Tissue Extraction Techniques for Leiomyomas and Uteri During Minimally Invasive Surgery

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Question 1:
It seems like patients are less aware of the power morcellation controversy when compared with prior issues related to medical devices in obstetrics and gynecology, like surgical mesh for pelvic organ prolapse or the Essure procedure. In your experience, do most patients have prior knowledge of power morcellation, or is this something they usually hear for the first time during the informed consent process? Do you think the power morcellation controversy has had less media coverage than the other medical devices?

Response from Dr. Siedhoff:
In 2014, most patients in my practice who were seen for leiomyoma surgery had heard of the morcellation controversy. In 2017, I would estimate half have heard of it prior to the visit and the others during the informed consent process. It should be noted that my patient population has relatively high health literacy, is nearly all referral-based, and has a generally high preference for uterine preservation compared to other patient populations.

This particular controversy seems to have gained more attention with the media and subsequently with patients for a number of reasons. First, the husband of the patient who experienced the complication of occult sarcoma morcellation in 2013, Dr. Hooman Noorchasm, has been relentless in his vocal and unaltered criticism of fragmented tissue extraction (contained or not) and now of gynecologic surgery training in general. He found a friendly voice with certain media outlets who selectively reported the downside of these techniques (potential tissue dissemination) over their relative benefits (fewer complications overall, decreased mortality). Fears around malignancy have cultural and psychological affects out of clinical proportion to other risks surrounding surgery, which also raises the attention of this particular issue. Lastly, although the risk of occult sarcoma is quite small, the relevant gynecologic condition that involves morcellation is an extremely common indication for gynecologic surgery—uterine leiomyomas.
**Question 2:**

Besides the potential risk of occult malignancy dissemination at the time of open morcellation, are there any data on the incidence of other complications like visceral injury, seeding of benign disease (i.e., endometriosis, parasitic leiomyomas), or infection secondary to necrotic tissue left inside the abdomen?

**Response from Dr. Siedhoff:**

Yes. The incidence of these types of complications are difficult to quantify because of underreporting, but one group of authors identified 55 injuries that occurred with power morcellators from 1992 to 2012 using the Manufacturer and User Facility Device Experience (MAUDE) database and search of the medical literature. The majority of injuries were intestinal or vascular, and 11 cases involved injury to more than one organ.1 Another group performed a systematic review and estimated the risk of iatrogenic endometriosis, adenomyosis, or parasitic myoma at approximately 1% for uncontained morcellation cases.2 A significant limitation of their approach is that they relied on studies reporting the complication and very likely underestimated cases where it didn’t occur. Clearly, spread of benign tissue is a complication that may result in patient symptoms and need for additional surgery, but those of us who have done hundreds or thousands of these operations haven’t seen it occur at a rate of 1%.

**Question 3:**

You mention that magnetic resonance imaging (MRI) might be useful prior to hysterectomy in cases of extreme uterine enlargement. Is there a particular uterine size or leiomyoma growth speed at which you would recommend MRI in addition to pelvic ultrasonography?

**Response from Dr. Siedhoff:**

Diffusion-weighted MRI with apparent diffusion coefficient has been shown to differentiate leiomyoma and leiomyosarcoma in one series,3 and MRI in combination with serum lactate dehydrogenase between degenerating leiomyomas and leiomyosarcoma in another,4 but these haven’t been replicated in larger populations. Sarcomas are more likely to be larger in size,5 but size alone can’t be used to distinguish benign from malignant disease. Rapidity of growth has never been well-defined or identified as a risk factor for leiomyosarcoma. I nearly universally obtain MRI prior to myomectomy, both because complete tissue containment is never possible in these procedures, and also for surgical planning. Magnetic resonance imaging is quite helpful in identifying good candidates for laparoscopic myomectomy and aids the surgeon during the procedure, since haptic feedback is more limited than in open surgery. If patients have a large uterus, perhaps greater than 18 weeks of gestation size, and the diagnosis of leiomyomas is new, then I think MRI is also helpful prior to hysterectomy. Perimenopausal or postmenopausal patients with heavy bleeding, a solitary mass, and those with other risk factors might also benefit from getting a preoperative MRI. If there were concerning features, it might influence decision-making about using a minimally invasive approach, especially if the surgeon didn’t feel that tissue containment with a specimen bag would be feasible. I usually do not get an MRI prior to hysterectomy for patients who have multiple leiomyomas and those who have been serially imaged over years, regardless of size.

**Question 4:**

Bag disruption during contained vaginal morcellation is quoted at 33% in the article. Do you think these disruptions are related to the type of vaginal morcellation technique or to the thickness and resistance of the containment bag?
These disruptions are likely due to experience in the learning curve as well as bag material. The key point is that all of the available contained morcellation techniques require acquisition of a new skill set, and surgeons would do well to review copious video presentations that identify tips and tricks for success, reach out to seasoned surgeons beyond their learning curve, and perform their initial cases with a surgeon already familiar with the chosen technique. The vaginal approach presents unique challenges given the distance to the colpotomy and more limited exposure.

**Question 5:**

Is there a limitation in regards to uterine size, number, and location of leiomyomas, or a patient’s body mass index (BMI) where you would not attempt contained manual morcellation?

**Response from Dr. Siedhoff:**

The number of myomas probably isn’t a limitation, since most of us string them together sequentially as they are removed in laparoscopic myomectomy so that no myomas are lost in the abdomen. However, the total size and shape of uterine tissue can be a limitation of specimen containment. Various bags have different size openings and volumes. Some, not U.S. Food and Drug Administration (FDA)-approved for contained extraction (eg, isolation bags), are large enough to contain almost any size tissue, but the size of the specimen itself may make it very challenging to manipulate it into the bag. Most specimens smaller than 1,500 grams can be contained in FDA-approved specimen bags without excess difficulty for experienced laparoscopists. For those that can’t be easily contained, an assessment of occult sarcoma risk and patient preferences should be discussed, with laparotomy offered as an alternative for en bloc tissue removal. Body mass index has not been a limitation to contained manual morcellation in my experience, although an abdominal incision may be easier than using a colpotomy for very large patients.

**Question 6:**

Besides placing a plastic guard during contained abdominal manual morcellation, is there any other intervention you would recommend in order to minimize the risk of bag disruption?

**Response from Dr. Siedhoff:**

The incision should be large enough that the scalpel can enter the tissue at a 45° angle or greater. This allows one to use the nondominant hand to rock the tissue back and forth while circular incisions are made into the tissue with the dominant hand, changing the shape from a ball to a strip in a rolling fashion. If the incision for extraction is too small (usually less than 2.5 cm), one has to direct the scalpel too acutely and the effect is inefficient coring rather than more efficient rolling. The acute angle of the blade with a small incision will also be more likely to disrupt the bag. Lastly, if a plastic guard isn’t used, a plastic ring retractor can be placed into the incision to maximize the opening and provide one additional layer of protection beyond the bag itself.

**Question 7:**

What advice do you have to lessen the sometimes-burdensome process of introducing a large containment bag and enclosing the specimen under laparoscopic visualization easier?

**Response from Dr. Siedhoff:**

Practice! Use a box trainer to practice with the specific bag available at your institution and practice introducing and manipulating it in a simulated environment. Watch videos and talk to those with more experience to develop a systematic approach to the technique and practice the steps with your surgical assistant. Be very clear
in communication; for example, “Ok I’m going to lift this end anterior; watch me with the camera and hold that end downward.” It can be very easy to get frustrated when you are learning to manipulate these large bags in the abdomen because visualization is impeded initially. If the surgeon and her assistant are not working in concert, the process will be stunted and aggravating.

Question 8:

Besides personal preference, do you think there is any reason or circumstance where contained power morcellation would be preferred over the manual method?

Response from Dr. Siedhoff:

In abdominal morcellation cases, the main advantage of contained power morcellation is keeping the umbilical incision at the smallest possible size, at least with the bag puncture method. With this method, the umbilical incision can be kept to 12–15 mm and is cosmetically superior to minilaparotomy contained manual morcellation at the umbilicus or an alternate site, which requires a 25–40 mm incision. For the FDA-approved contained power morcellation system, a single-site platform is used at the umbilicus and at least a 25 mm incision is also needed. As we point out in the review, literature on gynecologic single-site surgery suggests this approach doesn’t carry an increased risk of hernia formation, but many of us who have done a good deal of contained morcellation with incision sizes of 25 mm and greater have seen the complication at least once. I don’t think we can yet quantify hernia risk in these operations, but I do counsel my patients that contained or uncontained power morcellation uses the smallest possible incisions. Obviously, in total hysterectomy where contained vaginal morcellation is feasible, abdominal incisions can be kept to 5 mm or smaller.

References