

# Technical Update on Tissue Morcellation During Gynaecologic Surgery: Its Uses, Complications, and Risks of Unsuspected Malignancy

This technical update has been prepared by the Clinical Practice–Gynaecology Committee of the Society of Obstetricians and Gynaecologists of Canada (SOGC) and the Executive of the Society of Gynecologic Oncology of Canada (GOC) and approved by the Executive and Board of the SOGC and the Board of Directors of the GOC.

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## Abstract

**Objective:** To review the use of tissue morcellation in minimally invasive gynaecological surgery.

**Outcomes:** Morcellation may be used in gynaecological surgery to allow removal of large uterine specimens, providing women with a minimally invasive surgical option. Adverse oncologic outcomes of tissue morcellation should be mitigated through improved patient selection, preoperative investigations, and novel techniques that minimize tissue dispersion.

**Evidence:** Published literature was retrieved through searches of PubMed and Medline in the spring of 2014 using appropriate controlled vocabulary (leiomyosarcoma, uterine neoplasm, uterine myomectomy, hysterectomy) and key words (leiomyoma, endometrial cancer, uterine sarcoma, leiomyosarcoma, morcellation, and MRI). Results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies. There were no date limits but results were limited to English or French language materials. Searches were updated on a regular basis and incorporated in the guideline to August 2014. Grey (unpublished) literature was identified through searching the websites of health technology assessment and health technology assessment-related agencies, clinical practice guideline collections, clinical trial registries, and national and international medical specialty societies.

**Values:** The quality of evidence in this document was rated using the criteria described in the report of the Canadian Task Force on Preventive Health Care. (Table 1)

**Benefits, harms, and costs:** Gynaecologists may offer women minimally invasive surgery and this may involve tissue morcellation and the use of a power morcellator for specimen retrieval. Women should be counselled that in the case of

**Key Words:** leiomyoma, uterine sarcoma, leiomyosarcoma, morcellation, complications

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**Table 1. Key to evidence statements and grading of recommendations, using the ranking of the Canadian Task Force on Preventive Health Care**

Quality of evidence assessment*	Classification of recommendations†
I: Evidence obtained from at least one properly randomized controlled trial	A. There is good evidence to recommend the clinical preventive action
II-1: Evidence from well-designed controlled trials without randomization	B. There is fair evidence to recommend the clinical preventive action
II-2: Evidence from well-designed cohort (prospective or retrospective) or case-control studies, preferably from more than one centre or research group	C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making
II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category	D. There is fair evidence to recommend against the clinical preventive action
III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees	E. There is good evidence to recommend against the clinical preventive action
	L. There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

\*The quality of evidence reported in these guidelines has been adapted from The Evaluation of Evidence criteria described in the Canadian Task Force on Preventive Health Care.<sup>59</sup>

†Recommendations included in these guidelines have been adapted from the Classification of Recommendations criteria described in the Canadian Task Force on Preventive Health Care.<sup>59</sup>

unexpected uterine sarcoma or endometrial cancer, the use of a morcellator is associated with increased risk of tumour dissemination. Appropriate training and safe practices should be in place before offering tissue morcellation.

### Summary Statements

1. Uterine sarcomas may be difficult to diagnose preoperatively. The risk of an unexpected uterine sarcoma following surgery for presumed benign uterine leiomyoma is approximately 1 in 350, and the rate of leiomyosarcoma is 1 in 500. (II-2) This risk increases with age. (II-2)
2. An unexpected uterine sarcoma treated by primary surgery involving tumour disruption, including morcellation of the tumour, has the potential for intra-abdominal tumour-spread and a worse prognosis. (II-2)
3. Uterus-sparing surgery remains a safe option for patients with symptomatic leiomyomas who desire future fertility. (II-1)

### Recommendations

1. Techniques for morcellation of a uterine specimen vary, and physicians should consider employing techniques that minimize specimen disruption and intra-abdominal spread. (III-C)

2. Each patient presenting with uterine leiomyoma should be assessed for the possible presence of malignancy, based on her risk factors and preoperative imaging, although the value of these is limited. (III-C)
3. Preoperative endometrial biopsy and cervical assessment to avoid morcellation of potentially detectable malignant and premalignant conditions is recommended. (II-2A)
4. Hereditary cancer syndromes that increase the risk of uterine malignancy should be considered a contraindication to uncontained uterine morcellation. (III-C)
5. Uterine morcellation is contraindicated in women with established or suspected cancer. (II-2A) If there is a high index of suspicion of a uterine sarcoma prior to surgery, patients should be advised to proceed with a total abdominal hysterectomy, bilateral salpingectomy, and possible oophorectomy. (II-2C) A gynaecologic oncology consultation should be obtained.
6. Tissue morcellation techniques require appropriate training and experience. Safe practice initiatives surrounding morcellation technique and the use of equipment should be implemented at the local level. (II-3B)
7. Morcellation is an acceptable option for retrieval of benign uterine specimens and may facilitate a minimally invasive surgical approach, which is associated with decreased perioperative risks. Each patient should be counselled about the possible risks associated with the use of morcellation, including the risks associated with underlying malignancy. (III-C)

### ABBREVIATIONS

BRCA	breast cancer
ESS	endometrial stromal sarcoma
FDA	Food and Drug Administration
LDH	lactic dehydrogenase
LESS	laparoendoscopic single site morcellation
LMS	leiomyosarcoma
MIS	minimally invasive surgery
MRI	magnetic resonance imagery

### INTRODUCTION

Tissue morcellation during gynaecologic surgery has been widely practiced to facilitate removal of large uteri or uterine myomas through less invasive incisions than those used in a traditional laparotomy.<sup>1</sup> The first electronic

morcellator was introduced in 1993,<sup>2</sup> and morcellation of uterine specimens through the vaginal route or by mini-laparotomy has been a longstanding practice in gynaecology. Recent statements by the United States FDA (April 2014) and Health Canada (May 2014) have discouraged the use of power morcellators in gynaecology because of the risk of spreading an unsuspected uterine malignancy.<sup>3,4</sup>

This technical update reviews the use of tissue morcellation in gynaecological surgery for hysterectomy and myomectomy.

In Canada, 70% of hysterectomies are performed for heavy menstrual bleeding and fibroids.<sup>5</sup> Uterine fibroids are a common benign gynaecologic condition, found in > 80% of black women and > 70% of white women over the age of 50.<sup>6</sup> For women wishing to preserve their fertility, myomectomy is a therapeutic alternative. The benefits of a minimally invasive vaginal or laparoscopic surgery have been clearly established.<sup>1</sup> A vaginal or laparoscopic approach for hysterectomy offers patients faster recovery, reduced intraoperative blood loss, reduced perioperative complications, and a shorter hospital stay than laparotomy.<sup>1,7-9</sup> In certain cases vaginal and laparoscopic hysterectomy may be performed safely on an outpatient basis. Although the literature on the surgical approach for myomectomy is not as robust as it is for hysterectomy, it has been suggested that a minimally invasive approach has similar advantages.<sup>10</sup>

## **MORCELLATION TECHNIQUES**

Large uterine or fibroid size may act as a barrier to offering patients a minimally invasive surgical approach. A variety of morcellation techniques can be employed to reduce the size of the fibroids and to facilitate a vaginal or laparoscopic surgical route (Figure). Vaginal retrieval of the uterine specimen has been long employed, with modifications of the technique for increased uterine size. For this procedure, the specimen is directly visualized and may, if necessary, be incised with a scalpel to assist with removal. The specimen removal may be achieved through colpotomy for vaginal or total laparoscopic hysterectomy<sup>11</sup> or culdotomy for laparoscopic subtotal hysterectomy or myomectomy.<sup>12</sup> There is increasing experience with transvaginal bi-valve morcellation with the uterus in a bag for women with endometrial cancer who have bulky uteri, but larger studies are needed to determine the implications of this extraction method on histologic assessment.<sup>13</sup> The mini-laparotomy is another popular alternative to traditional abdominal hysterectomy/myomectomy and many variations of this technique are available.<sup>14</sup> LESS is currently being explored in gynaecologic surgery, but

the literature is somewhat limited.<sup>15</sup> This is an evolving technique that involves working with several endoscopic articulating instruments through one umbilical incision.<sup>15</sup>

One option for laparoscopic hysterectomy or myomectomy is to perform electromechanical or “power” morcellation to facilitate specimen retrieval.<sup>16</sup> This morcellation device was first approved by the FDA in 1995. The laparoscopic morcellator device consists of a hollow cylinder that penetrates the abdominal wall, ending with a circular blade, through which a grasper can be inserted to pull out an extractable specimen.<sup>16</sup> This device is not approved for transvaginal applications.

The risk of disseminating an unexpected uterine malignancy, particularly LMS, during power morcellation procedures, has raised recent concerns in the media and in the medical field. Both the FDA and Health Canada have issued statements warning about the use of power morcellators because of the risk of inadvertently morcellating a uterine malignancy and the possible intra-abdominal dissemination that may result.<sup>3,4</sup>

### **Recommendation**

1. Techniques for morcellation of a uterine specimen vary, and physicians should consider employing techniques that minimize specimen disruption and intra-abdominal spread. (III-C)

## **DIAGNOSIS OF UTERINE MALIGNANCY**

Endometrial cancer is the most common gynaecologic malignancy. The majority of women with endometrial cancer present with abnormal or postmenopausal bleeding. Endometrial biopsy is highly sensitive and must be performed in this setting. The 5-year survival rates for endometrial cancer are 78% to 91% and 20% to 26 % for stage I and IV disease, respectively.<sup>17,18</sup> In one retrospective series, the most common tumour type inadvertently morcellated was endometrial cancer. This finding highlights the importance of appropriate patient selection and preoperative evaluation, including endometrial biopsy.

Risk factors for endometrial cancer must be identified preoperatively and endometrial biopsies performed as appropriate. Hereditary cancer syndromes which predispose women to endometrial cancer include Lynch syndrome and Cowden syndrome, which increase the risk of endometrial cancer to 22% to 50% and 13% to 19%, respectively. BRCA mutation carriers may also be at risk for endometrial cancer, however this remains controversial.<sup>19,20</sup> Uncontained morcellation should be

**Overview of options for specimen removal available in minimally invasive gynaecologic surgery**

Vaginal morcellation	Mini-laparotomy	Power morcellation
<ul style="list-style-type: none"> <li>➤ with or without a bag</li> <li>➤ through culpotomy or culdotomy</li> </ul>	<ul style="list-style-type: none"> <li>➤ with or without a bag</li> <li>➤ extending trocar incision or another site</li> <li>➤ ± Alexis retractor</li> <li>➤ laparoendoscopic single site morcellation</li> </ul>	<ul style="list-style-type: none"> <li>➤ with or without a bag</li> </ul>

considered a contraindication in women with hereditary predispositions to endometrial cancer even if a negative endometrial biopsy has been obtained.

Uterine sarcomas represent approximately 3% to 6% of all uterine malignancies but 30% of deaths from uterine cancer.<sup>21,22</sup> Of the subtypes of uterine sarcoma, ESS and LMS are among the most difficult to diagnose preoperatively. Low-grade ESS usually grows slowly, with 50% to 76% diagnosed only after surgery. The majority of ESS are diagnosed at an early stage and surgery alone is often curative.

LMS is diagnosed preoperatively in only 65% of patients,<sup>23</sup> with the risk factors presented in Table 2. This tumour type is notoriously difficult to diagnose preoperatively and is often diagnosed on pathologic review of the surgical specimen. The average age of diagnosis is 52.<sup>24</sup> If there is a high index of suspicion of a uterine sarcoma prior to surgery, a gynaecologic oncology consultation should be obtained. Patients should be advised to proceed with a total abdominal hysterectomy, bilateral salpingectomy, and possible oophorectomy.<sup>21</sup>

The risk of unexpected LMS at surgery for presumed benign uterine fibroid is approximately 1 in 500 and the risk of any uterine sarcoma is 1 in 350.<sup>25-30</sup> Wright et al. reviewed a database of 232 882 women who underwent minimally invasive hysterectomy in 2006–2012. Morcellation was performed in 36 470 of these women. Uterine malignancy was identified in 99 cases after morcellation was performed. Although the authors report that 1 in 368 cases of women undergoing morcellation had uterine cancer, there was no information on the preoperative workup (or lack of), type of malignancies detected, or subsequent follow-up.<sup>30</sup> Although clinical features such as the size, rate of growth, and radiologic appearance of the uterine mass have been used to estimate the probability of a malignant tumour, none of these factors can reliably diagnose these malignancies.<sup>25,31</sup>

**Table 2. Risk factors for diagnosis of uterine sarcoma**

Race (leiomyosarcoma (1.51/10 <sup>5</sup> for black women vs. 0.91/10 <sup>5</sup> for white women, and 0.89 for women of other races, <i>P</i> < 0.01) <sup>60</sup>
Tamoxifen use <sup>61</sup>
Previous pelvic radiation <sup>62</sup>
Past history of hereditary retinoblastoma <sup>63</sup>

Improvements in MRI technology have improved the sensitivity of imaging for sarcoma detection, although cost and availability still limit its clinical utility.<sup>32-34</sup> Uterine masses growing in the postmenopausal period in the absence of hormonal stimulation should be considered malignant until proven otherwise. Adult soft tissue sarcoma of any site, including uterine sarcoma, requires reliable and complete excision.<sup>35</sup> Morcellation of an unexpected malignancy prior to its removal, however, presents the potential for tumour seeding and spread.

There is significant concern about the possible negative impact on patients’ prognosis for survival following inadvertent morcellation of a malignant tumour. Disease survival is dependent on stage and dissemination. In general, the 5-year survival is 60% and 90% for stage I (uterine contained) LMS and ESS and 15% and 37% for stage IV (disseminated) LMS and ESS, respectively.<sup>36</sup>

**Preoperative Evaluation**

Better patient selection may reduce the incidence of unsuspected cancer morcellation. A careful history and preoperative assessment may identify known risk factors for uterine cancer. The risk of malignancy increases significantly with age, especially after menopause. Tumour-disrupting procedures should be avoided in postmenopausal women with enlarging uterine fibroids in the absence of hormonal stimulation.



In 2002, Bansal et al.<sup>37</sup> reviewed all uterine tumours identified at hysterectomy. Of 142 sarcomas identified, 51% had undergone endometrial sampling. Preoperative biopsy suggested an invasive tumour in 86%. Endometrial biopsy must be performed for any abnormal uterine bleeding and any suspicion of a uterine malignancy. Endometrial biopsy should be seriously considered prior to any procedure involving uncontained uterine morcellation or potential tumour disruption even in the absence of abnormal bleeding or risk factors.

Additional investigations have been performed to improve the detection of LMS preoperatively. Serum LDH tends to be elevated in LMS and one study found a sensitivity of 100%, however the specificity of the test ranged from 33% to 53% because LDH is elevated in many patients with uterine fibroids, which limit its use as a screening tool.<sup>32</sup> MRI has also been shown to have excellent sensitivity in detecting LMS. In one study the positive predictive value ranged from 52.6% with MRI alone to 100% with the combined use of dynamic MRI and specific serum LDH isozymes.<sup>32</sup> Sato et al. recently studied the role of diffusion weighted MRI and demonstrated excellent sensitivity but a positive predictive value of only 67%.<sup>33</sup> Tamura et al. described a series of patients who underwent ultrasound-guided biopsy when a screening MRI was suspicious for uterine LMS. Sensitivity, specificity, and the positive and negative predictive values of biopsy in the aforementioned study were 91.7%, 100%, 100%, and 96.2%, respectively, in the 38 patients who subsequently underwent definitive surgery.<sup>34</sup> Obvious limitations for a universal approach such as this are the cost and invasive nature of these investigations for all women with uterine fibroids. There may be a role for LDH, MRI, and even biopsy for young women who wish to maintain fertility and who require a myomectomy or tumour-disrupting procedure. In these selected cases, the use of serum LDH, MRI, and biopsies may be considered as part of an individualized approach to patient care; however, more research is required.

The true solution to the morcellation dilemma will lie in professionals following surgical and oncologic principles in line with the novel approaches to controlled/contained morcellation that are required. One such approach was described by Favero et al. in 2012.<sup>38</sup> Morcellation of uteri containing known endometrial cancer was carried out within an endoscopic surgical pouch without dissemination or spill into the peritoneal cavity. The described technique added an average of 13 minutes to operative time and resulted in no intraoperative complications or excessive blood loss in this series.<sup>38</sup> Montella et al. reported on their use of a sealed vaginal morcellation technique within a

bag after completion of total laparoscopic hysterectomy in women with known endometrial cancer and large uteri. The mean additional operative time required for contained morcellation in this series was 12.1 minutes.<sup>13</sup> These techniques need to be carefully studied to determine the potential impact on histologic assessment of the specimen for determination of adjuvant treatment.

### Summary Statement

1. Uterine sarcomas may be difficult to diagnose preoperatively. The risk of an unexpected uterine sarcoma following surgery for presumed benign uterine leiomyoma is approximately 1 in 350, and the rate of leiomyosarcoma is 1 in 500. (II-2) This risk increases with age. (II-2)

### Recommendations

2. Each patient presenting with uterine leiomyoma should be assessed for the possible presence of malignancy, based on her risk factors and preoperative imaging, although the value of these is limited. (III-C)
3. Preoperative endometrial biopsy and cervical assessment to avoid morcellation of potentially detectable malignant and premalignant conditions is recommended. (II-2A)
4. Hereditary cancer syndromes that increase the risk of uterine malignancy should be considered a contraindication to uncontained uterine morcellation. (III-C)

### Prognosis Following Surgery for Uterine Sarcomas

Preoperative diagnosis of uterine sarcoma is challenging, therefore patients should be counselled that there is a small chance that apparently benign leiomyomas may be malignant. There is evidence that prognosis is worse for patients initially treated with myomectomy without morcellation instead of hysterectomy when the final pathologic diagnosis is LMS.<sup>39–41</sup>

The FDA statement<sup>3</sup> addressing concerns about the use of power morcellation is based on the limited literature (9 studies—8 articles and 1 conference abstract)<sup>24,26,27,35,36,42–44</sup> currently available that examines the risk of uterine sarcoma diagnosis when surgery is done for a presumed benign disease. These data are summarized in Table 3.

As previously noted the risk of unexpected LMS is approximately 1 in 500, and the risk of any uterine sarcoma is 1 in 350. The weakness in the current literature includes the lack of patient selection criteria for surgery and risk stratification for diagnosis of uterine sarcoma based on patients' risk factor profiles or age.

**Table 3. Risk of inadvertent uterine cancer diagnosis in surgery for benign indications**

Reference	Surgery performed	Indication	Number of patients	Cancer diagnosis
Seidman et al. (2012) <sup>42</sup>	Hysterectomies with morcellation	Unspecified	1091	1 LMS 1 ESS
Rowland et al. (2012) <sup>44</sup>	Laparoscopic hysterectomy with morcellation	Unspecified	1115	3 LMS 2 ESS 5 endometrial cancers
Leibsohn et al. (1990) <sup>27</sup>	Hysterectomy, unspecified	Leiomyoma	1429	7 LMS
Parker et al. (1994) <sup>25</sup>	Hysterectomy, unspecified	Leiomyoma	1332	1 LMS 2 ESS
Takamizawa et al. (1999) <sup>28</sup>	Hysterectomy, unspecified	Leiomyoma	923	1 LMS 1 ESS 1 endometrial cancer
Kamikabeya et al. (2010) <sup>43</sup>	Hysterectomy, unspecified	Leiomyoma	1364	2 sarcomas 1 endometrial cancer
Wright et al., 2014 <sup>30</sup>	Hysterectomy, unspecified	Unspecified	36 470	99 uterine cancers (histology unspecified)

Several studies have attempted to ascertain whether morcellation of a malignant uterine specimen affects patient prognosis. Seidman et al. reviewed 1091 cases of uterine morcellation from 2005 to 2010.<sup>42</sup> They found unexpected leiomyoma variants or atypical and malignant smooth muscle tumours in 1.2% of cases using power morcellation, including one ESS and one LMS. They also examined follow-up laparoscopies, both from in-house and consultation cases and found that disseminated disease was present in 64.3% of all tumours. Only disseminated LMS, however, was associated with subsequent death (75%; 95% CI 30.1% to 98.7%), with an average post-diagnosis survival of 24.3 months (95% CI 8.4 to 40.3 months). The dissemination and viability of non-cancerous leiomyoma variants in this series also highlighted the potential alteration of their natural history with the use of electronic morcellation.

Park et al. retrospectively compared outcomes between patients with apparent early-stage low-grade ESS who did and did not undergo a type of morcellation procedure.<sup>45</sup> Indicative of the difficulty of preoperative diagnosis, tumour morcellation occurred in 46% of patients with low-grade ESS in this Korean study. Five-year disease-free survival was 84% in the group who did not undergo uterine morcellation and 55% in those who did. The rate of abdominopelvic recurrence was 7.4% and 31.4%, again in favour of the group who did not undergo a morcellation procedure.<sup>45</sup>

Park et al. also assessed 56 consecutive patients with stage I and II uterine LMS, 25 with and 31 without tumour morcellation.<sup>46</sup> They found that tumour morcellation was significantly associated with poorer overall survival

(46% vs. 73% at 5 years). The percentage of patients with abdominopelvic dissemination (sarcomatosis or vaginal apex recurrence) was significantly greater in patients with tumour morcellation than in those without morcellation (44% vs. 12.9%,  $P = 0.032$ ). Within the study period, 22.6% and 56%, respectively, of patients in the non-morcellated group and the morcellated group had a recurrence.

George et al. recently published their retrospective data evaluating intraperitoneal morcellation on outcomes of localized uterine LMS.<sup>47</sup> In this retrospective cohort study, a multivariate adjusted model demonstrated a risk of recurrence associated with morcellation of greater than 3 times that of total abdominal hysterectomy. The median recurrence-free survival was 10.8 months for those who underwent a morcellation procedure and 39.6 months those who did not. There was a trend towards lower overall survival in the morcellation group at 36 months (64% vs 73%); however, this did not reach statistical significance (Table 4).

Re-exploration after morcellation of cancer has revealed a significant rate of dissemination of viable tissue. Oduyebo et al. reported that 28.5% of patients with LMS who had undergone tumour morcellation had disseminated peritoneal disease a median of 33 days after original surgery.<sup>48</sup>

Several studies have examined the impact of tumour disruption during fibroid surgery when an LMS is later diagnosed. Perri et al. looked at a series of 37 patients diagnosed with stage I LMS from 1969 to 2005.<sup>49</sup> Twenty-one patients were treated with total hysterectomy and 18 patients initially underwent procedures involving tumour disruption (myomectomy, laparoscopic myomectomy with morcellation, hysteroscopic myomectomy, subtotal

**Table 4. Oncologic consequences of uterine cancer morcellation**

Reference	Type of malignancy	Number of patients	5-year survival		Abdominopelvic recurrence	
			Morcellation	No morcellation	Morcellation	No morcellation
Perri et al. 2009 <sup>49</sup>	LMS	37	37.5%*	62%*		
Park et al. 2011 <sup>45</sup>	Low-grade endometrial stromal sarcoma	50	55%†	84%†	31.4%	7.4%
Park et al. 2011 <sup>46</sup>	LMS	56	46%	73%	44%	12.5%
George et al. 2014 <sup>47</sup>	LMS	58	10.8 months‡	39.6 months‡	85.7%	20%

Statistically significant unless otherwise stated

\*72-month study period

†Statistically significant difference in disease-free survival (no statistically significant difference in overall survival detected in this series)

‡Median recurrence-free survival

hysterectomy). They showed that survival was 2.8-fold better in the group initially treated with hysterectomy. Two of the patients included in this series initially underwent power morcellation.<sup>49</sup>

Morice et al. similarly examined 123 patients diagnosed with uterine sarcomas.<sup>39</sup> In this series, 38 patients underwent surgery with some degree of tumour disruption—vaginal or laparoscopic morcellation (with morcellation described in the surgical procedure), myomectomy, tumour biopsy, or hysteroscopic myomectomy. They reported a trend of increased tumour recurrence at 3 months in the group that did not have total hysterectomy, but this trend was not statistically significant. Recurrence rate at 6 months and overall survival did not differ between the 2 groups.

Loizzi et al. concluded that myomectomy affected patients' prognosis in the treatment of LMS no more than hysterectomy or more comprehensive surgery. However, the sample size in this study was small, and only 5 out of 28 patients underwent myomectomy.<sup>40</sup>

**Summary Statement**

2. An unexpected uterine sarcoma treated by primary surgery involving tumour disruption, including morcellation of the tumour, has the potential for intra-abdominal tumour-spread and a worse prognosis. (II-2)

**Recommendation**

5. Uterine morcellation is contraindicated in women with established or suspected cancer. (II-2A) If there is a high index of suspicion of a uterine sarcoma prior to surgery, patients should be advised to proceed with a total abdominal hysterectomy, bilateral salpingectomy, and possible oophorectomy. (II-2C) A gynaecologic oncology consultation should be obtained.

**Summary of Recommendations from Other Organizations**

Health Canada and a number of international organizations have recently issued statements on the use of the power morcellators and morcellation during gynaecologic surgery. These are summarized in Table 5.

**Other Complications With Uterine Morcellation**

Case reports/series have described the progression of morcellation-related pelvic implants to complex atypical hyperplasia, iatrogenic endometriosis, peritoneal adenomyoma, and peritoneal leiomyomatosis.<sup>50–55</sup> Parasitic peritoneal leiomyomatosis, resulting from the implantation and growth of viable leiomyoma particles disseminated throughout the peritoneal cavity occurs in about 0.9% of patients with morcellated fibroids.<sup>52</sup> Although it is a benign pathology unlikely to affect overall survival, it requires many of these women to have a second surgery for symptoms such as pain or mass effect. Surgery may also be indicated by a suspicion of a new malignancy when imaging is highly suspicious and preoperative pathology difficult to interpret.<sup>54–56</sup>

The true rate of complications with the power morcellator is difficult to ascertain because reporting of injuries is inconsistent and underreporting is expected. Milad and Milad completed a systematic review of morcellator-related injuries in the US from 1993 to 2013, including gynaecology, urology, and general surgery.<sup>56</sup> Most of the injuries they identified were from the FDA Medical Device Reporting and Manufacturer and User Facility Device Experience databases. There were 55 injuries noted and 6 deaths attributed to morcellator use. Injuries described were to the small and large bowel, vascular systems, kidney, ureter, bladder, and diaphragm. Surgeon inexperience was a notable finding in many of these cases. The authors suggested that increased surgeon experience and the

**Table 5. Summary of recommendations regarding uterine morcellation**

Society of Gynecologic Oncology – (December 2013)<sup>41</sup>

Power morcellator is generally contraindicated in the presence of documented or highly suspected malignancy, and may be inadvisable in premalignant conditions or risk-reducing surgery.

Currently there is no reliable method to differentiate benign from malignant (LMS or ESS) before they are removed. Furthermore, these diseases offer an extremely poor prognosis even when specimens are removed intact.

Patients and doctors should communicate about the risks, benefits, and alternatives of all procedures so that a patient is able to make an informed and voluntary decision about accepting or declining medical care.

American Association of Gynecologic Laparoscopists (April 2014)<sup>64</sup>

Most women with uterine cancer can be diagnosed prior surgical intervention.

Between 1 in 400 and 1 in 1000 women who undergo hysterectomy for presumed benign uterine myomas will be diagnosed with LMS.

The prognosis of patients with LMS is universally poor and may be worsened in the setting of power morcellation.

American College of Obstetricians and Gynecologists (May 2014)

Recommend comprehensive patient counselling and including the following points in consent:

There is a risk of inadvertent LMS diagnosis when a myomectomy/hysterectomy is being performed for a benign leiomyoma (2:1000).

Morcellation will increase peritoneal dissemination if LMS is diagnosed and may worsen patients' prognosis.

Minimally invasive surgical approach decreases perioperative risks to the patient.

Food and Drug Association (April 2014)<sup>3</sup>

1 in 350 women undergoing hysterectomy or myomectomy for the treatment of fibroids is found to have an unsuspected uterine cancer.

Laparoscopic power morcellation poses a risk of spreading unsuspected cancerous tissue, notably uterine sarcomas, beyond the uterus.

FDA discourages the use of laparoscopic power morcellation during hysterectomy or myomectomy for uterine fibroids.

Health Canada (May 2014)<sup>4</sup>

Recommends the following considerations for physicians taking care of women with uterine fibroids:

Recognize the prevalence of unsuspected uterine sarcoma in patients under consideration for hysterectomy or myomectomy for the treatment of uterine fibroids.

Consider the treatment alternatives for women with symptomatic uterine fibroids and review these options with each prospective surgical patient. Apart from a laparoscopic approach, alternative surgical procedures exist that do not require power morcellation. Also, some surgeons and centers may recommend closed morcellation in a bag as a way to reduce the risk of inadvertent spread of uterine tissue.

Be aware and inform patients that laparoscopic power morcellation of unsuspected uterine sarcoma during hysterectomy or myomectomy may disseminate the disease and negatively impact prognosis.

implementation of safe practices might help to protect against such complications.

### Recommendation

6. Tissue morcellation techniques require appropriate training and experience. Safe practice initiatives surrounding morcellation technique and the use of equipment should be implemented at the local level. (II-3B)

### SUMMARY

MIS has proven benefits for patients and likely for society as a whole. Tissue morcellation including the use of power morcellators is often required to facilitate a less invasive surgical approach. However, there are risks with removing tissue through these techniques that include dissemination of undiagnosed malignancy and injury to adjacent organs and/or vasculature.

Uterine sarcomas can be difficult to diagnose preoperatively and carry a poor prognosis if disseminated. The available literature reports that prognosis is worse in patients who are initially treated with a surgical approach involving tumour disruption. Patients should be carefully evaluated preoperatively for the possibility of malignancy and counselled appropriately about uterus-preserving surgery, as well as morcellation for specimen removal. The adverse outcomes of dissemination of viable tissue are apparent with the morcellation of both benign and malignant tissues. The morcellation of sarcoma results in a decrease in both progression-free and overall survival. The incidence of unanticipated malignancy may be reduced with appropriate patient selection, the liberal use of endometrial biopsy, and selective investigations including LDH, MRI, and biopsies in clinical circumstances in which uterine preservation is desired.



Although power morcellation is an acceptable option for the retrieval of benign uterine specimens, appropriate training and safe practice should be implemented prior to its use. Given the existing limitations in preoperative diagnosis and the potential complications of morcellation even of benign uterine tumours, steps must be taken to develop new techniques for controlled uterine morcellation. Controlled or contained morcellation techniques should eliminate tissue dispersion through the peritoneal cavity while maintaining a minimally invasive approach with its associated benefits. The value of MIS for the patient needs to be weighed against the risk of morcellation. Lowering the risk of morcellation, through preoperative investigations, improved technique, or improved morcellators, will benefit patients.

Techniques that minimize specimen disruption and intra-abdominal spread should be further investigated and shared within the gynaecologic community.

### Summary Statement

3. Uterus-sparing surgery remains a safe option for patients with symptomatic leiomyomas who desire future fertility. (II-1)

### Recommendation

7. Morcellation is an acceptable option for retrieval of benign uterine specimens and may facilitate a minimally invasive surgical approach, which is associated with decreased perioperative risks. Each patient should be counselled about the possible risks associated with the use of morcellation, including the risks associated with underlying malignancy. (III-C)

Information on the use of morcellators is changing rapidly. This update was submitted for publication on September 25, 2014. On November 24, 2014 the FDA issued an update on laparoscopic uterine power morcellation in hysterectomy and myomectomy and the American Congress of Obstetricians and Gynecologists released a statement on power morcellation.<sup>64</sup> New data on the true risk of sarcoma in fibroids undergoing surgery will be released in early 2015. These two recently released documents and the upcoming 2015 data will be carefully reviewed; if warranted, an update to this joint SOGC/GOC technical update will be published in early 2015. Please visit the FDA and ACOG websites<sup>63,64</sup> for their November 24, 2014 statements.

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