

# Laparoscopic myomectomy in a single centre over 10 years: a retrospective study

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**Introduction:** We retrospectively reviewed medical records of patients who underwent laparoscopic myomectomy in a hospital in Hong Kong over a period of 10 years.

**Methods:** Medical records of women who underwent laparoscopic myomectomy at the United Christian Hospital between January 2012 and December 2021 were retrospectively reviewed. Outcomes were compared between patients with fibroids >8 cm and patients with fibroids ≤8 cm and between patients with fibroids at the broad ligament or low positions and patients with fibroids at common locations.

**Results:** A total of 225 women aged 25 to 56 years were identified and a total of 460 fibroids were removed. Of 225 women, 47 (20.9%) had a fibroid >8 cm, whereas 17 (3.7%) had a fibroid at the broad ligament or low positions. Intraoperative complications included subcutaneous emphysema (n=3), breakage of the bag during contained power morcellation (n=1), and blood loss of 1400 ml (n=2). Postoperative complications included fever (n=4), wound infection with gaping (n=3), and pelvic haematoma (n=1). The rate of complication was 6.22%, and the rate of major complication was 2.22%. The rate of undiagnosed uterine malignancy was 0.4%. Compared with patients with fibroids ≤8 cm, patients with fibroids >8 cm had higher blood loss (161.56 vs 265.96 ml, p=0.029), operating time (145.44 vs 183.30 min, p=0.002), and intraoperative complications (1 vs 5, p<0.001). However, patients with fibroids at common locations were comparable with patients with fibroids at the broad ligament or low positions in terms of blood loss, operating time, inpatient stay, and intraoperative and postoperative complications.

**Conclusions:** Laparoscopic myomectomy is safe for fibroids >8 cm or at the broad ligament or low positions.

**Keywords:** Laparoscopic myomectomy; Leiomyoma; Morcellation; Myomectomy

## Introduction

Uterine leiomyomata (fibroids) are common in women, with a cumulative incidence at the age of 45 years being 70% to 80%<sup>1</sup>. Depending on the location and size, the fibroids may be asymptomatic. However, up to 50% of women have symptoms such as heavy menstrual bleeding, pressure symptoms, pelvic pain, and infertility<sup>1</sup>. Although medical treatments may relieve some symptoms such as heavy menstrual bleeding, surgical treatment may still be needed in most women. Myomectomy is the surgery of choice for women who wish to preserve the uterus. Laparoscopic myomectomy results in a faster recovery and a lower postoperative pain score<sup>2</sup>. Most studies of laparoscopic myomectomy are from Europe, India or Korea.<sup>3</sup> We retrospectively reviewed medical records of patients who underwent laparoscopic myomectomy in a hospital in Hong Kong over a period of 10 years. The current guidelines recommend an open approach in cases with lower-segment or cervical fibroids, or fibroids >6 to 10 cm<sup>1</sup>.

## Methods

We retrospectively reviewed the medical records of women who underwent laparoscopic myomectomy at

the United Christian Hospital between January 2012 and December 2021. Cases are identified by the Clinical Data Analysis and Reporting System. Data collected included demographics (age, parity, menopausal status, body mass index, previous surgery), presenting symptoms, any use of preoperative gonadotrophin-releasing hormone agonist (GnRH-a), operative details (number, size, and location of fibroids removed, location of primary trocar insertion, operating time, blood loss, any use of electromechanical morcellation, and any intraoperative complications), length of stay, postoperative complications, and the histological diagnosis of the fibroids. Intraoperative complications were defined as blood loss >1000 ml, major organ damage involving bowel, bladder, and blood vessels, laparo-conversion, the need for hysterectomy, and the presence of subcutaneous emphysema. Perioperative complications included postoperative fever, wound complication, and haematoma formation.

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All patients were assessed by the operating surgeon preoperatively. In general, patients with uterine sizes >20 weeks or with more than two fibroids >8 cm and previous surgery were advised to have the open approach. Laparoscopic myomectomies were performed under general anaesthesia with patients in the lithotomy position. The urinary bladder was catheterised using a Foley catheter. A uterine manipulator could be used to aid in the mobilisation of the uterus. An intraumbilical incision was used in all cases, except for those with uterine size >16 weeks. Supraumbilical incisions (3 cm above umbilicus) were used for primary trocar insertion. Three 5-mm ancillary lateral ports were used; the one at the left lower quadrant was extended to 12 to 15 mm for morcellation. Diluted vasopressin (20 international units diluted into 100 ml of normal saline) was injected into the myometrium to minimise bleeding. For most cases, a Harmonic scalpel was used and a 5-mm myoma screw was used to aid the enucleation of the fibroid. In earlier cases, the myometrium and serosa were closed in two to three layers of 0 Vicryl sutures with baseball sutures at the outermost layer. Later, self-retaining sutures such as V-Loc or Stratafix were used to close the myometrium, whereas the uterine serosa was closed by 0 Vicryl in baseball sutures. Vicryl sutures (2/0) were used to close the endometrial cavity if the cavity was entered. The fibroids were morcellated electromechanically via the left lower ancillary using the Supercut Sawalhe II Morcellator (Karl Storz, Tuttlingen, Germany). Since 2017, with the warning by the United States Food and Drug Administration of the possibility of upgrading the staging of leiomyosarcoma through the use of power morcellation<sup>4</sup>, we have changed to in-bag morcellation using MetraBag (Bowa Medical, Gomaringen, Germany) or the Vaxcon safe pouch SPB10XL bag (BNR, Sejong-si, South Korea). Anti-adhesives were used in selected cases.

Outcomes were compared between patients with fibroids >8 cm and patients with fibroids ≤8 cm and between patients with fibroids at the broad ligament or low positions and patients with fibroids at common locations.

## Results

A total of 225 women aged 25 to 56 years with a body mass index of 14.4 to 37 kg/m<sup>2</sup> were identified (Table 1). Of these, 99 (44%) were nulliparous and 126 (56%) were parous. One (0.44%) woman was menopausal. With regard to the symptoms, 96 (42.7%) women had menorrhagia, 73 (32.4%) women had pressure symptoms, 26 (11.6%) women had both, 17 (7.6%) women had pelvic pain, and 13 (5.8%) women were infertile. In addition, 182 (80.9%) women had no previous surgery, whereas

**Table 1. Patient characteristics**

Characteristic	Value*
Age, y	40 (25-56)
Body mass index, kg/m <sup>2</sup>	22.5 (14.4-37)
Parity	1 (0-3)
No. of fibroids removed	1 (1-16)
Size of largest fibroid removed, cm	7 (3-16)
Blood loss, ml	100 (10-1400)
Operative time, min	140 (60-433)
Length of stay, d	3 (1-8)

\* Data are presented as median (range)

31 (13.8%) women had a Caesarean section, six (2.7%) women had open surgery, and six (2.7%) women had laparoscopic surgery.

A total of 460 fibroids were removed. Of these, 206 (44.8%) were intramural, 190 (41.3%) were subserosal, 21 (4.6%) were submucosal, and 43 (9.3%) were pedunculated. With regard to fibroid location, 179 (38.9%) were anterior, 163 (35.4%) were posterior, 70 (15.2%) were fundal, and 31 (6.7%) were at the lateral uterine wall, whereas 17 (3.7%) were at the broad ligament (n=13) or low positions (n=4), which include fibroids posterior to the cervix, posteriorly lower and lateral at the internal os level and lower segment (Table 2). Supraumbilical ports were used in nine patients (Table 3). After 2017, preoperative GnRH-a was used in 16 (7.1%) patients to shrink the fibroids for more operative space. The supraumbilical port was used in one of the 16 patients.

Power morcellation was used. In 14 (6.2%) patients, manual morcellation with a cold knife through the umbilical port was used, based on the surgeon's preference or machine failure. After March 2018, in-bag morcellation was used in 106 (47.1%) patients to avoid the possibility of upgrading the staging of leiomyosarcoma through the use of power morcellation.

With regard to intraoperative complications, three patients had subcutaneous emphysema; one of them needed intensive care unit admission. One patient had breakage of the bag during contained power morcellation; the fibroid was 16×8 cm<sup>2</sup> and weighed 727 g, and the left lower ancillary port was extended to 4 cm for manual morcellation afterwards. Two patients had blood loss of 1400 ml; one of them required blood transfusion of one unit (Table 4). No patient had a bladder, bowel or

**Table 2. Details of 17 patients with fibroids at the broad ligament or low positions**

Year of operation	Size of fibroid, cm <sup>2</sup>	Location of fibroid	Operating time, min	Blood loss, ml
2021	12×12	Lower anterior wall with left broad ligament involvement	156	50
2021	7×7	Right anterolateral wall extending to broad ligament	109	100
2019	10×10	Right broad ligament	202	200
2018	8×8	Left lateral extending to broad ligament	278	450
2018	10×9	Lower posterior down to cervix	285	800
	8×8	Anterior intramural		
2017	4×4	Right lower broad ligament	90	100
2017	7×7	Left lower segment with submucosal component	115	100
2017	8×7	Right broad ligament	148	300
2016	10×10	Posterior subserosal just above cervix	369	200
2015	8×8	Right broad ligament	154	350
2015	5×5	Left broad ligament	269	200
2015	6×5	Right broad ligament	182	100
2015	6×6	Right broad ligament	111	50
2015	4×4	Pedunculated and arising from left lateral wall below uterine artery	81	10
2015	10×10	Left broad ligament	188	150
2014	10×5	Right broad ligament	76	10
2014	8×7	Right broad ligament	130	880

vascular injury. No laparo-conversion or hysterectomy was performed. Postoperative complications included fever (n=4), which was resolved with antibiotics; wound infection with gaping over the umbilical wound (n=2) or the left lower ancillary port wound (n=1), which was managed by re-suturing of the wounds under local anaesthesia; and a 5-cm pelvic haematoma resulting in a 4g/dL decrease in the haemoglobin level (n=1). This woman had an 8-cm right broad ligament fibroid and intraoperative blood loss of 880 ml; she was managed conservatively with intravenous antibiotics.

For the histological diagnoses, 208 (92.4%) cases were leiomyomas, 12 (5.3%) cases were adenomyomas, one (0.4%) case was a leiomyoma with bizarre nuclei, two (0.9%) cases were smooth muscle tumours of uncertain malignant potential, one (0.4%) case was an atypical leiomyoma with low risk of recurrence, and one (0.4%) case was a high-grade endometrial stromal sarcoma, for which power morcellation was not used owing to the soft consistency of the mass, which was retrieved inside an endobag through the ancillary port. The patient subsequently had a total abdominal hysterectomy.

One patient had iatrogenic parasitic fibroids. In April 2014, she underwent laparoscopic myomectomy with

power morcellation for a 6×7 cm<sup>2</sup> anterior wall intramural fibroid at age 38 years. In 2015, she was diagnosed with gastric carcinoma and underwent distal radical gastrectomy. In 2017, she had a self-palpable pelvic mass, and computed tomography showed a 5-cm pedunculated fibroid and two masses (10 cm and 4 cm) suspicious of peritoneal metastasis. Ultrasound-guided biopsy results showed a cellular leiomyoma. In March 2018, she underwent total abdominal hysterectomy and bilateral salpingo-oophorectomy. There was a 4-cm pedunculated soft-tissue mass arising from the back of the uterus and buried in the left pararectal space and another 4-cm soft tissue mass on the top of the uterus. Histology confirmed a leiomyoma.

Compared with patients with fibroids ≤8 cm, patients with fibroids >8 cm had higher blood loss (161.56 vs 265.96 ml, p=0.029), operating time (145.44 vs 183.30 min, p=0.002), and intraoperative complications (1 vs 5, p<0.001) [Table 5]. However, patients with fibroids at common locations were comparable with patients with fibroids at the broad ligament or low positions in terms of blood loss, operating time, inpatient stay, and intraoperative and postoperative complications.

## Discussion

The overall complication rate of laparoscopic

**Table 3. Details of nine patients with the use of supraumbilical ports**

Year of operation	Size of uterus, wk	No. of fibroids	Size of fibroids, cm	Location of fibroids	Weight of fibroids, g
2021	20	3	8	Anterior intramural	471
			6	Anterior intramural	
			4	Anterior intramural	
2019	18	2	10	Posterior intramural extending to broad ligament	450
			3	Anterior subserosal	
2018	18	4	10	Posterior subserosal down to cervix	408
			8	Anterior intramural	
			4	Fundal subserosal	
			4	Fundal subserosal	
2018	20	1	15	Fundal subserosal	571
2017*	14	1	8	Lateral subserosal	192
2017	20	1	12	Anterior intramural	502
2017	18	1	12	Right anterior	260
2016	18	3	12	Fundal subserosal	442
			2	Anterior subserosal	
			2	Anterior subserosal	
			2	Anterior subserosal	
2015	16	3	14	Lateral subserosal	650
			3	Lateral pedunculated	
			2	Left anterior subserosal	

\* The patient underwent laparoscopic ovarian cystectomy at the same time for an endometriotic cyst (10×12 cm<sup>2</sup>)

**Table 4. Intraoperative and postoperative complications**

Complications	No. (%) of patients
<b>Intraoperative</b>	
Subcutaneous emphysema	2 (0.89)
Surgical treatment for subcutaneous emphysema requiring intensive care unit admission*	1 (0.44)
Blood loss >1000 ml*	2 (0.89)
Breakage of bag with extension of wound for specimen retrieval*	1 (0.44)
<b>Postoperative</b>	
Fever	4 (1.78)
Wound infection	3 (1.33)
Pelvic haematoma*	1 (0.44)
<b>Overall complications</b>	<b>14 (6.22)</b>
<b>Overall major complications</b>	<b>5 (2.22)</b>

\* Major complication

myomectomy in our centre over a period of 10 years was 6.22%, comparable with the 2.08% to 11% reported in other series<sup>5</sup>. The rate of major complications was 2.22%,

compatible with the 0.31% to 3.5% reported in other series<sup>5</sup>. For uterine size >16 weeks, we used supraumbilical port entry or preoperative GnRH-a to maximise the surgical spaces. GnRH-a was not used in earlier cases, because it can make the plane of cleavage less obvious and lead to obliteration of the pseudocapsule<sup>6</sup>. In later cases, we found that the use of GnRH-a would not increase the difficulty in enucleation of fibroids laparoscopically. We thus used GnRH-a more often for cases with uterine size >16 weeks. The histological diagnosis in one (0.4%) patient was a high-grade endometrial stromal sarcoma; the rate of unexpected malignancy is similar to the 0.1% to 0.4% reported in other series<sup>5</sup>. Around 14% of sarcomas have ultrasound signs typical of a benign fibroid, and endometrial stromal sarcoma was most often misclassified as benign on ultrasound<sup>7</sup>. The incidence of an inadvertent leiomyosarcoma is <1 in 1000 for women aged <40 years<sup>8</sup>, but up to 1 in 158 for women aged 55 to 59 years<sup>9</sup>. Power morcellation should be used with extreme caution in women aged >45 years. Other risk factors for leiomyosarcoma include African ethnicity, use of tamoxifen for >5 years, pelvic radiation, and hereditary predisposition to uterine cancer<sup>6</sup>.

One (0.4%) patient had iatrogenic parasitic fibroids after uncontained power morcellation. It is likely to have

**Table 5. Comparison between patients with fibroids >8 cm and patients with fibroids ≤8 cm and between patients with fibroids at common locations and patients with fibroids at broad ligament or low positions**

Operative characteristic	Fibroid size		P value	Fibroid location		P value
	≤8 cm (n=178)	>8 cm (n=47)		Common locations (n=208)	Broad ligament or low positions (n=17)	
Mean blood loss, ml	161.56	265.96	0.029	178.45	243.53	0.314
Mean operating time, min	145.44	183.30	0.002	151.48	176.18	0.234
Mean inpatient stay, d	3.01	3.34	0.145	3.04	3.59	0.148
No. of intraoperative complications	1	5	<0.001	6	0	1.0
No. of postoperative complications	6	2	0.771	6	2	0.115

been caused by high-speed spinning of the morcellator with rotational cutting of the fibroid. Tissue fragments can spread all over the peritoneum, resulting in parasitic fibroids or disseminated peritoneal leiomyomatosis when tissue fragments neovascularised from the implanted sites. Such an incidence is reported to be 0.1% to 1%<sup>10</sup>. Contained morcellation can decrease the risk of upstaging the disease of an unexpected leiomyosarcoma from stage I (confined to the uterus) to stage III (peritoneal disease) and the risk of parasitic fibroids or disseminated peritoneal leiomyomatosis.

Blood loss and operating time were significantly higher for patients with fibroids >8 cm. Two patients had blood loss of 1400 ml; both had a uterine size >16 weeks with 12×12 cm<sup>2</sup> intramural fibroids weighing 502 g and 618 g, respectively. These patients underwent surgery in 2017 and were not given preoperative GnRH-a. The blood loss could have been reduced if preoperative GnRH-a had been given. Three patients had subcutaneous emphysema; the operating time in two of whom was 207 and 214 minutes. Risk factors for subcutaneous emphysema include the use of >5 cannulas, size of trocar >10 mm, procedure time >3.5 hours, repetitive movements causing disruption of tissue integrity, and consequent structural weakness<sup>11</sup>. Nevertheless, repetitive movements cannot be avoided during morcellation, especially for large fibroids, and the trocar size for a morcellator is 12 to 15 mm. In patients with large fibroids, the surgeon should liaise with the anaesthetist for prompt recognition and management of subcutaneous emphysema, which usually resolves spontaneously owing to the high diffusion rate of carbon dioxide.

The 17 patients with fibroids at the broad ligament or low positions were comparable with patients with fibroids at common locations in terms of blood loss, operating time, inpatient stay, and intraoperative and

postoperative complications. The lack of a significant difference may be the result of the small sample size and no major intraoperative complications in the 17 patients with fibroids at the broad ligament or low positions.

### Conclusion

Laparoscopic myomectomy is safe for fibroids >8 cm or fibroids at the broad ligament or low positions.

### Contributors

Both authors designed the study, acquired the data, analysed the data, drafted the manuscript, and critically revised the manuscript for important intellectual content. Both authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

### Conflicts of interest

Both authors have disclosed no conflicts of interest.

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### Data availability

All data generated or analysed during the present study are available from the corresponding author upon reasonable request.

### Ethics approval

The study was approved by the Kowloon Central Cluster Research Ethics Committee (reference: KC/KE-22-0129/ER-4). The patients were treated in accordance with the tenets of the Declaration of Helsinki. The patients provided written informed consent for all treatments and procedures and for publication.

## References

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1. Amoah A, Joseph N, Reap S, Quinn SD. Appraisal of national and international uterine fibroid management guidelines: a systematic review. *BJOG* 2022;129:356-64. [Crossref](#)
2. Jin C, Hu Y, Chen XC, et al. Laparoscopic versus open myomectomy: a meta-analysis of randomized controlled trials. *Eur J Obstet Gynecol Reprod Biol* 2009;145:14-21. [Crossref](#)
3. Mallick R, Odejinmi F. Pushing the boundaries of laparoscopic myomectomy: a comparative analysis for peri-operative outcomes in 323 women undergoing laparoscopic myomectomy in a tertiary referral centre. *Gynecol Surg* 2017;14:22. [Crossref](#)
4. Food and Drug Administration. FDA updated assessment of the use of laparoscopic power morcellators to treat uterine fibroids. Accessed 18 August 2023. Available from: [www.fda.gov/media/109018/download](http://www.fda.gov/media/109018/download).
5. Bean EM, Cutner A, Holland T, Vashisht A, Jurkovic D, Saridogan E. Laparoscopic myomectomy: a single-center retrospective review of 514 patients. *J Minim Invasive Gynecol* 2017;24:485-93. [Crossref](#)
6. Bryant-Smith A, Holland T. Laparoscopic myomectomy: a review of alternatives, techniques and controversies. *Obstet Gynaecol* 2018;20:261-8. [Crossref](#)
7. Ludovisi M, Moro F, Pasciuto T, et al. Imaging in gynecological disease (15): clinical and ultrasound characteristics of uterine sarcoma. *Ultrasound Obstet Gynecol* 2019;54:676-87. [Crossref](#)
8. British Society for Gynaecological Endoscopy. BSGE statement on power morcellation. Accessed 18 August 2023. Available from: [www.bsge.org.uk/news/bsge-statement-power-morcellation](http://www.bsge.org.uk/news/bsge-statement-power-morcellation).
9. Brohl AS, Li I, Andikyan V, et al. Age-stratified risk of unexpected uterine sarcoma following surgery for presumed benign leiomyoma. *Oncologist* 2015;20:433-9. [Crossref](#)
10. Lynam S, Young L, Morozov V, Rao G, Roque DM. Risk, risk reduction and management of occult malignancy diagnosed after uterine morcellation: a commentary. *Womens Health (Lond)* 2015;11:929-44. [Crossref](#)
11. Ott DE. Subcutaneous emphysema--beyond the pneumoperitoneum. *JLS* 2014;18:1-7. [Crossref](#)