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Original article

Power morcellation—An emerging risk complicating minimally invasive surgery for uterine mesenchymal neoplasms

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ABSTRACT

Study objective: To determine the local incidence and clinical consequences of myoma, after intraperitoneal dissemination via morcellation.
Materials and methods: An electronic search for laparoscopic myomectomies in the computer database of the KK Women's and Children's Hospital (Singapore) and sarcomas or myomata with atypical features in the National Cancer Registry (Singapore) was performed for a 10-year study period. The identified patients had their medical records were traced and their data were extracted and studied in detail.
Results: The incidence of unexpected diagnosis (i.e., variants, atypia, and malignancy) was 0.23%, and the incidence of unexpected sarcoma was 0.10%. One of four patients who underwent a subsequent laparotomy had peritoneal dissemination. She unfortunately was also the only mortality in this study.
Conclusion: Laparoscopic surgery had proven benefits over open surgery, although the dissemination of unexpected malignancy and extrauterine seeding were major concerns. To date, morcellation in the endobag or cutting the specimen using a knife or scissors may be alternative surgical techniques.

Background/Introduction

Power morcellation has become a gold standard technique and is used in modern minimally invasive surgery (MIS) for hysterectomy and myomectomy indicated for benign gynecological disease (e.g., uterine fibroids). However, it has a dire consequence if the morcellated tissues are sarcomas or tumors with atypical features. This study aimed to determine the local incidence and clinical consequences of these tumors, after intraperitoneal dissemination via morcellation.

Materials and methods

An electronic search for laparoscopic myomectomies and morcellation was performed for a 10-year study period in KK Women's and Children's Hospital (Singapore). A separate search in the National Cancer Registry (Singapore) during the same period was performed using the keywords: “leiomyosarcoma”, “smooth muscle tumor of uncertain malignant potential” (“STUMP”), “endometrial stromal sarcoma”, “cellular leiomyoma”, and “atypical leiomyoma”. The identified patients who met the study criteria (i.e., sarcomas or myomata with atypical features) and who were operated on for a presumed benign leiomyoma via laparoscopy and morcellation had their medical records traced and their data extracted and studied in detail.

Results

From 2004 to 2013 in our center, 3013 MIS myomectomies were performed with the aid of morcellation. Seven patients were subsequently diagnosed as having malignancy, leiomyoma variants, or atypical lesions on histological examination (Table 1). This finding represents an estimated 0.23% incidence of unexpected diagnosis (i.e., variants, atypia, and malignancy). The incidence of unexpected sarcoma is 0.10%. The ages of patients ranged 32–52 years. Two patients in their early 30s with atypical leiomyoma and cellular leiomyoma were appreciatively younger. The lesion sizes were variable, but all lesions were > 4 cm. There was a mix of solitary and multiple lesions in all categories.

For all seven patients with an unexpected diagnosis, follow-up procedures were offered to complete cancer staging and evaluate

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Table 1
Detailed analysis of patients with an unexpected diagnosis, after power morcellation for suspected leiomyoma.

Patient	Age (y)	Dx	Size of mass	1st Peritoneal diagnosis		2nd Peritoneal diagnosis		Clinical follow up		
				Dx	Interval (mo.)	Dx	Interval (mo)	Status	Treatment	Interval (mo.)
1H	52	LMS	Multiple, largest = 5.7 cm	—	14			Alive	None	100
2Y	43	LMS	9 cm	LMS	1	LMS	11	Deceased	Chemotherapy & radiotherapy	51
3L	42	STUMP	Multiple, largest = 7	Declined surgery				Alive	None	80
4W	41	STUMP	Multiple, largest = 12 cm	—	2			Alive	None	10
5C	47	ESS	Multiple, largest = 4.4 cm	—	1			Alive	None	76
6W	35	AL	4.8 cm	Nil				Alive	None	32
7L	32	CL	Multiple, largest = 4.1 cm	Nil				Alive	None	62

AL = atypical leiomyoma; CL = cellular leiomyoma; Dx = diagnosis; ESS = endometrial stromal sarcoma; LMS = leiomyosarcoma; STUMP = smooth muscle tumor of uncertain malignant potential.

potential iatrogenic peritoneal dissemination. Staging laparotomy was performed for three patients with cancer. One STUMP patient declined surgery, whereas the other patient underwent a total hysterectomy and bilateral salpingo-oophorectomy. Both patients with cellular leiomyoma and atypical leiomyoma were not keen for surgeries after discussion.

Discussion

Uterine myomata are the most common benign uterine neoplasm and typically occur in the middle to late reproductive years. Myomectomy, as an conservative management option, is the primary treatment for symptomatic myomata. It is often requested, even when there is no further desire for pregnancy because of social or religious reasons. Myomectomy is increasingly performed by reproductive surgeons[1,2] because myomata may contribute to infertility and may be responsible for serious complications during pregnancy.[3] Since 1979, laparoscopic myomectomy has been performed.[4] It has gained importance over the years because laparoscopic surgeries reduce operative blood loss, is associated with less of a hemoglobin drop, more patients are fully recuperated by Day 15, and it has fewer overall complications, compared to open myomectomy.[5] In addition, it is cosmetically more desirable and appealing for younger women who have not had previous open abdominal surgeries.

Power morcellation has advanced MIS and allows a greater number of fibroids and larger fibroids to be removed laparoscopically. A power morcellator is a hollow cylindrical instrument that penetrates the abdominal wall, with sharp cutting blades on its end through which a grasper can be inserted to pull the myoma into the cylinder to cut out extractable pieces. However, morcellation is associated with the spreading of the cellular material of the morcellated tissue. Loose fibroid fragments may become infarcted, necrotic, or parasitic and disseminated if they are left behind.[6] Disseminated disease reportedly occurs in more than one-half of patients.[7] Of note, at least six of 3013 cases of myoma morcellation in our study were associated with the subsequent development of disseminated peritoneal leiomyomatosis. In the year 2013, we reported a miniseries that was managed in our center.[8] Of the four patients who underwent a subsequent laparotomy, only one patient had peritoneal dissemination. She was unfortunately the only mortality in our study with a survival of 51 months.

In addition, there is a concern of disseminating unexpected malignancy with increased mortality.[9,10] Morcellation is an independent risk factor for tumor recurrence. It is prognostically associated with a shorter disease-free interval and overall survival. Only morcellation, size, and mitosis were significant factors, based on multivariate analysis.[11] Unexpected diagnosis of variant leiomyoma, atypia, and malignancy occurred in 0.23% of patients with a presumed preoperative diagnosis of benign uterine leiomyoma who underwent morcellation in our study. The incidence of unexpected sarcoma was 0.10%. This rate was similar to the incidence reported by Seidman et al[7] but lower than the incidence quoted by Leibsohn et al,[12] Parker et al,[13] and Kho et al[14] (Table 2).

Uterine sarcomas are rare and represent approximately 7.8% of all invasive uterine cancers locally (4.9% leiomyosarcomas; 2.9% endometrial stromal sarcomas).[15] They are aggressive tumors with a high rate of recurrence.[16] Moreover, there is no reliable preoperative diagnostic tools to differentiate uterine sarcomas from their benign counterparts.[17] Our 10-year data showed a local sarcoma prevalence rate of 0.65% in all patients undergoing MIS or laparotomy hysterectomies and myomectomies. This is higher than the unexpected postmorcellation sarcoma rate of 0.10%. This finding demonstrates the importance of preoperative risk stratification.

In a safety communication notice, the United States Food and Drug Administration (Silver Spring, MD, USA) recently discouraged the use of laparoscopic power morcellation during hysterectomy or myomectomy for the treatment of women with uterine fibroids. One of the largest suppliers of the device subsequently suspended its sale until the medical community redefines the role of morcellation. Despite decades of experience, the understanding of the short- and long-term sequelae of the morcellation is limited. Hence, during preoperative counseling with patients who are undergoing laparoscopic myomectomy and hysterectomy for which morcellation is anticipated, it is imperative to include the possible risk of recurrence at extrauterine locations, despite the surgeon's best efforts, and possible dissemination of unexpected malignancy with an associated increase in mortality.

Table 2
Different studies reporting the incidence of unexpected sarcoma.

Study	Year	Incidence of unexpected sarcoma (%)
Leibsohn et al[12]	1990	0.49
Parker et al[13]	1994	0.23
Seidman et al[7]	2012	0.27
Kho et al[14]	2014	0.09
Our study	2015	0.10

Whether the pros of laparoscopic surgeries can outweigh the cons of dissemination of unexpected malignancy and extrauterine seeding or whether banning the morcellation procedure will solve the issue are hotly debated topics, especially in the world of gynecology endoscopy. Complete abandonment of power morcellation will deprive many women from benefiting from MIS surgeries. While waiting for the development of more effective diagnostic tools to differentiate between sarcomas and benign myoma,[18] alternative treatment options (e.g., vaginal hysterectomy, abdominal hysterectomy, laparoscopically assisted vaginal hysterectomy, natural orifices gynecological endoscopic surgeries) and their risks and benefits should be discussed with patients.

Morcellation in a specimen bag may minimize the risk of spread in the peritoneal cavity. However it requires significant laparoscopic skills and experience. There are potential concerns such as insufficient bag size, reduced visualization, disruption of the morcellator by the bag, and morcellation of the bag and surrounding organs leading to visceral injuries. Further studies are required to evaluate the safety and feasibility of this technique.

Conclusion

Laparoscopic surgery had proven benefits over open surgery. However, the concern of disseminating unexpected malignancy raised a significant issue. Informed consent is crucial at this moment. Patients should be warned about an unexpected malignancy that may spread and worsen the prognosis if power morcellation is considered the best option for benign uterine fibroids. Alternative treatment options should be discussed.

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