

# Tissue Extraction and Morcellation: The Menace of Unexpected Malignancy

<sup>1</sup>Liselotte Mettler, <sup>2</sup>Khulkar Abdusattarova

## ABSTRACT

Uterine fibroids are a common indication for hysterectomy or myomectomy. Even with optimal preoperative imaging, unexpected uterine sarcoma can be detected in histopathology after uterine fibroid surgery. In case of inadvertent morcellation of an unexpected uterine sarcoma the clinical outcomes, due to the rapid intraperitoneal dissemination of malignant tissue during the procedure can be negatively influenced. The purpose of this study was to determine the prevalence of uterine sarcoma in women undergoing hysterectomy or myomectomy for benign uterine fibroids. We performed retrospective study (2003-2014 years). The total number of women operated for uterine fibroids was 2297. Of this, 938 (42.5%) women had myomectomies and 1269 (57.5%) women had hysterectomies. In myomectomies the most frequently used surgical method was laparoscopic myomectomy in 591(63%) cases, followed by hysteroscopy myomectomy in 306 (32.62%) cases, and laparotomic myomectomy only in 41 (4.37%) cases. In hysterectomies, laparoscopic approaches significantly dominated in 1163 (61.1%) cases, showing laparotomic approaches in 491(25.82%) cases and vaginal approaches in 247 (12.99) cases. Only one patient with endometrial stromal sarcoma (ESS) was not preoperatively diagnosed and treated as symptomatic uterine fibroid; this patient underwent laparoscopic supracervical hysterectomy. In the post-operative histopathological examination ESS was detected. Thus, our incidence of sarcomas among women who underwent benign uterine fibroid surgery is 1/2297 (0,043%). Laparoscopic power morcellation should be performed only in cases with no suspicion of malignancy Patients, who undergo laparoscopic surgery with power morcellation should be informed about the possible risks of morcellation in cases of rare not suspected malignant disease.

**Keywords:** Hysterectomy, Myomectomy, Uterine fibroids, Uterine sarcomas.

**How to cite this article:** Mettler L, Abdusattarova K. Tissue Extraction and Morcellation: The Menace of Unexpected Malignancy. *Int J Gynecol Endsc* 2017;1(1):1-4.

**Source of support:** Nil

**Conflict of interest:** None

<sup>1,2</sup>Professor

<sup>1,2</sup>Department of Gynecology and Obstetrics, University Hospitals Schleswig-Holstein, Campus Kiel, Germany

**Corresponding Author:** Liselotte Mettler, Professor, Department of Gynecology and Obstetrics, University Hospitals Schleswig-Holstein, Campus Kiel, Germany, e-mail: profmettler@gmx.de

## INTRODUCTION

With increasing numbers and varieties of minimally invasive surgeries being performed in all surgical subspecialties, tissue extraction remains a problem to be solved. Although many endoscopic surgical treatments are currently being performed by minimally invasive technologies, malignancies have to be carefully detected prior to any resection, extraction, morcellation, or homogenization process according to our present medical understanding. Particularly in gynecological endoscopic procedures, catheters, gloves, bags, and in-bag morcellation are advised to avoid unintended spread of malignant tissue at the time of tissue extraction.

## HISTORY OF UTERINE MORCELLATION

Endo-bags were developed in the early 1970s for ovarian cyst extractions, ectopic pregnancy removal, tube- and ovariectomies, as well as adnexectomies. Already, in 1978, Semm and Mettler<sup>2,3</sup> described tissue punching with a manual morcellator to solve the problem of tissue extraction in Kiel, Germany, which we had been using over 4 to 5 years in Kiel, Germany. The "Serrated Edged Macro-Morcellator" (SEMM) worked by punching out tissue cylinders of 1, 1.5, and 2 cm in diameter, and measuring 0.5 up to 10 to 20 cm in length specimen particles. Up to three times reusable metal serrated edged cylinders were used to cut the tissue, grasped with a big claw forceps. Working only with manual power, the technique was time consuming and difficult for the surgeon. The SEMM later added battery power and finally electric power, which was produced by WISAP, Germany. Different types of electromechanical morcellators were introduced into the market after 1995. The Steiner morcellator was the first to be Food and Drug Administration (FDA) approved. He used a rotating knife driven by an electric microengine, controlled via a foot pedal. The cutting cylinder, which was 13 mm in diameter and 25 cm long, was placed in a 14 mm trocar sleeve and protruded a few millimeters past the sleeve of the trocar into the abdomen.<sup>4</sup> Carter and McCarus<sup>5</sup> published a time and cost analysis of power vs manual morcellation in 1997. They demonstrated that electromechanical morcellation reduced the average time for extraction of specimen <100 gm by 15 minutes and of specimen weighing 401 to 500 gm by 150 minutes.

To everyone's understanding, this also led to a significant cost reduction despite the more expensive nature of the electromechanical morcellators.

### Modern Morcellators/Contained Morcellation

Ideal morcellators do not exist. The SEMM was soon replaced by morcellators with a rotating knife.<sup>6</sup> The morcellator knife first described by SEMM was further developed in 2000. It was a classic lancet with an interchangeable blade that was inserted through a 10 mm trocar and used to cut a specimen as it was held between two forceps. A posterior culdotomy was made to remove the small pieces of the specimen. The Sawalhe morcellator, developed by Karl Storz, modified the Steiner model and enabled removal of morcellated tissue from the abdominal cavity via the sleeve, obviating the need for a posterior culdotomy that was necessary with the morcellator knife.<sup>6</sup> Karl Storz then developed an even more competitive morcellator in 2007 called the Rotocut G1 morcellator. In comparison to the existing Sawalhe model in a study published in 2007, the Rotocut G1 device accomplished significantly shorter morcellation time, operative time, and duration of anesthesia. Fewer and longer pieces of tissue due to a more effective power output and drive transmission gave a faster removal time. In this model, the generator is located in the hand piece and is activated by a foot pedal.<sup>6</sup> The Gynecare Morcellex tissue morcellator developed by Ethicon Inc. is another popular power morcellator. Unlike the Rotocut G1, the Gynecare Morcellex does not require a foot pedal. In 2009, a randomized controlled trial was initiated to compare the two popular models, the Gynecare Morcellex and the Rotocut G1. There was no statistical difference between the two groups in regard to operative time, morcellation time, weight of excised pieces, blood loss/blood transfusion, intra- or postoperative complications, postoperative pain, hospitalization, or time to return to full working activity. Using a visual analog scale score ranging from 0 (low handling, easy) to 10 (high handling, difficult), the two morcellators were evaluated. There was a significant difference in ease of use, with the Gynecare Morcellex having a higher handling score (average 7.0 for supracervical hysterectomy and 7.2 for myomectomy).<sup>7</sup>

In July 2014, the Gynecare Morcellex was withdrawn from the market by Johnson and Johnson after a statement discouraging the use of power morcellators was released by the FDA (see "Updated FDA Recommendations").

Transcervical morcellation used a longer cannula and blade as the vagina and the cervical canal had to be passed, e.g., after laparoscopic subtotal hysterectomy.<sup>8</sup>

### Complications and Tissue Dissemination

In a study by Milad and Milad,<sup>9</sup> immediate morcellator injuries after hysterectomy, myomectomy, nephrectomy, and splenectomy even the death of 6 patients is reported. Long-term complications of morcellation concern iatrogenic endometriosis-retained leiomyomatosis and dissemination of undiagnosed malignancy.<sup>10</sup> The inadvertent dissemination of malignancy stands in the focus of this editorial and needs special attention. While tissue extraction of ovarian tumors and lymph nodes in endo-bags has been accepted worldwide, tissue morcellation in endo-bags remains widely unaccepted.

### Endometrial Adenocarcinoma

If morcellation of endometrial adenocarcinoma can cause cancerous tissue to be spread throughout the abdomen and lead to possible upstaging of an existing malignancy, this does appear as a maximal threat. Morcellation of endometrial adenocarcinoma can usually be avoided by appropriate preoperative evaluation with endometrial biopsy or dilation and curettage; however, this is not always accurate. Studies have shown a discrepancy of 10 to 16% in histologic diagnosis with endometrial biopsy or curettage when compared with hysterectomy. A recent European evaluation showed a concordance rate of only 62 and 67% of endometrial biopsy and curettage respectively, when compared with hysterectomy.<sup>11</sup>

### Uterine Sarcomas

Since the beginning of tissue morcellation in gynecology, it was strongly advised to exclude any case of unclear preoperative pathology from morcellation. Currently, there is no clear agreement among the available datasets on the prevalence of the postoperative detection of uterine sarcoma associated with surgery for uterine fibroids. In our study, the frequency of unexpected uterine leiomyosarcoma (ULMS) in patients who underwent surgery for uterine fibroids was 0% (0/2,269).<sup>12</sup> In addition, Pritts et al<sup>13</sup> found a low percentage of these cases from a comprehensive analysis of 133 studies, in which there was a 0.051% prevalence of unsuspected ULMS among more than 30,000 women. A recent study from the FDA that analyzed 12,402 women who underwent surgery for uterine fibroids estimates that the prevalence of unexpected ULMS is 0.064%.<sup>14</sup> In a retrospective analysis of 8,720 women who underwent laparoscopic supracervical hysterectomies (LASHs) for presumed uterine fibroids, Bojahr et al<sup>15</sup> found that the postoperative histological analyses revealed two cases of ULMS (0.023%). Recently, Kho et al<sup>16</sup> carried out a prospective cohort study and found that among 10,119 women who underwent a

hysterectomy for benign gynecologic indications, five unexpected cases of ULMS were identified, corresponding to a 0.049% incidence rate for unexpected ULMS. This study found that the frequency of unexpected endometrial stromal sarcoma (ESS) among women who underwent surgery for presumed benign uterine fibroids was 0.044% (1/2,269). Other studies have reported the following statistics: Graebe et al<sup>17</sup> identified three unexpected ESS cases among 1,361 patients who underwent surgery for uterine fibroids (0.22%), Bojahr et al<sup>15</sup> reported four unexpected ESS cases among 10,119 LASHs (0.037%), and Kho et al<sup>16</sup> reported two cases of unexpected ESS among 10,119 hysterectomies (0.019%).

Overall, our study found 6 preoperatively suspected cases of uterine sarcoma and 1 unsuspected case among 2,269 patients undergoing myomectomy and hysterectomy respectively, who had indications of benign uterine fibroids during a 12-year period. Kho et al<sup>16</sup> reported 64 cases of preoperatively suspected uterine sarcoma and 9 cases of unexpected uterine sarcoma among 10,119 hysterectomies performed due to benign indications within a 13-year period.

The prevalence of unexpected uterine sarcomas among patients undergoing uterine fibroid surgery appears to be low, but morcellation can negatively impact the patient's future with regard to the recurrence of the disease and survival. Bogani et al<sup>18</sup> concluded that open power morcellation was associated with a 3- and 4-fold increase in overall and intra-abdominal recurrence of ULMS respectively, as well as a 2.5-fold decrease in overall survival compared with patients whose tumors were removed intact. Guyon et al<sup>19</sup> concluded that morcellation might expose patients to increased morbidity in cases of unrecognized malignancy, due to the intra-abdominal dissemination of cancer.

Selecting the method of surgical treatment for patients with large uterine fibroids currently poses a dilemma for gynecologists due to the risks associated with myomectomy and morcellation in premalignant and malignant uterine tissue. Until a modified morcellation method, such as contained morcellation, can be agreed upon and implemented for clinical practice, it is important to consider the findings of a recent retrospective study. The study by Harris et al<sup>20</sup> included a comparative analysis of 18,299 hysterectomies performed in the 15 months leading up to and the 8 months after the FDA safety communication was released in April 2014. The results show that the application of abdominal (1.7%) and vaginal hysterectomies (2.4%) increased, whereas there was a 4.1% decline in laparoscopic hysterectomies. An overall higher rate of complications was observed (excluding blood transfusions) after the date of the FDA safety communication, from 2.2 to 2.8%, and the rate of

hospital readmission within 30 days also increased from 3.4 to 4.2%. To decrease the risks of unintended morcellation of uterine sarcomas, a preoperative differential diagnosis between uterine fibroids and uterine sarcoma should be performed by utilizing a combination of clinical findings, image modalities, and immunologic and biochemical factors.<sup>12</sup>

### Contained Morcellation: Does it Diminish the Risk?

Fibroid tissue morcellation within a bag is also called contained morcellation. Cohen et al<sup>21</sup> came out with a feasibility study in September 2014 reporting 73 successful cases of morcellation of uteri or myomas with an insufflated bag. There were no complications in this report and no visual evidence of tissue dissemination outside of the isolation bag. The bag used in this case was developed by one of the authors specifically for this use. Recently, many different forms of these bags are being evaluated. We work on a technique homogenizing the tissue in a bag to powder, to be extracted by a catheter technique to be later evaluated for malignancy by genetic technology. Despite all these reports on the danger of spreading malignant disease at morcellation, many of these data are still limited and controversial. In a systematic review of six studies, data seemed to be highly biased and of poor quality, resulting in the author's conclusion that there is no reliable evidence that morcellation significantly results in tumor upstaging or in poorer patient outcome. There is also no evidence from these studies that power morcellation affects patient outcomes differently than any other type of morcellation, or even simple myomectomy. Already a myoma enucleation, the opening of the pseudocapsule in a case of an adenomatoid tumor or a sarcoma, may have the same risk potential than a careful morcellation.

### CONCLUSION

"Primum non nocere" – first not to hurt – the old and always valuable advice of Hippocrates must remain in the center of attention for every surgeon. Laparoscopic power morcellation for tissue extraction should be performed only in cases where any malignancy potential can be most likely excluded. All patients who undergo laparoscopic or hysteroscopic surgery for myoma enucleation or hysterectomy and face morcellation during their surgery should be informed about the possible risks of morcellation in cases of difficult to diagnose and rare cases of unexpected malignancies. Special attention is advised in patients over the age of 50 years for morcellation, as most of the observed preoperative not suspected rare sarcoma cases were in females beyond the age of 50 years. The final advice concerning myomectomy alone, "power morcellation,"

“contained morcellation,” or “open surgery” to avoid unprotected morcellation is still outstanding. Who knows if even myomectomy at laparoscopic, open, or vaginal surgery does not already carry the same risks as we are discussing with morcellation?

## REFERENCES

1. Brown, Jubilee and board of trustees. AAGL Statement to the FDA on Power Morcellation. <http://aagl.org/>. Published July 2014.
2. Semm K. Tissue puncture and loop ligation – new aids for surgical therapeutic pelviscopy (laparoscopy)=endoscopic intraabdominal surgery. *Endoscopy* 1978 May;10(2): 119-124.
3. Semm K. Morcellement and suturing using pelviscopy: not a problem any more (Article in German). *Geburtshilfe Frauenheilkd* 1991 Oct;51(10):843-846.
4. Steiner RA, Wight E, Tadir Y, Haller U. Electrical cutting device for laparoscopic removal of tissue from the abdominal cavity. *Obstet Gynecol* 1993 Mar;81(3):471-474.
5. Carter JE, McCarus SD. Laparoscopic myomectomy. Time and cost analysis of power vs. manual morcellation. *J Reprod Med* 1997 Jul;42(7):383-388.
6. Brucker S, Solomayer E, Zubke W, et al. A newly developed morcellator creates a new dimension in minimally invasive surgery. *J Minim Invasive Gynecol*. 2007 Mar-Apr;14(2): 233-239.
7. Zullo F, Falbo A, Iuliano A, Oppedisano R, Sacchinelli A, Annunziata G, Venturella R, Materazzo C, Tolino A, Palomba S. Randomized controlled study comparing the Gynecare Morcellex and Rotocut G1 tissue morcellators. *J Minim Invasive Gynecol* 2010 Mar-Apr;17(2):192-199.
8. Rosenblatt PL, Makai G, DiSciullo AJ. Laparoscopic supracervical hysterectomy with transcervical morcellation. *J Minim Invasive Gynecol* 2010 May-Jun;17(3):331-336.
9. Milad MP, Milad EA. Laparoscopic morcellator-related complications. *J Minim Invasive Gynecol* 2014 May-Jun;21(3): 486-491.
10. Sepilian V, Della Badia C. Iatrogenic endometriosis caused by uterine morcellation during a supracervical hysterectomy. *Obstet Gynecol* 2003 Nov;102(5 Pt 2):1125-1127.
11. Gungorduk K, Asicioglu O, Ertas IE, Ozdemir IA, Ulker MM, Yildirim G, Ataser G, Sancı M. Comparison of the histopathological diagnoses of preoperative dilation and curettage and Pipelle biopsy. *Eur J Gynaecol Oncol* 2014;35(5):539-543.
12. Abdusattarova K, Alkatout I, Maass N, Mettler L. Incidence of uterine sarcomas among patients operated for uterine fibroids by myomectomy and hysterectomy *Geburtshilfe Frauenheilkd* 2016;76:P303.
13. Pritts EA, Vanness DJ, Berek JS, Parker W, Feinberg R, Feinberg J, Olive DL. The prevalence of occult leiomyosarcoma at surgery for presumed uterine fibroids: a meta-analysis. *Gynecol Surg* 2015;12(3):165-177.
14. Parker WH, Kaunitz AM, Pritts EA, Olive DL, Chalas E, Clarke-Pearson DL, Berek JS. U.S. Food and Drug Administration's guidance regarding morcellation of leiomyomas: well-intentioned, but is it harmful for women? *Obstet Gynecol* 2016 Jan;127(1):18-22.
15. Bojahr B, De Wilde RL, Tchatchian G. Malignancy rate of 10,731 uteri morcellated during laparoscopic supracervical hysterectomy (LASH). *Arch Gynecol Obstet* 2015 Sep;292(3):665-672.
16. Kho KA, Lin K, Hechanova M, Richardson DL. Risk of occult uterine sarcoma in women undergoing hysterectomy for benign indications. *Obstet Gynecol* 2016 Mar;127(3): 468-473.
17. Graebe K, Garcia-Soto A, Aziz M, Valarezo V, Heller PB, Tchabo N, Tobias DH, Salamon C, Ramieri J, Dise C, et al. Incidental power morcellation of malignancy: a retrospective cohort study. *Gynecol Oncol* 2015 Feb;136(2):274-277.
18. Bogani G, Chiappa V, Ditto A, Martinelli F, Donfrancesco C, Indini A, Lorusso D, Raspagliesi F. Morcellation of undiagnosed uterine sarcoma: a critical review. *Crit Rev Oncol Hematol* 2016 Feb;98:302-308.
19. Guyon F, Cordeiro Vidal G, Babin G, Stoeckle E, Querleu D. [A critical assessment of morcellation in case of uterine malignancies and its impact on gynecologic surgery: from "precautionary principle" to "realism"]. *Bull Cancer* 2016 Jan;103(1):96-103.
20. Harris JA, Swenson CW, Uppal S, Kamdar N, Mahner N, As-Sanie S, Morgan DM. Practice patterns and postoperative complications before and after US Food and Drug Administration safety communication on power morcellation. *Am J Obstet Gynecol* 2016 Jan; 214(1):98.e1-98.e13.
21. Cohen SL, Einarsson JI, Wang KC, Brown D, Boruta D, Scheib SA, Fader AN, Shibley T. Contained power morcellation within an insufflated isolation bag. *Obstet Gynecol* 2014 Sep;124(3):491-497.