube. The pressure needed to perform the epidural puncture (by both hands) generated by syringe infusion pump. APAD translates this pressure into corresponding acoustic and visible signals. 200 consecutive adult patients (ASA 1–3) went for lower limb orthopedic surgery under lumbar epidural anesthesia by means of APAD. Numbers of successful epidurals and accidental dural tap were documented. Epidural anesthesia considered successful if surgery could be completed by epidural anesthesia only.

Results: Epidural anesthesia by APAD was successful in 198 cases (99%) and considered failed in 2 cases (failure rate 1%). The accidental dural tap happened in 2 cases (1%).

Conclusions: With APAD, the success of identifying the epidural space was very high, with reliable successful anesthesia, and low incidence of accidental dural tap, giving a promising alternative to the use of conventional techniques. APAD is a novel device that may help to improve the quality of epidural anesthesia and decrease complications rate and it deserves more studies.

ESRA1-0783
Central Nerve Blocks
AN AUDIT ON COMPLICATIONS ASSOCIATED WITH LUMBAR EPIDURAL FOR LABOUR ANALGESIA
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Background and aims: Epidural provides effective analgesia with a risk profile. NAP3 set a safety benchmark with official figures of specific risks. This audit mirrored NAP3 in a smaller scale to establish incidence of epidural related complications and to identify contributing factors.

Methods: All epidural procedures performed at a Brighton based labour suite were audited prospectively over 4 months in 2014. Multiple attempts regardless of time intervals were counted as single episodes. Any intentional dural puncture (by both hands) generated by syringe infusion pump. APAD translates this pressure into corresponding acoustic and visible signals. 200 consecutive adult patients (ASA 1–3) went for lower limb orthopedic surgery under low lumbar epidural anesthesia by means of APAD. Numbers of successful epidurals and accidental dural tap were documented. Epidural anesthesia considered successful if surgery could be completed by epidural anesthesia only.

Results: Epidural anesthesia by APAD was successful in 198 cases (99%) and considered failed in 2 cases (failure rate 1%). The accidental dural tap happened in 2 cases (1%).

Conclusions: With APAD, the success of identifying the epidural space was very high, with reliable successful anesthesia, and low incidence of accidental dural tap, giving a promising alternative to the use of conventional techniques. APAD is a novel device that may help to improve the quality of epidural anesthesia and decrease complications rate and it deserves more studies.

ESRA1-0814
Central Nerve Blocks
POST DURAL PUNCTURE HEADACHE AFTER SPINAL ANAESTHESIA - 2 YEARS REVISION IN AN AMBULATORY SURGERY UNIT
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Background and aims: Post dural puncture headache (PDPH) is a known spinal anaesthesia (SA) complication.

Our Ambulatory Surgery Unit (ASU) created a protocol in 2012 for patients with headache detected in a call made 24h postoperatively. According to severity/disability degree recommendations are given to the patient: home treatment or referral for urgent consultation in Postoperative Pain Unit /Emergency Service (ES).

The aim of this study was to analyse the post-SA headache of patients operated in our ASU between 01/02/2012-31/12/2013, and verify the safety of this anaesthetic technique in AS.

Methods: We searched the 24h Postoperatively Call, Postoperative Pain Consultation and ES databases in order to select among all patients operated between 01/02/2012-12/31/2013 at ASU under SA those with PDPH.

We determined the SA prevalence and PDPH incidence by specialty and stratification (mild/moderate/severe headache). The PDPH population was also characterized as the ASA classification, age and gender.

ESRA1-0709
Chronic Pain Management
TREATMENT OF ATHLETIC PUBALGIA WITH PULSED RADIO FREQUENCY (PRF)
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Background and aims: Pulsed Radiofrequency (PRF) has been described as a successful method for treating groin pain. The genitofemoral nerve can be approached under ultrasound guidance. At the present our technique has not yet been described.

The aim of this study is to assess the short-medium term effectiveness of PRF in the treatment of pubalgia in athletes.

Methods: The sample consisted of 25 athletes (4 professional; 21 semiprofessional) suffering from recurrent groin pain. All patients were subjected to Pulsed Radiofrequency on the genito-femoral nerve before entering the fasciulcus (with administration of 1200 doses at 200mA for 20 ms at a temperature not exceeding 42 °C) using a US-guided 22 G 50 mm needle-electrode. The end result was evaluated on the basis of the reduction in subjective pain symptoms (Visual Analogue Scale) and the recovery time to usual sport activities.
Conclusions: In our experience, PRF has demonstrated good efficacy (92%) in the symptomatic treatment of athletic pubalgia, in the face of very low incidence of side effects (4% mild, 0% severe) and the chance to repeat the treatment in case of relapse.

ESRA-0729
Chronic Pain Management

CANCER PAIN THERAPY WITH A FIXED COMBINATION OF PROLONGED-RELEASE OXYCODONE/NALOXONE: A REAL-LIFE SCENARIO

Amato F.1, Centi S.2, Vellucci R.3, Palmieri V.4, Magaldi D.5, Notaro P.6, Consoletti L.1, Nameli S.5, Marcassa C.1 Anesthesiology, Ospedale Mariano Santo, Cosenza, Italy; 1Oncology, Ospedale Mariano Santo, Cosenza, Italy; 1Anesthesiology, Azienda Ospedaliera Careggi, Firenze, Italy; 1Anesthesiology, Azienda Ospedaliera Benevento, Benevento, Italy; 1Anesthesiology, Azienda Ospedaliera Piove Di Sacco, Padova, Italy; 3Anesthesiology, Azienda Ospedaliera Niguarda, Milano, Italy; 1Anesthesiology, Azienda Ospedaliera Universitaria Ospedali Riuniti, Foggia, Italy; 6Anesthesiology, Azienda Ospedaliera Cagliari, Cagliari, Italy; 7Anesthesiology, Fondazione Maugeri di Varese, Novara, Italy.

Background and aims: Strong opioids, including oxycodone, are the most effective analgesics for moderate to severe cancer pain, but opioid-induced bowel dysfunction remains a relevant issue. A fixed-dose combination of prolonged-release oxycodone and naloxone has been developed to address the challenge of opioid-induced bowel dysfunction in chronic pain management, but data are still scant on the effectiveness of OXN-PR in a ‘real-life’ oncologic setting. We report the preliminary data of a prospective multicenter observation evaluating the effectiveness and safety of OXN-PR in patients with cancer pain.

Results: Within our sample 23 athletes reported a score less than or equal to 2 on the VAS 4 days after treatment and 20 a score less than or equal to 2.5 months after treatment, with full resumption of sporting activity. In one patient, PRF was interrupted due to the onset of vagal reaction, while in another patient was repeated for three times. Only one patient with ‘sports hernia’ was latersubjected to surgery.

Conclusions: In this ongoing 60-day observational study, consecutive outpatients with advanced cancer and moderate-to-severe chronic cancer pain despite other WHO 1-3 drugs or side effects limiting patients’ compliance are rotated to OXN-PR with starting dosages according to previous opioid use. Recorded variables include pain intensity and related functional impairment as a measure of quality of life (QoL), episodes of BTCP, patient-reported bowel function (Bowel Function Index), and other side effects.

Results: Of 173 pts who were prescribed PR-OXN at entry (age: 65.3 ±12 years, 59.4% male), 129 (74.5%) had severe pain (NRS scale ≥7) and 24 (13.8%) were opioid-naïve; metastases were present in 136 (78.6%). After starting OXN-PR, the analgesic benefit was fast and relevant: pain intensity reduction >30% from baseline was reported at T30 by 131 (75.7%) pts; overall, pain decreased considerably (NRS from 7.2±1.8 at baseline to 3.6±1.9 at T60, p <0.0001), and prevalence of BTCP abated (from 47.3% at baseline vs 30.4% at T60; OR 0.48, 95% CI 0.30-0.78 p <0.05), as well as number of daily episodes (from 4.9 ±2.0 to 2.3 ±1.1, p<0.001). Pain-related functional impairment improved consistently across all 7 domains (global score 51.6±13.1 at baseline vs 28±18.6 at T60, p<0.0001), indicating a substantial improve-ment in Qol. OXN-PR mean daily dosage gradually increased from 44.3 ±28.9 mg at entry to 62.9 ± 32.9 at T60 (P <0.0001). Improved analgesia was paralleled by a significant reduction of opioid-induced bowel dysfunction: BFI decreased from 66.8±27.3 at baseline to 38.5±24.1 at T60 (p<0.0001) representing a relevant improvement. 135 patients (78%) completed the 60-day study period and 33 other did not due to severe disease progression without exitus (n. 20, 11.5%), early OXN-PR discontinuation for uncontrolled pain (n. 5, 2.9%) or adverse effects (n. 8, 4.6%); 3 pts were lost at final follow-up. Rotation to OXN-PR did not affect overall or individual rates of side effects typically related to opioids (from 60.6% at baseline vs 59.8% at T60, p=NS).

Conclusions: OXN-PR provided fast and effective analgesia with improved Qol and minimization of bowel dysfunction, and was well tolerated. These data extend our knowledge on effectiveness and tolerability of opioid agonist/antagonist combination therapy to patients with advanced cancer under real-life conditions.

ESRA-0736
Chronic Pain Management

EFFECT OF STATIN USE ON LOW BACK PAIN STEROID INJECTIONS

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Background and aims: Recent reports have revealed immunomodulatory and anti-inflammatory activities for statins in vivo and in vitro. The impact of statin use on response to epidural steroid injections remains unknown and may well increase the effect considering the substantial anti-inflammatory properties. We thus tested the primary hypothesis that patients taking statins before and after the procedure will have lower VAS scores compared to patients not on statins. Secondarily we tested the hypothesis that statin users will have improved quality of life.

Methods: With the approval of the Institutional Review Board of Adnan Menderes University in Aydin, Turkey, a retrospective study was performed by retrieving inpatient medical records of patients coming to the Algology Department with complaints of low back pain and scheduled to receive TAEIS over the period April 2012- December 2013 were included in this prospective double blinded study.

300 patients having transforminal epidural steroid injection were divided into groups: Group 1: With statin (n = 40) and Group 2: Without
Demographic parameters were similar between groups. Our primary result demonstrated that statin users had lower VAS scores at 1st month when compared to non-statin users (p=0.002, Bonferroni corrected). There was no difference in any other measurement time in VAS scores between groups. When quality of life was evaluated there was no difference at any measurement times in any of SF 36 scores between statin users and non-users.

Results: Demographic parameters were similar between groups. Our primary result demonstrated that statin users had lower VAS scores at 1st month when compared to non-statin users (p=0.002, Bonferroni corrected). There was no difference in any other measurement time in VAS scores between groups. When quality of life was evaluated there was no difference at any measurement times in any of SF 36 scores between statin users and non-users.

Conclusions: This is the first clinical study evaluating effect of statins on pain. In summary, statin users showed a potentially important decrease in first month pain scores after TAESI. This result is consistent with animal studies on neurogenic pain. Additional prospective studies with larger sample size in which patients are stratified to different statins and dosing is needed to determine the magnitude of this effect.

ESRA1-0743
Chronic Pain Management
HIGH DOSAGE OF A FIXED COMBINATION OXYCODONE/NALOXONE: EFFICACY AND TOLERABILITY IN PATIENT WITH CHRONIC CANCER
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Background and aims: The treatment of moderate-to-severe chronic cancer pain with opioids is often associated with central and gastrointestinal side effects, leading to dose reduction or discontinuation or rotation to another drug, thus resulting in inadequate pain control. Oral therapy with the a fixed combination of opioid agonist-antagonist such as prolonged-release oxycodone / naloxone (OXN-PR) strongly attenuates gastrointestinal side effects; results after high doses of OXN-PR treatment are scant. Aim of the study was to evaluate efficacy and tolerability of higher dose (>80 mg daily) of OXN-PR in patients with cancer pain.

Methods: The national society Federodore is running a multicenter observational study in Italy on consecutive patients with advanced cancer and uncontrolled moderate-to-severe pain or intolerant to analgesic treatment. Among the enrolled patients, subjects rotated at entry (T0) to OXN-PR ≥ 80 mg daily were selected for this study. All patients were prospectively evaluated after 15, 30, 45 and 60 days (T15-T60). The primary end point was the analgesic response rate (Responders: patients who achieved at T30 visit a decrease of pain intensity (NRS) ≥ 30% compared to T0; expected rate >70%). Other end-points were: decrease of pain intensity (and impact of pain on daily life (BPI-SF 7 items), bowel dysfunction (Bowel Function Index, BFI) and other side effects over the 60-day observation.

Results: Out of 173 patients enrolled in the general study, 50 pts at T0 were prescribed OXN-PR ≥ 80 mg daily (mean age 62.1 ± 12.3 years, 77% males; metastatic disease in 88%). At T0, the pain was severe (NRS ≥ 7) in 42 (84%) and moderate (NRS 4–6) in other 18 (16%) patients; 5 (10%) patients were opioid-naive, the remaining 45 (90%) already treated with other WHO 2-3 opioids; 18 patients (36%) were taking ROO for BTCP management. 42/50 (84%) patients completed the 60-day observation and 8 (16%) discontinued prematurely OXN-PR (exitus, n. 2; severe disease progression, n.3; lack of analgesic efficacy, n. 3). At T30, the Responders were 37 (74%); overall, OXN-PR resulted in a significant reduction in pain over time (NRS: from 7.4 ± 1.8 at T0 to 3.6 ± 2.4 at T60, p = 0.009), and the number of daily BTCP episodes declined (1.5 ± 2.2 at T0 vs 0.4 ± 0.8 at T60, p < 0.05). The daily dosage of OXN-PR increased only slightly during the 60-day observation (83.1 ± 13 at T0 vs. 88.6 ± 30 mg at T60, NS). The impact of pain on daily life abated (BPI-SF from 7.8 ± 1.6 to 4.0 ± 2.3 at T60, P 0.005). The analgesic efficacy did not aggravate bowel function, on the contrary BFI markedly improved (from 7.8 ± 1.6 at T0 to 5.9 ± 2.3 at T60, P < 0.001). The number of patients who complained for other side effects typical of opioids did not change over time (confusion 19% at T0 vs 19% at T60; nausea/vomiting 33% vs 13%; itching 10% vs 4%; dry mouth 27% vs 13%; tremor 15% vs 8%; dizziness 29% vs 12% (all: NS); diarrhea was unchanged (8% baseline vs 6% at T60).

Conclusions: In patients with advanced cancer and moderate-to-severe pain, the combination OXN-PR was highly effective and well tolerated even at high doses, alleviating pain and its impact on life style, reducing the number of BTCP with minimization of bowel dysfunction.

ESRA1-0746
Chronic Pain Management
CANCER PAIN THERAPY WITH A FIXED COMBINATION OF PROLONGED-RELEASE OXYCODONE/NALOXONE: A REAL-LIFE SCENARIO
Amato F.1, Ceniti S.2, Palmieri V.3, Vellucci R.4, Consoletti L.5, Magaldi D.6, Notaro P.2, Mameli S.1, Marcassa C.1 1Oncology, Ospedale Mariano Santo, Cosenza, Italy, 2Oncologia, Ospedale Mariano Santo, Cosenza, Italy, 3Anesthesia, Azienda Ospedaliera di Careggi, Firenze, Italy, 4Anesthesiology, Azienda Ospedaliero Universitaria Ospedali Riuniti, Foggia, Italy, 5Anesthesiology, Azienda Ospedaliera di Cagliari, Cagliari, Italy, 6Anesthesiology, Azienda Ospedaliera di Benevento, Benevento, Italy, 7Anesthesiology, Azienda Ospedaliero Universitaria Ospedali Riuniti, Foggia, Italy, 8Anesthesiology, Azienda Ospedaliera di Benevento, Benevento, Italy, 9Anesthesiology, Azienda Ospedaliero Universitaria Ospedali Riuniti, Foggia, Italy, 10Anesthesiology, Azienda Ospedaliera di Cagliari, Cagliari, Italy, 11Anesthesiology, Fondazione Maugeri IRCCS Verano, Novara, Italy, 12Anesthesiology, Azienda Ospedaliera di Novara, Milano, Italy.

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**Background and aims:** Strong opioids, including oxycodone, are the most effective analgesics for moderate to severe cancer pain, but opioid-induced bowel dysfunction remains a relevant issue. A fixed-dose combination of prolonged-release oxycodone and naloxone (OXN-PR) has been developed to address the challenge of opioid-induced bowel dysfunction in chronic pain management, but data are still scant on the effectiveness of OXN-PR in a ‘real-life’ oncologic setting. We report the preliminary data of a prospective multicenter observation evaluating the effectiveness and safety of OXN-PR in patients with cancer pain.

**Methods:** In this ongoing 60-day observational study, consecutive outpatients with advanced cancer and moderate-to-severe chronic cancer pain despite other WHO 1–3 drugs or side effects limiting patient compliance are rotated to OXN-PR with starting dosages according to previous opioid use. Recorded variables include pain intensity and related functional impairment as a measure of quality of life (QoL), episodes of BTP, patient-reported bowel function (Bowel Function Index), and other side effects.

**Results:** Of 173 pts who were prescribed PR-OXN at entry (age: 65.3 ±12 years, 59.4% male), 129 (74.5%) had severe pain (NRS scale ≥7) and 24 (13.8%) were opioid-naïve; metastases were present in 136 (78.6%). After starting OXN-PR, the analgesic benefit was fast and relevant: pain intensity reduction >30% from baseline was reported at T30 by 131 (75.7%) pts; overall, pain decreased considerably (NRS from 7.2±1.8 at baseline to 3.6±1.9 at T60, p<0.0001), and prevalence of BTP abated (from 47.3% at baseline vs 30.4% at T60; OR 0.48, 95% CI 0.30-0.78 p<0.05), as well as number of daily episodes (from 4.9±2.0 to 2.3±1.1, p<0.001). Pain-related functional impairment improved consistently across all 7 domains (global score 51.6±13.1 at baseline vs 28±18.6 at T60, p=0.0001), indicating a substantial improvement in QoL. OXN-PR mean daily dosage gradually increased from 44.3 ±28.9 mg at entry to 62.9 ±32.9 at T60 (p<0.001). Improved analgesia was paralleled by a significant reduction of opioid-induced bowel dysfunction: BFI decreased from 66.8±27.3 at baseline to 38.5±24.1 at T60 (p<0.0001) representing a relevant improvement. 135 patients (78%) completed the 60-day study period and 32 other did not due to severe disease progression with or without relapses (n. 20, 11.5%), early OXN-PR discontinuation for uncontrolled pain (n. 5, 2.9%) or adverse effects (n. 8, 4.6%); 3 pts were lost at final follow-up. Rotation to OXN-PR did not affect overall or individual rates of side effects typically related to opioids (from 66.6% at baseline to 59.8% at T60, p=NS).

**Conclusions:** OXN-PR provided fast and effective analgesia with improved QoL and minimization of bowel dysfunction, and was well tolerated. These data extend our knowledge on effectiveness and tolerability of opioid agonist/antagonist combination therapy to patients with advanced cancer under real-life conditions.

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**ESRA-0749**

Chronic Pain Management

**INTRANASAL FENTANYL FOR THE MANAGEMENT OF BREAKTHROUGH PAIN IN ADULTS WITH CHRONIC NONCANCER PAIN, RESULTS IN A SERIES OF FIVE PATIENTS**

De la Cruz García-Dihinx L.1, Villanueva Pérez V.L.1, Minguez Martí A.1, Hernández Cádiz M.J.1, Morales Sarabia J.1, Saiz Ruiz C.1, Vergara Sanchez A.1, Martínez Martínez W.1, González López L.1, De Andrés Ibáñez J.1. 1Department of Anesthesiology, Intensive-Care Medicine and Pain Therapy, University General Hospital of Valencia, Valencia, Spain.

**Background and aims:** PecFent is indicated for the management of breakthrough pain (BTP) in adults who are already receiving maintenance opioid therapy for chronic cancer pain. BTP is highly prevalent and varied in opioid-treated patients with chronic noncancer pain and this series of cases intends to propose an alternative treatment for managing this type of pain.

**Methods:** Five patients with breakthrough chronic noncancer pain triggered on mastication who were already receiving maintenance opioid therapy were included in this series of cases and were given PecFent® 100μg sprayed in one only dose before meals.

Case 1: A 59-year-old man diagnosed of trigeminal neuralgia with normal MRI and mandibular CAT-SCAN on many medications but without pain control who had received radiofrequency without any improvement.

Case 2: A 67-year-old man with Ramsay-Hunt’s syndrome whose basal pain was controlled but with piercing acute episodes related to the mastication that were not controlled by opiates of rapid onset action or could not be tolerated due to its side effects.

Case 3: A 45-year-old woman referred by the stomatology department for facial atypical pain that did not improve with the use of a splint and for which 4 pieces had been extracted without any pain improvement that appeared only when chewing.

Case 4: A 45-year-old male diagnosed with Wegener-granulomatose that affected both the high respiratory tract and ear who developed focal left paralysis with intense pain attacks triggered by mastication.

Case 5: A 58-year-old woman with right hemifacial pain, tearing, metallic flavor, lacrimation and acute episodes of pain with mastication secondarily to radiotherapy received for an acoustic neurinoma in remission. The electromogram revealed hyperserectability of the facial right nerve.

**Results:** In all subjects there was an improvement from EVA 9–10 to EVA 1–3 that allowed the patients to eat normally and without any adverse events.

PecFent proved to be useful in these cases where BTP was triggered by mastication.

PecFent was chosen due to its fast onset of action, route of administration different from the oral route that could alter the perception of flavors improving the overall pain control perception in non-cancer patients.

**Conclusions:** Intrasinal fentanyl can be a well-tolerated alternative for the management of BTP in adults with chronic noncancer pain receiving maintenance opioid therapy.

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**ESRA-0756**

Chronic Pain Management

**ULTRA-SOUND GUIDED RADIOFREQUENCY ABLATION OF MORTON’S NEUROMA: PRELIMINARY RESULTS**

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**Background and aims:** PecFent is indicated for the management of breakthrough pain (BTP) in adults who are already receiving maintenance opioid therapy for chronic cancer pain. BTP is highly prevalent and varied in opioid-treated patients with chronic noncancer pain and this series of cases intends to propose an alternative treatment for managing this type of pain.

**Methods:** Five patients with breakthrough chronic noncancer pain triggered on mastication who were already receiving maintenance opioid therapy were included in this series of cases and were given PecFent® 100μg sprayed in one only dose before meals.

Case 1: A 59-year-old man diagnosed of trigeminal neuralgia with normal MRI and mandibular CAT-SCAN on many medications but without pain control who had received radiofrequency without any improvement.

Case 2: A 67-year-old man with Ramsay-Hunt’s syndrome whose basal pain was controlled but with piercing acute episodes related to the mastication that were not controlled by opiates of rapid onset action or could not be tolerated due to its side effects.

Case 3: A 45-year-old woman referred by the stomatology department for facial atypical pain that did not improve with the use of a splint and for which 4 pieces had been extracted without any pain improvement that appeared only when chewing.

Case 4: A 45-year-old male diagnosed with Wegener-granulomatose that affected both the high respiratory tract and ear who developed focal left paralysis with intense pain attacks triggered by mastication.

Case 5: A 58-year-old woman with right hemifacial pain, tearing, metallic flavor, lacrimation and acute episodes of pain with mastication secondarily to radiotherapy received for an acoustic neurinoma in remission. The electromogram revealed hyperserectability of the facial right nerve.

**Results:** In all subjects there was an improvement from EVA 9–10 to EVA 1–3 that allowed the patients to eat normally and without any adverse events.

PecFent proved to be useful in these cases where BTP was triggered by mastication.

PecFent was chosen due to its fast onset of action, route of administration different from the oral route that could alter the perception of flavors improving the overall pain control perception in non-cancer patients.

**Conclusions:** Intrasinal fentanyl can be a well-tolerated alternative for the management of BTP in adults with chronic noncancer pain receiving maintenance opioid therapy.
Between January and October 2013, 20 feet of 16 patients were treated, with no post-procedure complications and no need to suspend the treatment. At the end of the procedure (about 15 minutes) patients could immediately walk and go back to their daily activities. In 3 cases it was necessary to repeat the RF treatment. Dysesthesias reported by 75% of patients in the area of the treated nerve regressed on average after 4 weeks. Pre-treatment pain was present in 100% of cases. Based on preliminary data currently available, 75% of patients reported a virtually full reduction of pain after the RF treatment, 16% a very limited reduction, 9% no reduction.

Conclusions: The preliminary study of ultra-sound guided radiofrequency ablation of MN shows a significant regression to disappearance of the pain symptoms. Available data on the duration of the treatment efficacy show a good short-medium term outcome (1–3 months) and are encouraging on the medium-long term (6 months), while we are waiting for the completion of the follow-up.

ESRA1-0760 Chronic Pain Management

**OCCIPITAL NERVE STIMULATION (ONS): EFFICACY, SAFETY AND TOLERABILITY IN PATIENTS WITH INTRACTABLE CHRONIC MIGRAINE IN OUR EXPERIENCE**

Amato F, Lacquaniti G. 

**Background and aims:** Chronic migraine (CM) affects 1.4-2.2% of people worldwide and about 2% is not responder to pharmacological therapies. Aim of this study is to evaluate the safety and the efficacy of the occipital nerve stimulation (ONS) as a treatment for CM refractory to pharmacological therapy.

**Methods:** Five patients underwent to ONS between 2012 and 2014. All patients affected by refractory CM and met inclusion criteria for an implant of the permanent impulse generator are included. All participants gave their informed consent before undergoing to implant: the percutaneous lead was inserted through a Tuohy needle, according the Seldinger technique and under fluoroscopy control, in local anesthesia. The correct paresthesia coverage of the painful area was tested intrapatiently. Then the subcutaneous lead was connected to an external stimulator. The stimulation test lasted for about 20 days to assess the real compliance of the patient in managing the stimulation and the device. In the second stage, the permanent impulse generator is connected with the previously placed lead.

**Results:** All patients assessed at 3 and 6 months after the implant showed a decrease in headache days = 36%, an improvement in the quality of life >60%, a patient’s satisfaction = 100%. Moreover, 80% of treated patients did not use pharmacological drugs for migraine. No adverse events occurred.

**Conclusions:** ONS seems to be an effective, safe and well-tolerated minimally invasive treatment for refractory CM.

ESRA1-0764 Chronic Pain Management

**OUR EXPERIENCE IN TREATMENT OF LOW BACK PAIN IN KUWAIT**

Velickovic K, Abotuhain A, All Mula A, Vaa N. 

**Background and aims:** Among the multiple non-surgeon modalities, epidural injection is one of the most common utilized treatment modalities in managing chronic low back and low extremity pain due to disc herniation and irradiation of the pain. Typically epidural injections are performed in operation theaters by anesthesiologist in our hospital. The most common methods are interlaminar and translaminar injections.

**Methods:** All procedures are done in prone position with standard monitoring (ECG, BP, SpO2, PC02). Mixture of 2ml 0,5% bupivacaine and 80 mg Solumedrol, has been given by touchy needle, fluoroscopy guided and confirmed with 1ml of contrast.

Results: This is a daily protocol, duration approximately 15-30min duration. Follow and check-up was performed by phone and after 2 weeks patients have been reviewed and advice was given about other steps in treatment.

**Conclusions:** Epidural injection are generally safe and post procedural complications are uncommon.

Quick pain relief and improving in quality of daily activities of the patients are true benefit.

Reducing the number of hospital days include an economy aspect, too.

ESRA1-0768 Chronic Pain Management

**PULSED RADIOFREQUENCY OF SPHENOPALATINE GANGLION: CLINICAL EVALUATION**

Brunete T, Nieto C, Garcia del Valle S, Molina R, Martínez P. 

**Background and aims:** Pulsed Radiofrequency of the sphenopalatine ganglion (PRF-SPG) has been used in the treatment of various pain syndromes as headache, trigeminal neuralgia and atypical facial pain when they failed to respond to more conservative treatments.

In our center we have developed clinical guidelines to perform this procedure and improve our clinical practice and enhance patient safety.

The purpose of this study is to evaluate the results achieved after the implementation of the guidelines.

We performed a six month follow-up study. All patients subject to PRF-SPG were included.

Primary efficacy measures were: reduction in medication, pain relief, EVA and quality of life (SVF36). Secondary objective: incidence of complications. Data were derived from phone conversations and clinical follow-up visits.

**Methods:** We performed a six month follow-up study. All patients subject to PRF-SPG were included.

Primary efficacy measures were: reduction in medication, pain relief, EVA and quality of life (SVF36). Secondary objective: incidence of complications. Data were derived from phone conversations and clinical follow-up visits.

**Results:** Eight patients were included. Three had atypical facial pain, three had trigeminal neuralgia and two had chronic headache. All of them had a basal EVA >8.

Three patients reported no pain relief, three complete pain relief for six months and two mild-moderate pain relief for three-four months.

We have found that difference between basal and six months EVA to be statistically significant in patients receiving PRF-SPG.

All patients with complete response improved their quality of life and reduced their treatment for six months. Patients with moderate pain relief reduced their treatment for 3–4 months.

Any patient developed complications

**Conclusions:** Despite of our limited experience, PRF-SPG seems to be a rewarding and safe intervention in the treatment of this pain disorders.

Further trials are needed to confirm our results in bigger populations.

ESRA1-0769 Chronic Pain Management

**COMPLEX REGIONAL PAIN SYNDROME TYPE I – MULTIDISCIPLINARY TEAM APPROACH IS ESSENTIAL**

Serrano S, Semedo E, Pereira P, Valentim A. 

**Background and aims:** Complex regional pain syndrome (CRPS) reflects an abnormal activity of the CNS, PNS, sympathetic nervous system and immune system, conditioning major functional loss and psychosocial dysfunction. Because of the syndrome complexity, a correct management requires a multidisciplinary team approach. Authors aim to demonstrate this aspect describing a clinical case.
The data was collected from patient's clinical file.

Methods: The data was collected from patient's clinical file.

Results: 27-year-old woman, architect, referred to Chronic Pain Unit because of progressive, uncontrollable neuropathic pain at upper right extremity, particularly in the last four months, associated with motor, sensitive, sudomotor dysfunction and severe functional impairments. Pain severity was reported to be 7/10, in average. Function loss was evident with a 'nugent-like' dysfunction of the right extremity. Complementary exams excluded cervical radiculopathy, outlet syndrome and peripheral neuropathies. A psychiatric evaluation was performed and cognitive behavioral therapy was considered. Due to the poor results with standard pharmacologic treatment, a trial of bisphosphonate therapy was started. An ultrasound-guided stellate ganglion block was performed resulting in a decrease of VAS score from 7 to 3, with short relief. Therefore, a continuous interscalene brachial plexus block was performed to allow a daily rehabilitation program. Noticeable improvements were noticed shortly, with increased range of motion and pain relief.

Conclusions: CRPS remains a challenging condition to diagnose and treat. There is no efficient single therapy approach. Regional analgesia is suitable in pain relief allowing an effective rehabilitation program. Patients with complex disabling CRPS should have access to specialist interdisciplinary team. Fully long-term ongoing support is required.

ESRA1-0770
Chronic Pain Management
PULSED RADIOFREQUENCY OF SPHENOPALATINE GANGLION: CLINICAL EVALUATION
Brunete T1, Nieto C1, Garcia del Valle S1, Molina R1, Martinez P1
1Anesthesia, Hospital Universitario Fundación Alcorcón, Madrid, Spain.

Background and aims: Pulsed Radiofrequency of the sphenopalatine ganglion (PRF-SPG) has been used in the treatment of various pain syndromes like headache, trigeminal neuralgia and atypical facial pain when they failed to respond to more conservative treatments.

In our center we have developed clinical guidelines to perform this procedure and improve our clinical practice and enhance patient safety.

The purpose of this study is to evaluate the results achieved after the implementation of the guidelines.

Methods: We performed a six month follow-up study. All patients subject to PRF-SPG were included.

Primary efficacy measures were: reduction in medication, pain relief, EVA and quality of life (SF36). Secondary objective: incidence of complications.

Data were derived from phone conversations and clinical follow-up visits.

Results: Eight patients were included. Three had atypical facial pain, three had trigeminal neuralgia and two had chronic headache. All of them had a basal EVA >8.

Three patients reported no pain relief, three complete pain relief for six months and two mild-moderate pain relief for three-four months.

We have found that difference between basal and six months EVA to be statistically significant in patients receiving PRF-SPG.

All patients with complete response improved their quality of life and reduced their treatment for six months. Patients with moderate pain relief reduced their treatment for 3-4 months.

Any patient developed complications.

Conclusions: Despite of our limited experience, PRF-SPG seems to be a rewarding and safe intervention in the treatment of this pain disorders.

Further trials are needed to confirm our results in bigger populations.

ESRA1-0779
Chronic Pain Management
SPINAL IRRITATION FOLLOWING EPIDURAL STEROID INJECTION
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Background and aims: Accidental intrathecal steroid injection during epidural steroid treatment might cause cauda equina syndrome and neural toxicity(1). In this case, we discussed the patient with myoclonic spasm and twitch due to spinal irritation following accidental intrathecal steroid injection.

Methods: 73 year old woman presented with radicular pain on the left leg. Physical examination revealed L4-5 dermatomal hyposthesia and motor deficit. Epidural steroid injection was decided and epidural space was confirmed with 0.5 mL contrast material before injection of 16 mg dexamethasone+60 mg lidocaine in 10 mL solution. However the control scopy images didn’t demonstrate spread of contrast material. After 30 minutes of injection, painful spinal irritation symptoms like myoclonic spasm and twitch movements occurred in patient legs. IV 2 mg midazolam reduced the frequency and intensity of the symptoms but symptoms occurred after a meanwhile. 0.25 mg clonazepam drop was started and symptoms reduced for 2 hours. Thereby 0.5 mg oral clonazepam was added to the therapy. Cranio-spinal MRI was normal. Symptoms were completely resolved after 4th hour of medication and the medical treatment was proceeded for 24 hours.

Results: The scopy images was consulted with radiology and the contrast material which was not spread following injection was suspected to be in the intrathecal space. The patient was discharged after neurologic examination and absence of both neurologic symptoms and pain.

Conclusions: During epidural spread injection, the spread of contrast material in the epidural space is an important marker of the correct localization. However, contrast material which is isobaric as spinal fluid don’t spread in intrathecal space. The epidural space should be confirmed with saline injection after contrast material and the spread of the contrast through the epidural space should be identified with scopy images before steroid injection to prevent the occurrence of spinal irritation.
We compared RF ablation with MTEE and Cosman cannula. Cases An eight-week pregnant woman, who was submitted to bilateral month and a year after RF. We also took into consideration sec-

ESRA1-0783
Chronic Pain Management

ULTRASONOGRAPHIC EVIDENCE AND CLINICAL RESULTS OF CATHETER INSERTION TECHNIQUE ON THE PAINFUL MYOFASCIAL AREA

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Background and aims: Fibromyalgia is a neuropathic syndrome with painful myofascial areas. The recommended treatment includes amitriptiline, trigger point injection, massage, TENS, behavioral therapy(1). In this case we dis-
cussed the insertion of catheter instead of repeating injections on the painful myofascial areas and investigated the tissue alterations by ultrasound after the therapy and determined the clinical results.

Methods: 42 years old female patient who had continuous burning back pain radiating to neck and arm had NRS of 8. Massage, warm and physiotherapy re-
solved the symptoms for short intervals whereas intensity of symptoms were raised with stress. Physical examination demonstrated sensitivity on right scap-
ular areas and palpation of fibrous bands. Ultrasonographic examination was performed to calculate the size of the fibrous bands and the blood flow rate of the painful area. After local anesthetic infiltration 18 gauge Touhy needle was inserted through the fibrous tissue, catheter was advanced while the needle was withdrawn. 20 mg tenoxicam and 100 mg lidocain in 10 mL saline solution was prepared and 1 mL of the solution was injected through the catheter. The treatment protocol was designed as 4x1 mL for 3 days. Patient was reevaluated by ultrasonography after 1 week of catheter removal. NRS was 4 and ultrasono-
graphy results demonstrated that the anterior- posterior diameter of the supraspinatus muscle measured at the 5th cm of the muscle tendon was 13 mm and regressed to 10 mm following the treatment. The control measurement at the left site was 9 mm before and after the treatment. Blood flow measure-
ments did not changed due to the treatment protocol. Amitriptiline 10 mg was used for the treatment maintenance.

Results: Physical examination demonstrated sensitivity on right scapular areas and palpation of fibrous bands. Ultrasonographic examination was performed to calculate the size of the fibrous bands and the blood flow rate of the painful area. After local anesthetic infiltration 18 gauge Touhy needle was inserted through the fibrous tissue, catheter was advanced while the needle was withdrawn. 20 mg tenoxicam and 100 mg lidocain in 10 mL sal-
ine solution was prepared and 1 mL of the solution was injected through the catheter. The treatment protocol was designed as 4x1 mL for 3 days. Patient was reevaluated by ultrasonography after 1 week of catheter removal. NRS was 4 and ultrasonography results demonstrated that the anterior- posterior diameter of the supraspinatus muscle measured at the 5th cm of the muscle tendon was 13 mm and regressed to 10 mm following the treatment. The control measurement at the left site was 9 mm before and after the treat-
mend. Blood flow measurements did not changed due to the treatment proto-
col. Amitriptiline 10 mg was used for the treatment maintenance.

Conclusions: We thought that catheter insertion at the site of myofascial pain-
ful areas in fibromyalgia and intermittent bolus injections through the catheter improved morphological tissue alterations with clinical outcome.

ESRA1-0788
Chronic Pain Management

PARAVERTEBRAL BLOCK IN A PREGNANT WOMAN TO MANAGE THORACIC PAIN AFTER THORACIC SYMPATHECTOMY

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Background and aims: Analgesia management during pregnancy is stressful and frequently neglected due to the possible teratogenic effects caused by the medication. We herein report a case of thoracic paravertebral block (TPB) in a pregnant woman to mitigate a disabling pain after thoracic sympathectomy.

Methods: An eight-week pregnant woman, who was submitted to bilateral thoracoscopic sympathectomy for palmar hyperhidrosis, developed an incapacitat-
ing pain after surgery. She was taking acetaminophen, metamizole and gabapentin, withdrawing the last two after acknowledging she was pregnant. She came to us with neuropathic pain [visual analogue scale (VAS) max=9; mean=7].

Results: Two TPB were performed, in the first procedure a loss of resistance technique was used (T5-T7), and in the second ultrasound guidance (T7). The local anaesthetic used was ropivacaine 0.2%, 3ml for each level in the for-
mer procedure and 10 ml in the latter. After the first intervention, a significant relief of her pain was documented (from 9 to 4 in the VAS), and afterwards oral acetaminophen was used only occasionally. Three months later the patient returned again with pain complaints (VAS 6) after a strenuous physical exertion. Since the second intervention the patient reports a great improvement in her quality of life, with minimal pain, and without daily medication requirements. To the best of our knowledge this is the first report of a TPB on a pregnant woman to treat neuropathic thoracic pain.

Conclusions: TPB is an efficacious method on thoracic pain management dur-
ing pregnancy. Clinical judgment, assessment of the risks/benefits for the indi-
vidual patient, and careful follow-up are needed.

ESRA1-0789
Chronic Pain Management

VISUALIZATION AND MEASUREMENT OF RADIOFREQUENCY LESIONS BY HIGH RESOLUTION ULTRASOUND IN A TISSUE MODEL IS FEASIBLE AND ACCURATE

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Background and aims: The application of radiofrequency (RF) is a well-
established technique to treat facet joint mediated pain. Cannula gauge, tip length, set temperature and lesion time affect width and length of RF heat le-
sions. Fluoroscopy guidance has been considered mandatory to ensure place-
ment of the active tip of the cannula close to the medial branch. However, it can neither visualize the target nerve nor lesion size and is relying on bony land-
marks alone. Recently, Ultrasound (US) was introduced as a new possibility for RF cannula guidance but there are no reports about sonographic localization of lesion, which could further improve clinical success.

Methods: 18 RF heat lesions were produced by a TherMedico NK1 RF-gener-
ator with different cannula tip sizes (18 gauge and 20 gauge), set temperatures and lesion times (60 seconds/ 70 °C, 90 seconds/ 80 °C, 180 seconds/90 °C ) at several levels of depth (1cm, 2cm and 3cm) with a 30°C needle-angle in a tis-
sue model (turkey-breast). US images were recorded with the cannula in-plane, lesion size was calculated sonographically and correlated (Pearson correlation coefficient r) to actual lesion dimension measured at tissue surface.

Results: All 18RF lesions could clearly be visualized and measured by US at a depth of 1-3cm from the surface. Their length and width were in the range of 5-11.5mm resp. 2-5.5mm. Sonographic measurements strongly correlated to actual lesion sizes (r=0.97 at 3cm, 0.91 at 2cm, 0.9 at 1cm;<0.9).

Conclusions: This is the first report of RF lesion visualization by US. In the tissue model US proved feasible and highly accurate to localize and measure lesion size, which could clinically help to improve RF success in the future. In vivo studies now should follow to further evaluate our promising results.
ESRA Abstracts
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ESRA1-0794
Chronic Pain Management

SPHENOPALATINE GANGLION BLOCK AS A TREATMENT FOR TRIGEMINAL NEURALGIA IN A PATIENT WITH A MEDICAL HISTORY OF MULTIPLE SCLEROSIS

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Background and aims: A 52 year old male, with a known history of MS for 20 years was referred to our pain clinic by our hospitals' neurologist, stating acute facial pain located along the distribution of the trigeminal nerve (especially the 2nd and the 3rd branch). The patient has been paraplegic for the last 15 years and his condition is deteriorating. As a therapy for his neuralgia he received conservative medical treatment. During physical examination it was observed that the patient suffered from severe dysesthesia located at the right cheek, the lateral nasal surface as well as the right maxillary and mandibular area. The patient suffered from incapacitating pain (numeric rating pain score 8-10/10 at rest and 9/10 during mastication or speech). The pain was repetitive and its duration varied from a few seconds to several minutes. MRI showed lesions compatible with MS but no vascular contact between the inferior cerebral artery and the trigeminal nerve was found. The above finding excluded any neurosurgical intervention aiming at the relief of the patient.

Methods: A localized sphenopalatine ganglion infiltration was performed using 1 amp dexamethasone (8mg) and 6 ml ropivacaine 7.5% (45mg), which resulted in the block of the 2nd and the 3rd branch of the trigeminal nerve. An immediate relief of the symptoms was observed, which lasted for 1 week before the recurrence of the symptoms. Another 2 injections followed, one every 15 days (a total of three injections).

Results: The symptoms remission lasted for a week and following that, the patient complained for acute sharp facial pain. Today, one year later, the patient still suffers (numeric rating pain score 6-7) and receives carbamazepine and gabapentin, while his treatment with duloxetine had to be interrupted due to dizziness.

Conclusions: Trigeminal nerve block using local anesthetics and corticosteroids is a valid method which offers the patient immediate relief. Its duration though can be short in several cases and its use is rather limited to patients with poor prognosis.

ESRA1-0795
Chronic Pain Management

STELLATE GANGLION BLOCKS IN CRPS TYPE I WITH RAYNAUD SYNDROME SYMPTOMATOLOGY

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Background and aims: A 52 year old female, smoker with a known positive history of Raynaud syndrome for the last six years was referred to our pain clinic. The referral was made by the hospital rheumatologist. The symptoms of the patient included hand numbness and pain (numeric rating pain score 7 during activity and 4-5 at rest). The patient had been treated for two years with pregabalin showing poor results. Physical examination: Pale cold fingers, without cutaneous ischemic necrosis foci (ulcers, gangrene) accompanied by reduced sensitivity of the distal phalanges were observed. The symptoms were distributed symmetrically. Telangiectasias coexisted on both palms.

Methods: The patient was treated with stellate ganglion block which was repeated five times during a period of 2 ½ months. Each time 8 ml bupivacaine 0.25% were administered after previously injecting a test dose of 0.5 ml. The block was performed using the common anterior approach. The patient was placed in the supine position with the head and the neck slightly hyperextended and rotated to the opposite side. The infusion took place between the carotid and the cricoïd cartilage. Throughout her treatment up to the 2nd session she additionally received pregabalin. From the 3rd session and onwards pregabalin was interrupted and administration of duloxetine started. Smoking cessation and avoidance of cold water were also recommended as complementary protective measures.

ESRA1-0806
Chronic Pain Management

ULTRASOUND GUIDED PUDENDAL NERVE BLOCK – TREATMENT FOR CHRONIC ORCHIALGIA; CASE REPORT

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Background and aims: Chronic orchialgia is defined as unilateral or bilateral testicular pain, continuous or intermittent, of more than 6 months duration.

Results: A 28 year old gentleman was referred to our pain clinic with a 14 year history of bilateral inguinal pain radiating to his testes and anus, as well as lower back pain. The pain was constant, sharp and burning in nature, 6-8/10 in severity. There is a history of severe depression, anxiety and sexual abuse. He had been-treated for prostatitis. NSAIDs and Gabapentin were unhelpful. Previous transverse abdominis plane block was unsuccessful.

We undertook bilateral ultrasound guided pudendal nerve blocks. Using a curvilinear low frequency (4MHZ) probe, we located the right pudendal artery. Using a medial to lateral in plane approach, a 21g echostim needle and hydrodissection technique was used to visualise the artery and adjacent pudendal nerve. Here, we injected 5ml 0.5% bupivacaine and 40mg depo-medrol. This was repeated on the left.

Results: He experienced almost immediate relief of his perianal burning and testicular pain, and was able to sit for longer periods of time.

Conclusions: Ultrasound guided pudendal nerve block maybe a useful intervention for management of chronic orchialgia.

ESRA1-0613
Miscellaneous

THE EFFECT OF DEXMEDETOMIDINE ON PROPOFOL INJECTION PAIN

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Background and aims: Propofol has a problem of pain during vascular injection. In this study, we evaluated the efficacy of dexmedetomidine for reducing pain during propofol injection.

Methods: One hundred twenty ASA physical status 1 or 2 patients scheduled for elective surgery were randomly divided into four groups; group 1 (propofol 120 mg and normal saline, n = 40), group 2(propofol 120 mg and dexametomidine 0.25 μg/kg, n = 40), group 3 (propofol 120 mg and dexmedetomidine 0.5 μg/kg, n = 40), and group 4(propofol 120 mg and dexmedetomidine 0.75 μg/kg, n = 40). The volume of drug mixture(propofol and saline or dexmedetomidine) was 15 ml in all patients, and the drug mixture was administrated for 25 sec during anesthetic induction. Vascular pain was graded using a 4-point scale.
Results: The incidence of injection pain diminished significantly in group 3 and 4 as follows: 30(75%) in group 1, 30(75%) in group 2, 21(52.5%) in group 3, and 20(50%) in group 4.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pain score</th>
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<tr>
<td>1</td>
<td>10(25)</td>
</tr>
<tr>
<td>2</td>
<td>10(25)</td>
</tr>
<tr>
<td>3</td>
<td>19(47.5)</td>
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<tr>
<td>4</td>
<td>20(50%)</td>
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Conclusions: Dexmedetomidine 0.5 or 0.75 μg/kg mixed with propofol effectively reduced or prevented vascular pain during propofol injection (P < 0.05).

ESRA1-0649
Miscellaneous
CORE OUTCOMES IN REGIONAL ANAESTHESIA (CORE) STUDY PROTOCOL
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Background and aims: The COMET (Core Outcome Measures in Effectiveness Trials) initiative pioneers the development and application of agreed standardized sets of outcomes, known as ‘core outcome sets’. These sets are not restrictive, but offer the minimum that should be measured and reported in all clinical trials of a specific area. This makes it easier for the results of trials to be compared, contrasted and combined appropriately, whilst researchers continue to explore their outcomes as well. No core outcome sets have been developed for clinical regional anaesthesia trials.
Methods: Core outcomes sets are developed using a patient-centered approach, so that the outcomes measured are relevant to patients and clinical practice. The CORE study objectives are: to identify a list of outcomes previously reported in randomised controlled trials from a systematic review of the literature; to prioritise outcomes from the clinician perspective, and to prioritise outcomes from the perspective of patients.
Results: Data from the above stages will be used to develop a comprehensive list of outcomes to be considered for inclusion in the core outcome set. In the final stage, patients and clinician experts will participate in a Delphi consensus exercise, to finalise the contents of the core outcome set.
Conclusions: The study has been registered with the COMET initiative, and will be completed August 2015. Consistent implementation of the CORE outcome set in regional anaesthesia trials will improve the quality and relevance of regional anaesthesia research.

ESRA1-0706
Miscellaneous
QUALITY OF LIFE IN MAJOR AMBULATORY SURGERY (M.A.S) IN ORTHOPAEDICS
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Background and aims: The Outpatient Surgery has been one of the most important innovations that affect the health care process. The object was to study retrospectively the results of Orthopaedics Surgery, carried out as a day procedure during the last 15 years of major ambulatory surgery (M.A.S.) in the autonomous unit in H.C.U in Valladolid.
Methods: We reviewed the medical records of 10.524 patients who underwent mayor ambulatory surgery in orthopaedics between June 1993 and December 2013.
Results: There has been no major complications. By applying Student t test for related samples was found a difference between baseline and postoperative value of SF-36 score p <0.001
Conclusions: Outpatient surgery is an alternative care beneficial in all areas of health, economic and social. We must develop it widely, always using a few objective parameters that allow us to evaluate and compare the quality and efficiency of MAS we do.

ESRA1-0753
Miscellaneous
THE PERFORMANCE OF THE INTUBATION DIFFICULTY SCALE (IDS) AMONG OBSESE THAI PATIENTS
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Background and aims: An intubation difficulty scale (IDS) is the most commonly used tool to detect difficult airways with an objective measure. There have not been any studies in Thailand on assessing the use of IDS in obese patients. The objectives of this study were to determine the performance of the IDS among obese Thai patients to define difficult tracheal intubation (DI) according to the existing definitions and to identify optimal cutoff points of the IDS in those patients.
Methods: This prospective study was conducted in adult obese patients who underwent conventional endotracheal intubation. The definition of DI in this study is defined as at least 1 of the following: >3 attempts, grade 3 or 4 laryngoscopic view on a 4-point scale, need for a second operator, or non-elective use of an alternative airway device. Performing intubations were observed by research assistants, and IDS scores were collected.
Results: The incidence of intubation difficulty was about 10%. The area under the receiver operating characteristic curves (ROC) is 0.97 with 95% confidence interval (CI) of 0.95, 0.98. The optimal cutoff point is 3; it provides sensitivity and specificity of 82.1% (95% CI 69.6, 91.1), and 94% (95% CI 91.5, 95.9). The positive and negative predictive values are 68.5% (95% CI 48.6, 71.6) and 97.9% (95% CI 96.2, 99).
Conclusions: The IDS remains a good tool to diagnose DI among obese Thai patients. It is recommended that a score of 3 or over is an optimal cutoff point to indicate DI.

ESRA1-0765
Miscellaneous
DIFFICULT INVASIVE AIRWAY ACCESS CAUSED BY GROSS TRACHEAL DISPLACEMENT
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Background and aims: Difficult airways are encountered with distorted neck and facial anatomy.
Methods: We report a challenging case requiring emergency surgical tracheostomy.
Results: A 71 year old male presented to the emergency department with acute onset breathlessness. He was initially treated for lower respiratory tract infection. His medical history included hypertension and large chronic Goiter. After twelve hours he developed stridor. Nasoendoscopy showed supraglottic, glottic oedema and displaced epiglottis.
Conclusions: The IDS remains a good tool to diagnose DI among obese Thai patients. It is recommended that a score of 3 or over is an optimal cutoff point to indicate DI.
ESRA1-0777
Miscellaneous

QUADRATUS LUMBOURUM BLOCK TYPE II FOR CHRONIC MYOFASCIAL PAIN SYNDROME
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Background and aims: Myofascial pain syndrome (MPS) is characterized by chronic pain caused by multiple trigger points and fascial constrictions; focal point tenderness; pain upon trigger point palpation; referred pain; and limited range of motion.

We aimed to report a clinical case of lumbar MPS management, in an ambulatory patient, with the recently described Quadratus Lumborum Block Type II (QLB2).

Methods: 50-year-old man with a history of lumbar back surgery, followed in chronic pain consult for severe lower back pain, with characteristics of MFS (bilateral paravertebral lumbar trigger points and gluteus/thigh referred pain).

Previous approaches included opioids, local infiltration, physiotherapy, acupuncture. In our consult, we proposed a bilateral QLB2.

The technique was performed without pre-medication, using echography, an 100 mm needle, injecting in each side 5 cc of ropivacaine (0.2%).

Results: The procedure progressed uneventfully. The patient was evaluated one week later and he reported great satisfaction, with significantly improvement on his pain levels. He wants to continue this kind of strategy.

Conclusions: We would like to emphasise the following learning points:

- Ultrasound is a useful bedside tool, to confirm position of trachea and anatomical landmarks, both for anaesthetist and surgeon.
- Intubation and needle cricothyrotomy would have been difficult.
- Fibreoptic-bronchoscopy in conjunction with glidescope, could aid intubation when airway oedema not causing sever narrowing of glottis opening.

ESRA1-0778
Miscellaneous

STELLATE GANGLION BLOCK FOR COMPLEX REGIONAL PAIN SYNDROME
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Background and aims: Complex regional pain syndrome (CRPS) is a chronic systemic disease characterized by severe pain, swelling, and changes in the skin. It is a multifactorial disorder with clinical features of neurogenic inflammation, nociceptive sensitization, vasomotor dysfunction and maladaptive neuroplasticity. CRPS is the result of an inappropriate response to tissue injury.

We aimed to report a clinical case of CRPS management with the application of the Stellate Ganglion Block (SGB).

Methods: 31-year-old healthy woman, with a history of two surgeries to a synovial cyst on her right wrist, has since than complaints of neuropathic pain, in the right radial nerve territory, with trofic skin alterations, and nociceptive and temperatures sensitization (alodynia), which all have been worsen in time. After imaging studies being normal, without any signs of cervical pathology, she was diagnosed with CRPS.

After trying different strategies to solve her complaints, including medication, local infiltration, the patient never had satisfactory results. In our consult, we proposed an ipsilateral SGB. The technique was performed, using echography and fluoroscopy guidance, an 50 mm needle, injecting 5 cc of ropivacaine (0.2%).

Results: The procedure progressed uneventfully. She was evaluated one week later and reported great satisfaction, with significantly improvement on her pain levels. She wants to continue this kind of strategy.

Conclusions: It was a very positive outcome so far, that is encouraging to go on, but we need to grow our experience in the future, for any further conclusions.

ESRA1-0777
Miscellaneous

IMPORTANT OF MULTIDISCIPLINARY INTERACTION AND AVAILABILITY OF TREATMENT KITS FOR SYSTEMIC TOXICITY BY LOCAL ANESTHETICS.
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Background and aims: Systemic toxicity by local anesthetics (LA) is a singular but potentially fatal anesthetic complication. The most important mechanism is neuro and cardiotoxicity. Our goal is to demonstrate that the development of a management protocol with toxicity kits treatment for quick control of this dreadful complication improving the prognosis of these patients.

Methods: To perform a literature review about the treatment of AL toxicity in the last ten years and provide a clear learning for quick action before this terrible event.

Results: The procurement of equipment (kits) for handling AL toxicity with ready availability in the health-care environment would accelerate the treatment process and reduce the establishment of this irreversible and fatal ending.

Conclusions: The awareness of all health staff involved in the monitoring and care of this patients, including anesthesiologists, obstetricians, surgeons and nurses, seems a critical key to improve this situation, besides the presence of treatment kits.

ESRA1-0791
Miscellaneous

INTER-OBSERVER RELIABILITY OF ROUTINE PREOPERATIVE AIRWAY ASSESSMENT TESTS BETWEEN AN ANESTHESIOLOGIST AND REGISTERED NURSE ANESTHETIST STUDENTS
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Background and aims: Practice of preoperative airway assessment is necessary for registered nurse anesthetist students. There was no bedside teaching in our curriculum. The objective of this study was to determine inter-observer reliability of routine preoperative airway assessment tests between an anesthesiologist and registered nurse anesthetist students.

Methods: Eighteen volunteer were examined by an anesthesiologist and 31 registered nurse anesthetist students using seven routine airway assessments which were malformation of teeth, Modified Mallampati test (MMT), inter-incisor gap, thyromental distance, neck movement, hyomental distance and sternomental distance. Inter-observer agreement between an anesthesiologist and registered nurse anesthetist students was described by using the intraclass correlation coefficient (ICC), accuracy, sensitivity and specificity.

Results: The results of MMT and range of motion of neck examined in normal volunteers, i.e., MMT class I and normal neck movement had excellent inter-observer agreement (accuracy 80-100%). The results of the ICC of four tests, inter-incisor gap, thyromental distance, thyromental distance and sternomental distance. Inter-observer agreement between an anesthesiologist and registered nurse anesthetist students was described by using the intraclass correlation coefficient (ICC), accuracy, sensitivity and specificity.

Conclusions: Many of the preoperative airway assessment tests had only fair inter-observer reliability. This may provide information for organizing airway assessment tests workshop in our program.
ESRA Abstracts

ESRA1-0798
Miscellaneous

COMPARISON IN THE ATTITUDE OF ANAESTHETISTS IN UK AND UAE TOWARDS THE USE OF SPINAL ANAESTHESIA

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Background and aims: This survey was conducted following the personal experience of the authors who recently relocated to the Middle East after training and working in the UK.

The aim was to gauge the attitudes of anaesthetists in the UK and UAE towards Spinal Anaesthesia (SA).

Methods: A survey was conducted using “Survey Monkey”, over one month period. The questionnaire was sent via e-mail to all anaesthetists working under Abu Dhabi Health Services Company in the UAE and to anaesthetists working in 3 teaching hospitals in the UK.

Results: 56 anaesthetists in the UAE and 59 in the UK responded.

84% in UAE considered SA to be generally safer than GA, compared to 47.5% in the UK. The result was not affected by the training background of the anaesthetist. Figures 1 & 2 show the results for specific operations & co-morbidities respectively.

Conclusions: Anaesthetists in the UAE preferred SA to GA and perceived it to be generally safer.

One hypothesis may be that in the countries of origin of the anaesthetists, SA may actually be safer than GA due to lack of adequate monitoring, reliable oxygen supply, anaesthetic gases, drugs or anaesthetic machines and warrants further investigation.

ESRA1-0805
Miscellaneous

EVALUATION OF A NEW TOOL TO IMPROVE LOCAL ANAESTHETIC USE

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Background and aims: Medication errors are the second most frequently occurring adverse incident in anaesthesia 1. In a survey of over 4 million anaesthetics, local anaesthetic (LA) toxicity accounted for 15.8% of cardiac arrests associated with anaesthetic practice 2. We evaluated a novel technique for reducing this risk; a recently published nomogram for calculation of maximum volume of LA that can be safely administered 3.

Methods: A questionnaire was produced asking anaesthetists to calculate maximum volumes they would give in scenarios with varying weight, age and LA agent. For each scenario candidates were asked to use their usual method followed by the nomogram, which was adapted to local practice. They were then asked to evaluate the nomogram. Volumes were compared to ideal answers produced by a local expert. Data were stored in excel and analysed using SPSS.

Results: Of the 23 anaesthetists surveyed, most were consultants and most used mental arithmetic to calculate maximum volumes (Table 1). Use of the nomogram led to significantly less discrepancy between volumes administered compared to expert opinion and to less variability in dosing. Both methods produced volumes that correlated significantly with the expert’s volumes, however the nomogram correlated more closely than the standard method. The majority of anaesthetists found the nomogram a valuable, easy to use tool. Most felt it improved patient safety and would incorporate it into practice if available.

Figure 1 demonstrates the responses, and the variability in responses, to each scenario by the expert and the candidates. Greatest discrepancy between expert and candidate answers occurred in scenarios involving obese patients, especially obese paediatric patients. In these patients, many calculated volumes based on maximum doses per kilogram body weight rather than total maximum dose of agent.

Conclusions: We have therefore demonstrated that the nomogram is a practical, well accepted tool with considerable potential to improve patient safety, especially in highlighting the maximum total volume than can be given. We are producing laminated copies for distribution throughout areas of LA use in our hospital and disseminating these results within our department and to other specialties, including surgery and emergency medicine.

| TABLE 1. Results of survey and analysis of volume calculation exercise |
| --- | --- |
| Seniority | ST1-2 | 8.6 (2) |
| | ST3-4 | 8.6 (2) |
| | ST5.5 | 34.7 (8) |
| | Consultant | 47.8 (11) |
| Standard Method | Mental Arithmetic | 60.8 (14) |
| | Calculator | 17.3 (4) |
| | Variable | 21.7 (5) |
| | Standard | 8.87 (12.5) |
| | Nomogram | 0.15 (6.7) |
| | Pearson’s Correlation Coefficient | Standard | r=0.79 (p < 0.0001) |
| | | Nomogram | r=0.93 (p < 0.0001) |
| Value of Nomogram (0-10) | 8 (6-8) |
| Ease of Use (0-10) | 9 (8-9) |
| Improves Patient Safety | Yes | 78.3 (18) |
| | No | 21.7 (5) |
| Would Use if Available | Yes | 69.5 (16) |
| | No | 21.7 (5) |
| Undecided | 8.6 (2) |

* = % (n), t = mean (SD), ~ = median (IQR) 1 from Paired t Test
Emails were sent to more than 1900 addresses at two separate times. Email replies were received from about 242 (13%). Of respondents to the survey General anaesthesia (GA) in 57% (108), epidural anaesthesia, 74% (86), combined epidural analgesia 48% (77) preferred less than 25% for elective CS (ECS). Spinal anaesthesia for ECS in the preferences of the participants in the All percentages are equal in the spinal anesthesia (SA) were preferred. GA: Propofol in patients 74% (86), combined epidural anesthesia, 48% (77) preferred less than 25% for elective CS (ECS). Spinal anaesthesia for ECS in the preferences of the participants in the All percentages are equal in the spinal anesthesia (SA) were preferred. GA: Propofol in patients 73% (172), SA: Bupivacaine 85% (205) is mostly preferred. Multiple options can be checked in the survey is currently underway.

Figure 1. Mean volume of LA agent administered for each scenario (error bars = StDev).

ESRA1-0813
Miscellaneous

AUDIT OF ANAESTHETIC PATIENT REPORTED OUTCOMES IN DAY SURGERY

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Background and aims: Patient satisfaction with both process and outcome of anaesthetic care is an increasingly important focus on quality assurance.

Methods: This prospective audit was carried out for a period of 4 months. 104 adult day case patients undergoing various surgical procedures were requested to complete a questionnaire prior to their discharge.

Results: The results obtained were compared against standards provided by the Royal College of Anaesthetists1.

Conclusions: Our results reinforce the importance of excellent pre-operative assessment rate, our commitment to provide adequate privacy during anaesthetic consultation and effective pain management paving the way for good overall rating of anaesthetic care. Implementation of nurse led discharge has decreased the need for postoperative anaesthetic review, but the practice should be encouraged. We plan to re-audit, after implementing measures to improve effective pre-operative provision of information about anaesthesia and enhance continuity of care by the same anaesthetist.

Patients who underwent timely pre-operative assessment 100%

Information leaflet was given 89% Information was easy to remember 91%
Pre-operatively assessed and anaesthetised by the same 96% Adequate privacy was provided during anaesthetic consultation 98% Incidence of post-operative nausea and vomiting 10%
Pain management was effective 98% Patients reviewed postoperatively by anaesthetist 63% Overall rating of anaesthetic care was good or excellent 98%

Reference:

ESRA1-0614
Obstetric

THE EFFECT OF COLLOID PRELOAD VERSUS PROPHYLACTIC INTRAVENOUS EPHEDRINE ADMINISTRATION ON QTc INTERVALS DURING SPINAL ANAESTHESIA FOR ELECTIVE CESAREAN DELIVERY: A RANDOMIZED PROSPECTIVE STUDY

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Background and aims: We aimed to investigate the effect of colloid infusion immediately before spinal anaesthesia, and the prophylactic intravenous (IV) infusion of ephedrine after injection of intrathecal bupivacaine on hemodynamic parameters, QTc, corrected QT (QTc) and dispersion of QTc (QTcDisp) intervals in women undergoing elective cesarean section.

Methods: Sixty women scheduled for elective cesarean delivery with spinal anesthesia were allocated randomly to receive either IV fluid preloading with 0.5 L of 6% w/v hydroxyethyl starch (HES) solution immediately before spinal anesthesia (colloid group, n=30) or prophylactic IV infusion of 15 mg ephedrine (diluted with 10 ml saline, n=30) over 1-minute period after the injection of intrathecal bupivacaine (ephedrine group). Electrocardiography (ECG) tracings were recorded before anesthesia procedure at baseline (T0), 5 min (T1) and 10 min (T2), 30 min (T3), 60 min (T4), and 120 (T5) min after the spinal anesthesia also the mean arterial pressure (MAP), heart rate (HR) and peripheral oxygen saturation (SpO2) values were recorded in the same time intervals.

Results: There were no significant difference between the groups with respect to MAP, HR, SpO2, QT and QTc intervals at any time points (P > 0.05). Compared to the colloid group, the QTcDisp interval at T1 was significantly longer in the ephedrine group (P < 0.05).

Conclusions: Both methods have similar effects on the ECG and hemodynamic parameters during cesarean section. So, both methods may be preferred in women undergoing elective cesarean delivery under spinal anesthesia.

ESRA1-0618
Obstetric

THE ANESTHETIC MANAGEMENT OF CESAREAN SECTION IN TURKEY: NATIONAL RESEARCH SURVEY

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Background and aims: Number of the institution of Turkey Statistics announced in bulletin that the crude birth rate of 17 per thousand and delivered pronounced in bulletin that the crude birth rate of 17 per thousand and delivered In Turkey.

Methods: A “web-based survey form” was sent to anaesthetists working in Turkey by email. A total of 43 questions were asked. The questions were in 6 groups.

Results: Emails were sent to a more than 1900 addresses at two separate times. Email replies were received from about 242 (13%). Of respondents to the survey General anaesthesia (GA) in 57% (108), epidural anaesthesia, 74% (86), combined epidural analgesia 48% (77) preferred less than 25% for elective CS (ECS). Spinal anaesthesia for ECS in the preferences of the participants in the All percentages are equal in the spinal anesthesia (SA) were preferred. GA: Propofol in patients 73% (172), SA: Bupivacaine 85% (205) is mostly preferred. Multiple options can be checked in the survey is currently underway.
Conclusions: Our study shows that SA is widely preferred for ECS by anesthetists in Turkey. It is evident that creation of a “standard care guide” for science branches is essential. The first stage of creating a standard care guide is to analyze and document the current application in use.

**ESRA1-0732**

**Obstetric**

**IMPROVING OBSTETRIC ANAESTHESIA FOLLOW-UP THROUGH INFORMATION TECHNOLOGY**

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**Background and aims:** Follow-up of mothers after obstetric analgesia and anaesthesia is vital. It enables us to assess risk and monitor standards of care, whilst detecting potential problems.

There are no standardised methods of reliably collecting data pertaining to obstetric anaesthesia follow-up. Practice varies considerably amongst trusts and databases can be expensive with ongoing maintenance costs. We historically collected this information and recorded it manually in a log-book. This carried inevitable risks of misplacement and breach of confidentiality. It also made audit and retrieval of data difficult. We felt that creation of a password-protected database linked to our trust network would improve our current practice.

**Methods:** An retrospective audit of 50 elective obstetric cases in May 2014 was performed assessing adequacy of log-book recording and follow-up. A secure database was then created and introduced in which was available through the trust network. Retrospective re-audit of 50 elective cases was carried after introduction of the database.

**Results:** Initial audit showed that 39/50 elective cases were recorded in the book with only 58% follow-up. After introduction of the database, 100% were recorded and 80% were followed-up.

**Conclusions:** The database significantly improved follow-up rates from 58% to 80% (p<0.017).

It improved data protection and contained detailed information pertaining to procedures and complications. This facilitated audit using the database search function with a positive impact upon quality of patient care.

**ESRA1-0733**

**Obstetric**

**ARE WE ACHIEVING THE PRINCIPLES OF ENHANCED RECOVERY IN PATIENTS UNDERGOING ELECTIVE LOWER SEGMENT CAESAREAN SECTION (LSCS)?**

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**Background and aims:** Enhanced recovery is a model of care which reduces the physiological stress response and organ dysfunction caused by elective surgery. It enables patients to recover more quickly and be discharged from hospital sooner resulting in benefits to both patients and staff.

This model has been used with success in different surgical specialties however, in obstetrics this is still a new frontier. The aim was to audit the current practice for patients undergoing elective LSCS and utilise the findings to develop an enhanced recovery protocol.

**Methods:** The study was approved by the hospital audit committee. A questionnaire was formulated to follow up patients undergoing neuraxial blocks for elective LSCS which included patient’s level of satisfaction for pain relief and time for pre and post-operative fasting, post-operative urinary catheter removal, mobilisation and discharge. The data was collected, analysed and results were compared with the principles laid down by NHS Enhanced Recovery Partnership Programme (ERP) for obstetrics. Mean and 2 standard deviation (SD) was calculated.

**Results:** 23 patients were followed up and the results are shown as mean and 2 SD of the findings in table 1. Level of satisfaction for pain relief was moderate in 22%, good in 56% and excellent in 22% patients. 67% of patients were discharged from hospital three or more days after the operation. 9% patients achieved recommended pre-operative fasting time for clear fluid while none achieved recommended time for pre-operative food and urinary catheter removal.

**Conclusions:** Majority of patients fasted much longer than the ERP and AAGBI recommendations with delayed urinary catheter removal and mobilisation. All these factors can potentially lead to stressed mother during peri-operative period which increases the risk of stress disorder, postpartum depression and dysfunctional parenting. Delayed discharge has both psychological and financial implications. Our results identified areas where improvement is required in order to achieve compliance to the generic elements of ERP.

Based on the findings we recommend greater emphasis on fasting guidelines and importance of early urinary catheter removal as it delays patient mobilisation. These can be achieved by greater patient involvement and re-educating midwives and theatre staff about the importance of generic elements of ERP in the patient outcome. Regular patient feedback would help to improve their level of satisfaction. A local enhanced recovery protocol needs to be developed and re-audit to evaluate the progress.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Mean (hours)</th>
<th>± 2SD</th>
<th>Recommendation by ERP (hours)</th>
<th>Patients that achieved recommended time by ERP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-op fasting time for clear fluid</td>
<td>5.87</td>
<td>1.14–10.60</td>
<td>02</td>
<td>09</td>
</tr>
<tr>
<td>Pre-op fasting time for food</td>
<td>13.0</td>
<td>9.11–17.06</td>
<td>06</td>
<td>00</td>
</tr>
<tr>
<td>Post-op fasting time for clear fluid</td>
<td>1.24</td>
<td>(1.60)–4.07</td>
<td>As tolerated</td>
<td>—</td>
</tr>
<tr>
<td>Post-op fasting time for food</td>
<td>5.02</td>
<td>0.18–9.86</td>
<td>As tolerated</td>
<td>—</td>
</tr>
<tr>
<td>Removal of urinary catheter</td>
<td>18.72</td>
<td>12.69–24.75</td>
<td>12</td>
<td>00</td>
</tr>
<tr>
<td>First mobilisation of patient</td>
<td>18.57</td>
<td>11.78–24.96</td>
<td>As tolerated</td>
<td>—</td>
</tr>
</tbody>
</table>

**ESRA1-0740**

**Obstetric**

**AUDITING THE VERTEBRAL LEVEL OF SPINALS AND EPIDURALS USING ULTRASONOGRAPHY IN A GENERAL DISTRICT HOSPITAL OBSTETRIC UNIT**

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**Background and aims:** Neurological complications after central neuroaxial anaesthesia (CNA) are rare events. However, they still occur. In our attempt to improve the safety of the CNA in our obstetric unit, we recognized the need to audit the vertebral level of spinal and epidural blocks among parturients.

**Methods:** Audit conducted in maternity theatre and postpartum ward during May–July 2013 following hospital audit department approval. In theatre pre-CNA, the anaesthetist identified the needle insertion level. The level then scanned and identified by the ultrasound scan (US). Postpartum puncture site scanned with the US to determine the vertebral level then compared to that in the medical notes. The patients who had multiple puncture sites were excluded.

**Results:** 59 patients included in our audit, 8 done in theatre,2 excluded due to incomplete documentation in the notes.33 spinal and 24 epidural. Block level in 33 patients (58%) correlated with the US; 24 (73%) of those were spinal and 9 (27%) epidurals. In 24 patients (42%) puncture site level wasn’t in agreement with U/S and the vertebral level being higher or lower was equal. The highest level identified was L1-L2 level in 2 patients, both had epidurals. The maximum difference was 2 vertebral levels in 1 patient also had an epidural. The highest level identified was L1-L2 level in 2 patients, both had epidurals. The maximum difference was 2 vertebral levels in 1 patient also had an epidural. The level then scanned and identified by the ultrasound scan (US). Postpartum puncture site scanned with the U/S to determine the vertebral level then compared to that in the medical notes. The patients who had multiple puncture sites were excluded.

**Conclusions:** NAP3 audit project stressed on the avoidance of too cephalad spinals, yet it still occurs. Our results agreed with other studies and highlighted the remaining existence of this problem. One of the causes is the poor accuracy
of the palpation method in identifying the vertebral levels. NICE guidelines in 2008 recommended the use of U/S scan in the catheterisation of the epidural space, yet still lack the routine use of this technique in many hospitals. We recommended and already started promoting the gain of competencies in U/S scan of spine and the routine use of U/S for the CNA in our hospital.

ESRA1-0744
Obstetric

SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY SYSTEM FOR THE IDENTIFICATION OF THE EPIDURAL SPACE IN PIGLETS

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Background and aims: Epidural needle insertion is traditionally a blind technique where the rate of success depends upon the experience of the operator. We describe a novel method that involves the use of a fiber-needle based swept source optical coherence tomography (SSOCT) system to guide epidural needle insertion.

Methods: We placed an optical fiber probe (diameter: 0.9 mm) into the hollow chamber of a 17-gauge Tuohy needle. The needle probe was inserted in increments of 2 mm until the epidural space was identified. A series of two-dimensional OCT circumferential images were constructed by rotating the optical probe within the needle while acquiring image lines. The insertion was performed three times into both the lumbar and thoracic regions of five pigs (average weight: 25 kg) using a paramedian approach. The epidural space was identified through direct observation of the tomographic structures from the epidural fat.

Results: A side-looking, fiber-needle-based SSOCT is constructed, which can create a visual image of underlying structures. OCT tomograms from different tissues, including hypoderm, muscle, ligamentum flavum, and epidural fat, were identified using the intrinsic optical scattering properties of the tissues.

Conclusions: This is the first study to introduce a SSOCT fiber probe embedded in a standard epidural needle. We anticipate that this technique could reduce the number of failed epidural blocks and other complications such as dural punctures.

ESRA1-0752
Obstetric

IT IS TRUE THAT EPIDURAL ANALGESIA INCREASE THE INCIDENCE OF INSTRUMENTAL LABOR OR CESAREAN DELIVERY? A RETROSPECTIVE STUDY IN A REGIONAL HOSPITAL

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Background and aims: We aimed to clarify whether the epidural analgesia is associated with the instrumental labor or cesarean delivery, in our hospital where there is a lot of variability interracial.

Methods: 3015 patients were admitted to Obstetrics Specialist Hospital for vaginal delivery between January 1 to December 31, 2013. The women were divided into 2 groups; epidural (Group A) and non epidural group (Group B). Epidural analgesia was initiated by a bolus of bupivacaine 0.25% (5-10 ml) plus fentanyl (50 microg), followed by bupivacaine 0.125% plus fentanyl (1 microg/ml) at the rate of (10 to 14 ml/h). Non-epidural analgesia was initiated by meperidine 50 to 100 mg IM.

Results: A total of 1773 patients requested epidural (Group A), while 942 patients received other analgesic methods (Group B). There was no difference in the rate of cesarean section deliveries between the two analgesia groups; 219 patients of 1773 in Group A (12,35%), versus 173 patients of 942 (14,54%) in Group B. Significantly, more patients in the epidural group had forceps, or vacuum assisted deliveries; 414 patients of 1773 in Group A (23,35%) compared to the other analgesia group (Group B); 66 patients (83% of women who received epidural rated their satisfaction as excellent or good (Visual Analogue Scale (VAS) < 4) versus 37% in the non-epidural group. p < 0.001

Conclusions: Epidural analgesia was associated with an increased rate of instrumental delivery, but it does not increase the incidence of cesarean section deliveries. However the epidural analgesia is an effective method of pain relief during labor compared to the other analgesic methods.
ESRAI-0773

Obstetric

EPIDURAL BLOOD PATCH - 3 YEARS FOLLOW-UP

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Background and aims: The incidence of postdural puncture headache (PDPH) in obstetric population is up to 80% after accidental dural puncture. Epidural blood patch (EBP) is the gold-standard therapy.

The aims of this study were: characterize the obstetric population submitted to EBP, analyze the time between beginning of the symptoms and execution of EBP and blood volume used, evaluate efficacy, satisfaction and availability to be submitted to NA in future occasions.

Methods: An observational retrospective study was performed from 2011 to 2013. Clinical reports EBP were consulted and a questionnaire structured by 6 closed answer questions was performed. Descriptive analysis of the data.

Results: 14 women were submitted to BPE for refractory PDPH. Time between the beginning of the symptoms and EBP was 3,7±3,49days. Technique’s efficacy was 100%, with no need to repeat it and there weren’t complications reported.

Blood volume administered was 13,21±2,99mL. In a satisfaction scale from 1 (very unsatisfied) to 5 (very satisfied), 78,6% correspond to level 5. When questioned about if they would accept NA in future occasions, 35,7% answered negatively.

Conclusions: This study reveals that EBP is a safe technique and provides high levels of satisfaction. The average time between symptoms and EBP was high when compared with literature. This is due to 2 cases in which the EBP was executed in the 7th and 17th days. Only 35,71% would accept NA in future occasions, which most probably reflects the intensity and the disabling characteristics of the PDPH.

ESRAI-0774

Obstetric

THE EFFECT OF GENERAL AND SPINAL ANAESTHESIA ON NEUTROPHIL TO LYMPHOCYTE RATIO (NLR) IN PATIENTS UNDERGOING CESAREAN SECTION

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Background and aims: NLR has become popular recently so that many studies have been done to find out the predictive value of NLR in many different topics. The aim of this retrospective study was to evaluate the relationship between blood NLR and anaesthetic techniques in patients undergoing caesarean section.

Methods: In this study, eighty patients (American Society of Anesthesiologists physical status I-II) undergoing elective caesarean section using spinal (group S: 40) or general anesthesia (group G: 40) were retrospectively analyzed for neutrophil to lymphocyte ratio.

Results: The demographic characteristics of the group; amount of bleeding; before the operation, neutrophil to lymphocyte ratio values were similar in both the spinal and general anesthesia groups (Table 1, 2). However, the significant difference was observed with regard to NLR values in the postoperative period (Table 2).

Conclusions: In this study spinal anesthesia was compared with general anesthesia in patients undergoing caesarean section and consequently NLR of spinal anesthesia group was observed significantly lower in the postoperative period.

ESRAI-0811

Pediatric

ULTRASOUND-GUIDED INFRACLAVICULAR BRACHIAL PLEXUS BLOCK AND SEDATION AS AN ALTERNATIVE ANAESTHETIC TECHNIQUE IN A PEDIATRIC PATIENT WITH HURLER DISEASE

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Background and aims: To describe the anaesthetic technique used as an alternative to general anaesthesia in a pediatric patient with a potentially difficult airway. We report the case of a 2 year old child with Hurler Syndrome going under infraclavicular brachial plexus block and sedation as the anaesthetic technique used for the urgent surgical treatment of a supracoaxal humerus fracture.

Mucopolysaccharidosis type I or Hurler syndrome is a hereditary degenerative progressive disorder, caused by the intralysosomal excess accumulation of gliomoglicanos in diverse tissues. It is considered to be the most difficult airway to manage in pediatric anaesthesia. It is associated with micrognathia, restriction of mobility of the temporomandibular joint, atlantoaxial subluxation, odontoid process dysplasia, short neck, subglottic stenosis, adenosial and tonsillar hypertrophy, macroglossia, abundant tracheobronchial secretions, restrictive cardiomyopathy and lung disease and mental retardation.

Methods: Given the possibility that the patient has a difficult airway, we prepare the difficult airways cart and the fiberoptic bronchoscope in case we need to administer general anaesthesia.

Once in the surgery room, we monitor the patient and since there is already peripheral venous catheter, we proceed to premedicate with atropine 0,15 mg and after that we induce anaesthesia with ketamine 2 mg/Kg iv.

Sedation is maintained with remifentanil 0,02-0,05 mcg/Kg/min and we give oxygen to the patient through nasal cannula in order to maintain spontaneous ventilation.

Under appropriate sedation level, we carry out an ultrasound-guided infraclavicular brachial plexus block with 9cc of ropivacaine 0,5%. The plexus block approach was decided after discounting the axillary approach to prevent fracture mobility and supraclavicular levels for cervical instability and short neck.

Throughout the surgery we apply sevoflurane 2-3 vol% through nasal cannula while reducing remifentanil to minimal doses.

Results: Despite the low volume administered, an effective block is achieved which implies minimal doses of opioids with the only requirement of sevoflurane for maintaining sedation and resulting in the ideal post-surgical analgesic control without adverse effects.
Conclusions: Considering that these patients have the most difficult airways, we must always carry out an exhaustive airway examination and take all of the necessary precautions. For this reason, whenever possible, locoregional anaesthesia should be considered a valuable alternative in this type of patient.

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ESRA1-0617

Peripheral Nerve Blocks

THE USE OF A FOREARM TOURNIQUET AND ELBOW BLOCKS TO ENABLE RAPID RECOVERY AFTER HAND SURGERY

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Background and aims: One of the key limitations of regional anaesthesia as a primary anaesthetic technique for hand surgery is the need to provide anaesthesia for the tourniquet site. An extensive blockade of the proximal brachial plexus might be required to cover the traditional site of an upper arm tourniquet in awake patients. We present a consecutive series of awake hand surgery under individual nerve blockade at the elbow, with the application of a forearm tourniquet for surgical haemostasis.

Methods: 34 patients were included in this study at Robert Jones and Agnes Hunt Hospital (Oswestry, UK); data was collected in regards to anaesthetic time, tourniquet time, patient discomfort and haemostasis.

Results: The mean anesthetic time was 16 minutes (10-2 minutes), mean tourniquet time was 45 minutes (16-81 minutes), mean patient discomfort Visual analogue score of 1 and 91% of cases achieved satisfactory to adequate haemostasis.

Conclusions: This technique provides a viable option for day-case hand surgery with rapid recovery, and may avoid complications arising from proximal brachial plexus blockade.

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ESRA1-0625

Peripheral Nerve Blocks

NEOSTIGMINE PROLONGS ANALGESIA IN PERIPHERAL NERVE BLOCK: A META-ANALYSIS.

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Background and aims: Background: Neostigmine- as an acetylcholinesterase inhibitor - can increase the acetylcholine receptors located on the dorsal horns inducing analgesia; the use of neostigmine as an adjuvant in locoregional anaesthesia showed a dose-dependent analgesic effect even if associated with nausea and vomiting. The intra-articular administration of neostigmine showed a significant analgesic effect; it is presumable that neostigmine can also be used as an adjuvant in the peripheral blocks. We performed a meta-analysis to assess the efficacy of peripherally administered neostigmine on the duration of analgesia and side-effects when added to local anaesthetics for peripheral nerve blocks.

Methods: Design: A meta-analysis of randomized-controlled human trials.

Data sources: Google Scholar and PubMed were searched (updated May 25th, 2014). Authors and external experts were contacted.

Eligibility criteria: Inclusion criteria for potentially relevant studies were: random allocation to treatment, comparison of neostigmine administered in peripheral nerve block versus placebo; experimental design with approval of Ethical Committee.

Results: The use of neostigmine as adjuvant in the peripheral nerve block could prolong the duration of analgesia: + 47.88 min [CI: 21.86 – 74.08 min] of analgesic effect, p for effect 0.0003; p for heterogeneity 0.69; I^2=0%. The risk of nausea is not increased: 6/116 in neostigmine group vs 0/145 episodes in control arm; OR 5.34; 95% CI 0.89-31.89, p for effects 0.07, p for heterogeneity 1.00; I^2=0%.

Conclusions: Peripherally administered neostigmine might prolong the duration of analgesia without increasing side effects, particularly nausea.

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ESRA1-0630

Peripheral Nerve Blocks

MANAGEMENT OF FRACTURE NECK OF FEMUR IN MEDICALLY UNFIT ASA4 PATIENTS USING DIRECT INFILTRATION LOCAL ANAESTHESIA

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Background and aims: Patients presenting with fracture of the femoral neck are usually elderly, and often have extensive co-morbidity. Patients who are considered able to survive an operation under general or regional anaesthesia usually undergo surgical stabilisation of the fracture or hemiarthroplasty of the hip for to facilitate mobilisation and minimise the risk of developing complications of long term bed rest. Patients who are considered too unwell for surgery are often kept being delayed until assumed optimised or treated non-operatively. [1,2,3] These patients have a high morbidity and mortality and present significant nursing difficulties. The current fracture neck of femoral guidelines provide strict rules emphasising early surgery within 24–48 hours of admission with early orthogeriatric input. Failure to achieve these goals leads to hospital inquiring financial penalties. We describe a technique of fixation of fracture of the femoral neck under direct infiltration local anaesthesia; that can be performed on the sick elderly patient with lower risk association than with general or regional anaesthesia.

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ESRA Abstracts

ESRA1-0637
Peripheral Nerve Blocks
A SYSTEMATIC REVIEW AND META-ANALYSIS OF PERIPHERAL DEXAMETHASONE FOR PERIPHERAL NERVE BLOCKS
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Background and aims: Peripheral nerve blockade with local anaesthetic (LA) provides effective analgesia. Interventions that increase the duration of LA action may permit a prolongation of postoperative patient comfort. Dexamethasone has been shown to prolong peripheral nerve block in animals. Subsequent to the first clinical translation published in 2003, several trials have been published with enthusiastic results. The objective of this meta-analysis is to better define the efficacy of dexamethasone as a LA adjunct for peripheral nerve blockade.

Methods: We followed the PRISMA guidelines and searched the following databases without language restriction to May 2014: PUBMED; COCHRANE CENTRAL; EMBASE; GOOGLE SCHOLAR. We included randomised controlled trials (RCTs) that compared perineural LA without versus with dexamethasone for peripheral nerve blockade. The primary outcome was duration of analgesia and was defined as time between injection and first analgesic request. We grouped interventions in RCTs by duration of LA action, short and medium (lidocaine, mepivacaine, prilocaine) vs long term action (bupivacaine, levobupivacaine, ropivacaine). Other secondary endpoints included pain-related outcomes and adverse effects associated with dexamethasone. We also performed meta-regression for the interaction between dexamethasone dose and duration of analgesia and achieved a subgroup analysis according to doses of dexamethasone. We considered a two-sided p value < 0.05 significant.

Results: We included 29 RCTs with 1695 adults. LA with short term or medium term action were injected in 9 RCTs whilst 20 RCTs injected LA with long term action.

Dexamethasone increased the mean (95% CI) duration of analgesia, our primary outcome, by 116 (127–145) min when injected with LA with short or medium term action, p < 0.00001, and by 406 (399–413) min when injected with long term action, p < 0.00001. There was no association between the total dose of perineural dexamethasone and the mean increase in duration of analgesia (r = 0.02, p = 0.54). This was further confirmed by a subgroup analysis that revealed that 4 mg of dexamethasone was equivalent to 8 mg when injected with LA with short or medium term action (dexamethasone 4 mg: 200 min, 51–350 min; dexamethasone 8 mg: 251 min, 175–327 min, p = 0.55) or with long term action (dexamethasone 4 mg: 461 min, 240–681 min; dexamethasone 8 mg: 480 min, 403–557 min, p = 0.88).

Dexamethasone also reduced morphine consumption (0.04), pain scores (p<0.00001) and rate of PONV at 24 postoperative hours (p=0.008). No significant adverse effects were associated with the use of dexamethasone.

Conclusions: In summary, perineural dexamethasone at a dose of 4 mg prolongs duration of analgesia after peripheral nerve blockade with LA, similarly to a dose of 8 mg, without any reported serious adverse effects.

ESRA1-0648
Peripheral Nerve Blocks
VARIATION OF NEEDLE TIP ENDPOINTS DURING COMMON REGIONAL ANAESTHESIA BLOCKS: THE ENDPOINT SURVEY
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Background and aims: Ultrasound guidance is rapidly becoming the gold standard for regional anaesthesia [1], facilitating nerve identification, observation of surrounding structures, improving block quality and decreasing doses of local anaesthetics [2]. With nerve stimulation, the appropriate muscle twitch was a pre-defined endpoint for acceptable needle positioning. With purely ultrasound-guided techniques, there are no pre-defined endpoints. Our aim is to survey current practice of ultrasound guided regional anaesthesia; specifically, accepted needle endpoints for common blocks, using a bespoke interactive website.

Methods: 30 local regional anaesthesia specialists where surveyed, and 11 appropriate common blocks identified. Ultrasound images from healthy volunteers were obtained, using a Sonosite S-Nerve and Sonosite X-Porte machine. From November to December 2013, a user-friendly website was developed in a combination of php and javascript: www.regionalandpoint.com. The website was trialled by 18 regional anaesthesia specialists.

Results: All participants enjoyed taking part in the survey. Focusing in on the Interscalene nerve block, we can see wide variation in needle tip endpoints targets (Fig 1). 83% use an in-plane approach, whilst 17% use an out of plane approach. Only one anaesthetist used a nerve stimulator concurrently. 67% (n=12) used 15-20mls of local anaesthetic, whereas 33% (n=6) used 10–15 mls. No
ESRA1-0661
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INFLUENCE OF SUBJECT POSITION IN THE VISUALIZATION OF THE SCIATIC NERVE AT THE POPLITEAL FOSSA

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Background and aims: Evaluate the effect of the patients’ position in obtaining a good quality sciatic nerve image at the popliteal fossa by anesthesiology trainees.

Methods: Ethics Committee approval. First (1YR) and 2nd year residents (2YR) of our anesthesiology program scanned the right popliteal fossa of a unique subject in 3 positions (supine, lateral, prone).

Time from US-probe reception good quality image (70% counter, 3 structures within the nerve) acquisition was measured. An investigator, blind to the subject position, determined during real-time observation the quality of the image and the end of the scanning. A questionnaire regarding the experience was answered.

Results: 12 (1YR and 14 2YR) residents completed the study. 2YR had more previous US procedures (avg: 37 vs 10 p = 0.00007). All 1YR had less than 6 US-guided popliteal blocks. 8 2YR had ≥6 US-guided popliteal blocks. No difference in time to obtain a good quality image in the 3 different positions (median sec (IQ25–75): Prone 220.5 (170–5–369.5); Lateral: 169.5 (94.5–329.5); Supine 208 (138–354.5) p = 0.29. There was no difference between 1YR and 2YR residents with ≥ 6 blocks experience needed less time considering all positions together: 187 (103.75–217.25) vs 232.5 (154.25–393.75) p = 0.025. 96% residents felt position influenced image acquisition, prone the most favorable and supine the least.

Conclusions: Although position did not affect US scanning time, residents’ perception was that position did influence. Previous exposure to at least 6 popliteal blocks resulted in less time to obtain a good quality US image of the sciatic nerve at the popliteal fossa.

ESRA1-0677
Peripheral Nerve Blocks

ADDMING MAGNESIUM SULFATE TO MEPIVACAINE FOR AXILLARY BRACHIAL PLEXUS BLOCK IN TRAUMA SURGERY

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Background and aims: Magnesium has been observed to lower the required dose of anesthetic when delivered intravenously, and prolong the length of anesthesia when added to the local anesthetic agent. Experimental studies have shown that it inhibits the neurotransmitter release in peripheral nerves and generates the hyperpolarization possibly leading to elevated nerve block by local anesthetic agents. The aim of this study was to compare the effect of adding magnesium to mepivacaine on sensitive and motor block duration and opioid consumption for axillary brachial plexus block in trauma surgery.

Methods: 20 patients, ASA I–III, aged 22 to 77 years, divided into 2 groups: Group 1 (n = 10 historic control group) received total 30 ml of mepivacaine 1.5 % total 450mg; Group II (n = 10) received 30 ml of mepivacaine 1.5 % 450mg + 1 ml magnesium sulfate (150 mg) mixture. All patients were evaluated with regard to sensitive and motor block ending times and opioid consumption in 24hs.

Results: All the patients concluded the study; there was no statistically significant difference between the groups with regard to demographic data, length and type surgery. Sensitive and motor block durations were increased in Group II when compared with Group I (p < 0.05). Fewer opioids consumption in the first 24hs postoperative was seen in magnesium group.

Conclusions: The ideal drug for peripheral nerve block should provide, relatively long-lasting analgesia, excellent sensory block, minimal side effects and be cheap. We consider that magnesium sulfate adjacent to mepivacaine could be a real alternative for achieving these challenges.

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compare the effect of sub-Tenon anesthesia 3 mL and 5 mL lidocaine on intraocular pressure, analgesia and akinesia.

Methods: After obtaining ethics approval (Baskent University Institutional Review Board and Ethics Committee/Project no: KA14/34) and informed consent of patients, 88 patients were randomly enrolled to the study to receive sub-Tenon's block with either 3 mL (Group I) or 5 mL (Group II) lidocaine. Intraocular pressure (IOP) was measured before the block, IOP, analgesia and akinesia was evaluated at 10 minutes after the block. Complications such as chemosis and subconjunctival hemorrhage were also noted.

Results: Two patients were excluded from the study due to the patients’ request for sedation during block administration. Patients’ characteristics such as age, weight, height, axial length, ASA physical status were comparable in-group before and after block measurement and between groups. Akinesia and analgesia were significantly better in Group II in comparison to Group I. ‘No eye movement’ was obtained in 13 patients (38.2%) in Group II whereas none of the patients had ‘no eye movement’ in Group I. Eighteen (56.3%) patients had ‘no pain’ and 14 (%43.7) patients had ‘mild pain’ in Group I whereas ‘no pain’ in 28 patients (82.8%) and ‘mild pain’ in 6 patients (17.6%) was observed in Group II. Complications were comparable between groups.

Conclusions: Sub-Tenon’s anaesthesia either with 3 or 5 mL lidocaine had no effects on IOP; on the contrary analgesia and akinesia were preferably better in patients who received 5 mL lidocaine for the block during cataract surgery by phacoemulsification.

Ethics committee approval is as below:

ESRA1-0735 Peripheral Nerve Blocks

THE COMPARISON OF ANKLE BLOCK AND SPINAL ANAESTHESIA FOR FOOT SURGERY: A RETROSPECTIVE STUDY

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Background and aims: Today, regional anesthesia methods in lower extremity injuries are preferred more than general anesthesia methods. The purpose of this study is the comparison of unilateral spinal block and ankle block methods in foot operations retrospectively due to open wound in foot, debritement and toe amputation in the plastic surgery clinic.

Methods: After the study protocol was approved by the Ethics Committee, the files of previous 60 patients who had operations due to open wound in foot and who had regional anesthesia were examined retrospectively in the Plastic Surgery Clinic in ASA (American Society of Anesthesiologists) I-III risk group. These patients in the study were divided into two groups as the patients who received Unilateral Spinal Block (Group S) (n=30) and the patients who received 5 mL lidocaine for the block during cataract surgery by phacoemulsification.

Conclusions: Despite their good properties, peripheric nerve blocks are generally less used when compared with other methods. The reasons for this may be that the skills of the anaesthesiologists vary when this anesthesia technique is concerned, this technique requires additional time, anesthesia effect time is later and the safety of it is changeable.

ESRA1-0737 Peripheral Nerve Blocks

INTERTEMPORAL PERICONE AND SUB-TENON’S BLOCK: A COMBINED ANAESTHETIC APPROACH FOR VITREORETINAL SURGERY

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Background and aims: Peribulbar block is recognized as a safe regional anaesthesia technique to carry out most ophthalmic surgeries. However, in some vitreoretinal procedures, an adequate analgesia is not obtained and a sub-Tenon’s block is often executed by the surgeon. Moreover, locoregional anaesthesia is an important approach in the frequent comorbid ophthalmological patient and a useful technique on day-surgery cases. We describe an adapted regional block to the posterior segment surgery performed in our hospital.

Methods: Anxious patients receive a short-acting drug few minutes before the blockade and a titrated sedation during the procedure. Good surface conjunctival anaesthesia is accomplished with topical oxygenicaine 4%.

Firstly, we perform the inferotemporal percutaneous pericone injection according to the Hamilton technique. After test aspiration, up to 5ml of ropivacaine 1% are slowly injected. The injection is immediately stopped if the globe becomes tense. Ocular pressure is applied by the Honan cuff for 10 minutes.

We then perform the sub-Tenon’s block, in the inferonasal quadrant, with the Stevens cannula. Up to 5ml of ropivacaine 1% are delivered in the sub-Tenon’s space. Ocular pressure is applied by the Honan cuff. Akinesia and analgesia are assessed 10 minutes later.

Results: Peribulbar and sub-Tenon blocks are popular anaesthetic approaches due to their easy execution, stress response inhibition, lower complication rates and adjustable surgical/post-operative analgesia.

Conclusions: Based on our practice, a single inferotemporal puncture of the peribulbar block, which produces good akinesia, combined with a sub-Tenon’s infiltration, which in turn provides better analgesia, is a feasible and effective anaesthesia technique in vitreoretinal procedures.

ESRA1-0739 Peripheral Nerve Blocks

INTERSCALENE BLOCK AND RESULTANT MOTOR BLOCK MAY BE UNNECESSARY TO PROVIDE EXCELLENT POST-OPERATIVE ANALGESIA FOR REPAIR OF MID-CLAVICULAR FRACTURES

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Background and aims: Sensory innervation of the clavicle is poorly understood.(1) The Allman classification divides the clavicle into anatomic thirds and groups the clavicle fractures based on frequency of occurrence. Group I is comprised of the fractures occurring in the middle 1/3 of the clavicle, and these fractures account for 69 - 85% of fractures.(2) The following three cases present patients with Group I (mid-clavicular) fractures who all had excellent postoperative analgesia without having an interscalene block.

Methods: Case #1:

In December 2013, an obese (111 kg and 183 cm) 44y/o male presented with a left mid-clavicular comminuted and displaced fracture obtained from snow skiing. Due to surgeon skepticism, the complexity of the fractures, and the patient’s body habitus, a plan was devised to block most of the nerves of the upper extremity except C5-8. Instead, USG superficial cervical plexus block (SCPB) plus USG T1 PVB were performed. USG-SCPB was performed with 10ml of ropivacaine 0.5% using a 22g Touhy needle between the superficial and deep fascia of the neck while the C5 nerve root was
These three patients had excellent postoperative analgesia without regional anesthesia. Thoracic wall analgesia is a challenge for anesthesiologists. The other patient requires NSAID's for wound pain relief, and asks for the SPB. Thru the postoperative period the first patient had complete analgesia. The other patient had full motor strength from mountain-bike riding accident. USG SCPB was performed with 20ml of ropivacaine 0.5%, and T1 PVB with 10ml of the same. The patient also had GETA and had no motor block and no postoperative opioids. He was discharged home and his sensory block did not dissipate until the next morning, 18 hours later.

Results: These three patients had excellent postoperative analgesia without having interscalene blockade. SCPB relieved preoperative baseline fracture pain in all cases. Postoperative pain was also well controlled in all cases, and it is unknown if the T1 PVBS performed contributed to this analgesia, however, ISB was not necessary. In all cases, the patients and surgeons were pleased that motor blockade of the arm was not necessary to achieve pain relief.

Conclusions: A patient's analgesic needs for ORIF of the clavicle may best be understood by the region of the clavicle injured.

While it is unlikely that SCPB is sufficient for analgesia for all clavicular fractures, these cases contribute some evidence that SCPB may be sufficient analgesia for the most common type of fractures (mid-clavicular). Furthermore, ISB may be unnecessary for mid-clavicular fractures and operative repairs that do not involve plating and screw fixation in the distal end of the bone.

References:

ESRA1-0751
Peripheral Nerve Blocks

PECTORAL NERVE BLOCKS (PEC) AND SERRATUS PLANE (SPB) BLOCKS FOR POSTOPERATIVE PAIN RELIEF OF CLAVICULAR AND MULTIPLE RIB FRACTURES

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Background and aims: Pain management after clavicular fracture associated with multiple rib fractures is a challenge. Often managed with classic regional techniques. Peripheral nerve blocks of the thoracic wall, seem to open new perspectives for these patients.

Methods: Reports: Case1: 37yo, obese male, clavicular fracture plus 4 anterolateral costal arch fractures. Case2: 60 yo male, clavicular fracture plus 3 anterolateral costal arch fractures.

They both underwent general anesthesia. PEC's I, II and SPB are performed, using bupivacaine plus adrenaline 1:200.000, 10ml for each PEC and 20ml for the SPB. Thru the postoperative period the first patient had complete analgesia. The other patient requires NSAID's for wound pain relief, and asks that afternoon for discharge due to complete pain relief.

Results: Thoracic wall analgesia is a challenge for anesthesiologists. PEC's I, II and SPB have been described useful in breast surgery. The lateral-pectoral nerve innervates the clavicular periostium and the acromioclavicular joint, what makes it interesting for this type of surgery. SPB the lateral branches of the intercostal nerves, being ideal for postoperative analgesia in these patients, however it does not block the anterior or posterior branches.
Conclusions: We conclude that the use of PEC 1 is a good option for analgesia in clavicular surgery, and that the use of the SPB seems to be an option for chest wall pathologies.

References:

ESRA1-0757
Peripheral Nerve Blocks

CONTINUOUS TRANSGLUTEAL SCIENTE NERVE BLOCK TO PREVENT PHANTOM LIMB PAIN AFTER TRANS-FEMORAL AMPUTATION IN PATIENT WITH COPA

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Background and aims: Phantom limb syndrome is a frequent complication of trans-femoral lower limb amputation. The aim of the study is to evaluate the decrease of phantom limb pain in patients treated with perineural L-bupivacaine, in order to accelerate the protthetic rehabilitation process.

Methods: Approved by the local ethics committee (protocol number 0014965), this pilot randomized prospective double-blind trial aims to recruit 40 patients in 2 years. Pain assessment is carried out by patient’s scores, MCGill score and OBAS (Overall Benefits of Analgesia Score) test on pre-operative day (T0), on the first 5 post-operative days (T1-5) and during follow-up at 3, 6 and 12 months.

Every patient undergoes standard general anestesia (opioids and sevoflurane) and is provided of full post-operative analgesia with continuous subcutaneous morphine infusion; a pre-operative transgluteal sciatic perineural catheter is placed for 5-days continuous infusion of L-Bupivacain versus saline

Results: Since December 2013, 11 patients were enrolled (3 women and 8 men). First results showed that patients treated with L-Bupivacaine (3 with follow-up at 6 months, 1 at 3 months and 2 perioperative) got an OBAS score <4 and an improved MCGill, while those treated with saline (3 with follow-up at 3 months and 2 perioperative) got an OBAS score ≥4 and an unvaried or worse MCGill.

Conclusions: Preliminary results show that the use of perineural infusion of L-Bupivacaine has a better outcome concerning phantom limb pain if compared to traditional perioperative analgesia both in the first post-operative period and at 3rd-6th month follow up.

ESRA1-0784
Peripheral Nerve Blocks

TRANSVERSUS ABDOMINIS PLANE BLOCK: A SURVEY OF KNOWLEDGE AND PRACTICE

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Background and aims: The transversus abdominis plane (TAP) block was first described in 2001 and has been ultrasound-guided since 2007. TAP blocks are increasingly being performed in the UK lower abdominal surgery. A survey was conducted to examine current practice and knowledge of relevant anatomy.

Methods: A survey was sent to NHS anaesthetists in three London teaching hospitals. Experience of TAP blocks, current practice and knowledge of underlying anatomy were appraised.

Results: 55 completed surveys were returned. 46 respondents (84%) performed at least 3 TAP blocks per year. 87% of respondents who perform TAP blocks used ultrasound. All used bupivacaine (or levobupivacaine), but volume and concentration varied considerably (10-70ml each side, 0.125-0.5% respectively). 47 respondents (85%) were able to correctly identify muscle and fascial layers and site of anaesthetic infiltration on ultrasound. However, only 27 (40%) respondents correctly named nerves supplying the anterior abdominal wall, and only 26 (47%) respondents could correctly name dermatomes reliably covered by a TAP block.

Conclusions: There is wide variation in current practice. Ultrasound is preferred to landmark technique, but there is no consensus as to the volume or concentration of anaesthetic used.

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of block likely to be achieved. This could have implications for success of post-operative analgesia.

ESRA1-0797
Peripheral Nerve Blocks

ULTRASOUND IN REGIONAL ANESTHESIA: HOW TO STIMULATE ITS ACHIEVEMENT
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Background and aims: Ultrasound-guided regional anesthesia has advanced rapidly over the past decade, and is now a day-to-day practice in many anesthetic departments.

In order to contribute to the achievement of ultrasound-guided peripheral nerve blocks and its standardization, a protocol has been created in our hospital.

Methods: Our protocol includes the local anesthetic (LA) toxicity algorithm, decision algorithm of anticoagulant/antiplatelet therapy, required material for peripheral blocks and a summary of the most important nerve blocks to our practice (upper limb, lower limb and abdomen).

Results: We selected the most important nerve blocks for our practice and elaborated a summary about each one. In this summary we included the indication and contraindications for its realization, equipment needed, drugs/ doses, the patient's position, ultrasound imaging, ultrasound and neuro-stimulation references.

Conclusions: With the development and implementation of this protocol, we hope to facilitate the use of ultrasound in peripheral nerve blocks, contributing to a more effective postoperative analgesia and greater patient satisfaction.

One year from now, we intend to evaluate the impact of this protocol on the performed nerve blocks.

ARE ANESTHESIOLOGY RESIDENCY PROGRAMMES PREPARING FUTURE SPECIALISTS TO PERFORM PERIPHERAL NERVE BLOCKS
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Background and aims: Regional anesthesia (RA) has been evolving and increasing its popularity. In Portugal, residency programme requires the minimum performance of 50 unspecified peripheral nerve blocks (PNB). We report the results of a RA practice survey addressed to final year anesthesiology residents.

Methods: Sixty questionnaires were sent on February 2014, consisting of multiple choice questions grouped in two parts: 1- PNB teaching and practice; 2- residents' subjective opinion about these techniques.

Results: There were 16 replies. All residents fulfilled the minimum techniques required. The majority of blocks performed were: axillary brachial plexus, femoral nerve and eye. Thoracic and lumbar paravertebral, obturator, suprascapularial and infrascapularial brachial plexus, rectus abdominis sheath and PECs blocks were executed <10 times by 87,5% of residents. Fifty percent had <10 peripheral continuous blocks. Though not mandatory, 8 residents attended a RA fellowship and 12 a RA course. Considering self-confidence to perform PNB, 4 felt very confident, 3 felt unease to use ultrasoundography and 1 neurostimulation. Although all residents were aware of PNB’s complications, only 3 felt very comfortable diagnosing and treating them.

Conclusions: PNB is recognized as a highly valuable input in one’s practice and important skill for future employment. The data presented reveals that residents performed a small diversity of blocks and that few executed the minimum number required to master a technique. This could explain the low level of confidence to manage complications. The authors think that there should be a revision of the Portuguese residency programme in order to promote better skilled future anesthesiologists.

ESRA1-0629
Postoperative Pain Management

A NURSING INITIATIVE TO IMPROVE EFFICACY OF EPIDURAL ANALGESIA
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Background and aims: Repeated audit cycles revealed a 38-46% failure rate in adequate epidural analgesia provision for surgical patients.

Reasons for failure were multifactorial including unilateral block, missed segments and catheter migration. In spite of interventions to remedy the situation the success rate could not be improved.

Aim: To improve the efficacy of epidural analgesia and reduce the failure rate

Methods: Local ethics approval was sought but waived for this service improvement initiative. A working group to formulate a strategy was established with anaesthetic and pain team representation.

A Guideline and training package was developed and approved to enable nurses working within the Acute Pain Team to administer bolus doses of diamorphine 2 – 3mg via the epidural catheter as a top up. A repeat audit was carried out over a 6 month period.

Results: During the 6 month study period there were 176 epidural infusions performed. The success rate had increased to 81%. 52 patients had diamorphine bolus tops up.

The19% failure rate was due to catheter migration, persistent hypotension and inappropriate catheter placement. There was an increase in pruritus but no increase in other side effects.
Conclusions: This audit revealed a significant improvement in epidural efficacy. Reasons for this include the development of the nurse initiative as issues relating to inadequate analgesia are now addressed in a more timely manner. Diamorphine is an effective epidural analgesic in small doses and associated with very few side effects. There have been no adverse events associated with this change in practice.

ESRA1-0631
Postoperative Pain Management

PAIN MANAGEMENT AFTER MAJOR OPEN ABDOMINAL SURGERY: EPIDURAL VS CONTINUOUS WOUND INFUSION (PAM TRIAL - PILOT STUDY)

Araújo R.1, Marques C.1, Fernandes D.2, Rodrigues M.1, Ferreira M.1, Santa-Bárbara R.1, Bernardo R.1, Freitas S.1, Alves J.1, Almeida E.1 1Department of Anaesthesiology, Hospital de Santa Maria - Centro Hospitalar Lisboa Norte, Lisbon, Portugal. Background and aims: Pain control on major abdominal surgery is a challenge. Epidural analgesia (EDA) is a common technique for pain relief in this procedure. The aim of the study is to evaluate the effectiveness of this established technique with one not yet consensual: Continuous Wound Infusion (CWI).

Methods: 28 patients submitted to major abdominal surgery (median laparatomy) under general anaesthesia were randomized to either EDA or CWI. The CWI group received analgesia through a multiorifice wound catheter placed above the peritoneum and connected to a 10 mL/h ropivacaine 0,2% infusion. The EDA group received ropivacaine 0,2% infusion bolus of morphine every 12 hours according to a protocol based on age and catheter level. Both analgesic regimens were continued for 48 hours. Efficacy criteria were based on pain at rest (Verbal Response Scale 0-10) in the first 24 hours, pain intensity, rescue analgesia consumption, and side effects were assessed at 6, 24, and 48 hours after surgery.

Results: The proportion of patients successfully controlled for their postoperative pain management were 79% for CWI and 57% for epidural. On the CWI uncontrolled pain group, all patients classified their pain at 24 hours below 6/10. The incidence of nausea, vomiting, pruritus, and urinary retention was significantly lower in the wound infusion group and time to recovery of bowel function was shorter.

Conclusions: The effectiveness analysis suggests that CWI is the dominant strategy for managing postoperative pain in comparison with EDA after major abdominal surgery. This technique is associated with better analgesia and a lower incidence of side effects, contributing for a quicker recovery and discharge.

ESRA1-0633
Postoperative Pain Management

ULTRASOUND-GUIDED TRANSVERSUS ABDOMINAL PLANE (TAP) BLOCK VERSUS CAUDAL BLOCK FOR POSTOPERATIVE ANALGESIA IN CHILDREN UNDERGOING UNILATERAL GROIN SURGERY

Ahmed A.1, Rayan A.2, kasem A.1 1anesthesia, Prince Sultan hospital, Almadinah Elmonawarah, Saudi Arabia, 2anesthesia, king abdul aziz airbase hospital, Dhahran, Saudi Arabia. Background and aims: This study was designed to evaluate the efficacy of US guided TAP block and to compare it to caudal block in unilateral pediatric, day case hernia repair.

Methods: 40 pts 1-5 years scheduled for elective unilateral herniotomy. Patients received sevoflurane for induction and maintenance and LMA was used. Patients were randomized to (group T)US-guided TAP block using 0.5 mg/kg 0.25% bupivacaine on the same surgery side and (group C) received caudal block using 1mg/kg 0.2% bupivacaine. Surgery was allowed 15 min after the block. Standard monitoring was applied. If HR &/or MAP increased by 15%, sevoflurane was increased and fentanyl1 lmg/kg was administered and the block was considered a failure. After surgery, patients remained for 4 h in the recovery room. Postoperative pain was evaluated by the children and infants postoperative pain scale (CHIPS). If CHIPS was > 4, rescue analgesia, 20 mg, kg acetaminophen was administered.

Results: No difference was found in HR and MAP to the base line in both groups. Also the amount of intraoperative fentanyl was not different in both groups. CHIPS was less in caudal group however, the difference was not statistically significant.

Conclusions: US-guided TAP block is as effective as caudal block in providing immediate postoperative analgesia in inguinal hernia repair.

ESRA1-0663
Postoperative Pain Management

SERVICE EVALUATION AND AUDIT OF POST OPERATIVE PAIN RELIEF FOR SHOULDER ARTHROPLASTY

Thanawala V.1, Kambasi M.1, Anurag Patnaik M.1, Sinha R.1, French J.1, Bedforth N.1 1Anaesthesia, Nottingham University Hospitals NHS Trust, Nottingham, United Kingdom. Background and aims: Shoulder arthroplasty is associated with significant postoperative pain. Optimal multi-modal analgesia including continuous interscalene brachial plexus blockade helps to provide good functional recovery with minimal opioid requirement and reduction of side-effects and hospital stay.

Methods: Retrospective service evaluation of adequacy of peri-operative pain relief following shoulder arthroplasty performed at Nottingham University Hospitals NHS Trust in 2012. We recorded: ASA grade, type of anaesthesia and analgesia provided, worst and average post operative pain scores in the first 72 hours, postoperative opioid usage and length of hospital stay.

Results: We identified 97 patients, all had ultrasound-guided interscalene brachial plexus block. Interscalene catheters placed in 81 patients and used for 848 hr.

87, 76 and 79 patients had an average pain score < 1 (scale 0-10) in the first 24, 48 and 72 hr respectively.

76, 77 and 80 had worst pain score <2 in the first 24 hr.

Two patients had pain scores of 6-7 following catheter failure (abandoned due to aspiration of blood and catheter fall out) requiring rescue analgesia.

Conclusions: The use of continuous interscalene brachial plexus block as part of a multi-modal analgesia regime provided our patients with satisfactory analgesia following shoulder arthroplasty. Patients require active follow-up by an acute pain team to deal with complications including catheter failure.


ESRA1-0718
Postoperative Pain Management

NURSING APPROACHES AIMED AT POST-THORACOTOMY PAIN MANAGEMENT

Ince S.1, Kol E.1 1Fundamentals of Nursing, Nursing Faculty, Antalya, Turkey. Background and aims: Post-thoracotomy pain is acute traumatic. In cases where the pain persists longer than two weeks, the patient is considered as having post-thoracotomy pain syndrome. Management of postoperative pain speeds recovery, decreases the rate of complications and shortens hospital stay by contributing to the early mobilization of the patient.

Methods: In our intensive care unit, our main goal in the management of post-thoracotomy pain is the prevention of atelectasis. To this end, pain management is achieved and coughing and deep breathing exercises are initiated within four hours. The nursing procedure performed for post-thoracotomy pain management in our clinic begins with warming of the patient to avoid tremors due to aspiration of blood and catheter fall out) requiring rescue analgesia.

Results: Our observations indicate that these applications are effective in alleviating the pain and reduce the demand for analgesics. The present study is aimed to evaluate the efficiency of these applications.

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Conclusions: The aim of postoperative pain management is to reduce the brain's response to the nociceptive stimuli as early and uninterruptedly as possible so that the sensitivity of autonomic and somatic reflexes is minimized. It has been reported that using both pharmacological and non-pharmacological treatment methods simultaneously for pain management is more effective than the use of these two methods separately since they target different pain mechanisms. Nonpharmacological methods such as exercise, patient education, heat and cold therapy, massage and distraction; which are used more and more widespread today; increase the efficiency of pain management.

ESRA1-0721
Postoperative Pain Management
ULTRASOUND VISIBILITY OF SPINAL STRUCTURES AND LOCAL ANESTHETIC SPREAD IN CHILDREN UNDERGOING CAUDAL BLOCK
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Background and aims: Caudal block with local anesthetics provides prolonged postoperative analgesia for children. Although various methods had been suggested to predict cranial spread of local anesthetics, large discrepancies exist due to patient age, volume of the anesthetics and bias caused by ultrasound visibility of spinal structures. We assessed ultrasound visibility of spinal structures and the extent of drug spread levels with different volumes using real-time ultrasound.
Methods: Eighty children scheduled for urological surgery were included. Ultrasound visibility of dura mater and ligamentum flavum at 3 levels (lower lumbar, upper lumbar, and lower thoracic), conus medullaris and dural sac were assessed. During caudal block, we evaluated spread levels at each time point of 0.5, 1.0, 1.25 and 1.5 ml/kg of 0.15% ropivacaine injected using real-time ultrasound.
Results: Conus medullaris, dural sac and dura mater were easily identified with ultrasound. Ultrasound visibility of dura mater and ligamentum flavum decreased at lower thoracic level compared to lumbar level. Additionally, visibility of the thoracic ligamentum flavum markedly decreased in children over 7 months, or heavier than 8.5 kg. Drug spread level was higher with increasing volume (P < 0.001), in children ≤ 12 months (P < 0.001), and showed significant correlation with age (R² = 0.534).
Conclusions: Ultrasound visibility of spinal structures decreased with increasing vertebral levels. Visibility of the thoracic ligamentum flavum markedly decreased in elderly, heavier children. Real-time ultrasound may be helpful in estimating cranial drug spread levels up to 1.25 ml/kg at roughly 2 to 3 segments lower than seen on radiography.

ESRA1-0738
Postoperative Pain Management
THE INFLUENCE OF THE MENSTRUAL CYCLE ON ACUTE AND PERSISTENT PAIN AFTER LAPAROSCOPIC CHOLECYSTECTOMY
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Background and aims: Fluctuations of female sex hormones during the menstrual cycle influence pain perception. Endogenous pain in the follicular phase of the menstrual cycle. We tested the primary hypothesis that the women having surgery during their follicular phase have more acute pain and require more opioids than those in the luteal phase, and secondarily we tested that women who have surgery during their follicular phase have more incisional pain at 3 month postoperatively.
Methods: 127 adult females having laparoscopic cholecystectomy were randomized to have surgery during the luteal or follicular phase of their menstrual cycle. Standardized anesthesia and pain management regimen was given to all patients. Pain and analgesic consumption were evaluated in PACU and every four hours in first 24 hours. Adverse effects were also questioned every four hours. Time to oral intake and ambulation were recorded. Post-surgical pain, hospital anxiety and depression scale, and SF-12 questionnaire were also evaluated at 1- and 3-month visits.
Results: Demographic parameters were similar between groups. There was no difference in acute pain scores and analgesic consumption through the 24-hour period. Persistent postoperative pain was significantly more common one (p = 0.04) and at three month (p = 0.02). VAS pain scores at one month among those reporting pain were 1.6 ± 0.7 cm for follicular group vs. 2.7 ± 1.3 cm for luteal group (p = 0.049), and at three month 1.8 ± 0.8 cm in the follicular group and 2.9 ± 1.7 cm in the luteal group (p = 0.2). There were no significant differences between the groups with respect to anxiety and depression, and SF-12 scores at either time. Nausea was more common in the follicular-phase group (p = 0.01) and oral feeding time was shorter in the follicular phase (5.9 ± 0.9 hours) than in the luteal phase (6.8 ± 1.9 hours, p = 0.02).
Conclusions: Although persistent postoperative pain was significantly more common one and three months after surgery the magnitude of the pain was low. Our results do not support scheduling operations to target particular phases of the menstrual cycle.
Conclusions: At 1 pence per dose more than codeine, Sevredol is a cost effective alternative. Our results suggest that Sevredol is as clinically effective as codeine and patients reported high satisfaction scores with the revised analgesia protocol.

ESRA1-0767

Postoperative Pain Management

COMPARISON BETWEEN EPIDURAL ANALGESIA AND DOUBLE BLOCKADE (FEMORAL + SCIATIC) FOR POSTOPERATIVE PAIN RELIEF IN TOTAL KNEE REPLACEMENT SURGERY

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Background and aims: Pain relief after total knee replacement can be achieved with either epidural analgesia or femoral and sciatic blockade. The aim of our study was to compare both techniques in postoperative pain relief, adverse effects and hospital stay in total knee replacement surgery.

Methods: We conducted a prospective, randomized, case control study with 81 patients scheduled for primary unilateral knee replacement. 46 patients received epidural analgesia and 35 double blockade (DB: femoral + sciatic) for postoperative pain relief. Both groups received intradural blockade. We analyzed the visual analogue scale (VAS) at 24, 48 and 48 hours after the surgery, length of stay in the recovery room, opioid consumption, incidence of hypotension, bladder catheterization, motor or lateralization blockage, day of standing and initial grades of movement.

Results: Both groups have similar baseline characteristics (age, weight, size, BMI). No significant differences were found in all the variables except the length of stay in the recovery room (DB 2,98 Vs epidural 3,87 p<0,01), the incidence of bladder catheterization was significantly lower in the DB group (47% Vs 16%; p<0,01) and the median for deambulation was significantly different between groups but clinically irrelevant.

Conclusions: There was no difference between groups in terms of postoperative pain relief measure by the VAS. However, the length of stay in the recovery room and the incidence of hypotension and bladder catheterization were significantly lower in the double blockade group than in the epidural one. Further studies are required to find differences in terms of pain relief.

ESRA1-0771

Postoperative Pain Management

PULSED RADIOFREQUENCY IN MANAGEMENT OF CHRONIC POST-SURGICAL NEUROPATHIC PAIN – CASE REPORT

Serrano S.¹, Semedo E.¹, Pereira P.², Valenta A.³, Chronic Pain Management Unit – Department of Anesthesiology, Coimbra Hospital and University Centre, Coimbra, Portugal.

Background and aims: Chronic post-surgical neuropathic pain prevalence is increasing. Chronic groin pain following inguinal hernia repair is a potential complication and its incidence can be as high as 62.9%. Severe functional loss is associated. With a case report, we aim to demonstrate the benefits of using ultrasound to perform selective guided nerve block and to discuss possible benefits of pulsed radiofrequency (PRF) treatment.

Methods: The data was collected from patient’s clinical file.

Results: 40-year-old man, professor, with history of hernioplasty and residual pain, is referred to Chronic Pain Management Unit because of progressive and uncontrolled neuropathic pain in his left groin and scrotal area, worsened after vasectomy. Pain was continuous, referred as a burning sensation in left thigh with electric shock-like pain irradiation to the scrotum. Pain was reported to be 8/10,VAS score was reduced to 4/10, after 2 weekly sessions. Thus, patient reduced pharmacology. More series of PRF were proposed.

Conclusions: Chronic post-surgical pain constitutes a difficult condition to treat. Ultrasound can be an effective technique identifying injured nerve. PRF can be a valuable coadjuvant tool even the mechanism by which PRF controls pain is unclear. This technique can avoid unnecessary nerve release surgery and morbidity.

ESRA1-0786

Postoperative Pain Management

POSTOPERATIVE PAIN MANAGEMENT IN FOREFOOT SURGERY AFTER ANKLE LOCK WITH DOMICILIARY ELASTOMERIC BOMB.

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Background and aims: Postoperative pain is the most frequent complication in major ambulatory surgery. Currently, the introduction of new complex surgeries in the MAS has forced to anesthesiologists to develop strategies for the control of postoperative pain without increasing costs or hospital admissions.

Methods: A prospective study of 100 patients who underwent foot surgery in major ambulatory surgery between January to June 2014 at the Reina Sofia Hospital in Córdoba was performed. The simple was randomly in two groups, one with postoperative elastomeric bomb for 48 hours and the other without it. End point was the effectiveness of the elastomeric bomb for postoperative pain control and the development of nausea and vomiting. P < 0,05 was considered significant statistically.

Results: A total of 100 patients were included. With an average age of 56 years (35–77). No statistically significant differences in age, surgery and ASA in both group. Incidence of postoperative pain categorized in none, light, moderate and severe in the elastomeric bomb group was 27%, 66%, 7% and 8% vs 10%, 46%, 10% y 4% in the other group (p< 0,05).

Conclusions: We conclude that in major ambulatory surgery of foot the lock ankle followed domiciliary elastomeric bomb in the first 48 hours after surgery decreases the incidence of acute postoperative pain and other side effects associated.

ESRA1-0792

Postoperative Pain Management

COMPLICATIONS AND INTERVENTIONS ASSOCIATED WITH NEURAXIAL ANESTHESIA AND ANALGESIA

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Background and aims: Despite its associated complications, neuraxial anesthesia is increasingly used to provide or supplement intrathecal anesthesia and postoperative analgesia. This study aims to identify the incidence of these complications and the interventions required to change the outcome.

Methods: Prospective data was collected in the scope of acute pain management consultation over a period of one month. Data collected include the level of insertion of the epidural catheter, type and size of the spinal needle, administered drugs, associated complications and required interventions.

Results: The sample data consisted of 126 records of neuraxial anesthesia/analgesia. The overall incidence of complications was 28.6%; out of these, 83.3% required intervention. Below we summarize the principal complications, associated factors, and interventions conducted thereafter: in 32 cases in which opioids were administered (66 cases): 12.7% occurrence of nausea and vomiting; an anti-emetic drug was administered in 81.3% of these complications.

- epidural analgesia (73 cases): 11.0% accidental catheter pull-outs, 2.7% non-functional catheters, and in 1.4% the epidural technique failed; epidural analgesia was discontinued in all occurrences of the previous complications. Motor block occurred in 2.7% of the cases, requiring only close monitoring. Incidence of arterial hypotension was 4.2%; administration of local anesthetic was ceased in 66.7% of these 4.2%.

- overall (126 cases): 1.6% post-dural puncture headache; resolved with conservative treatment in all cases.
Conclusions: This study shows the importance of regular assessment and early intervention to manage neuraxial anesthesia/analgesia-related complications; the importance of training for the nursing staff is also highlighted. As a consequence of this work, the implemented protocols are being revised.

Methods: Observational retrospective study. The study sample of 170 patients older than 18 years old with inguinal hernia undergoing ambulatory surgery, between May 2013 and May 2014 in Fuenlabrada University Hospital. We divided the patients in two groups, the first with spinal anesthesia and the second with general anesthesia. We calculated the time in the recovery room since the arrival until discharge. Data collection was obtained from medical records.

Results: Mean recovery time was 242.24 minutes with spinal anesthesia versus 232.43 minutes with general anesthesia. In the <65 years patients group the recovery time with spinal anesthesia was 262.68 minutes versus 207.75 minutes with general anesthesia. In the >65 years patients group the recovery time was 221.79 minutes with spinal anesthesia versus 281.80 minutes with general anesthesia.

Conclusions: Of all patients, there was no significant difference in the time between the spinal and general anesthesia (9.81 minutes higher for the spinal anesthesia group). In the <65 years group, the mean was 54.93 minutes less than for the general anesthesia group, while in the other group, the mean was 60.01 minutes higher with general anesthesia.