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Comparison of clinical outcomes and postoperative quality of life after surgical treatment of type II submucous myoma via laparoscopy or hysteroscopy

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Abstract

Objective: This study was performed to compare the clinical outcomes, advantages, and disadvantages of laparoscopic myomectomy (LM) and transcervical resection of myoma (TCRM) in the treatment of type II submucous myoma.

Methods: In total, 136 patients with type II submucous myoma with a tumour diameter of 4 to 5 cm were randomly assigned to the hysteroscopy group or laparoscopy group.

Results: The operative duration was shorter and the intraoperative bleeding volume was lower in the hysteroscopy than laparoscopy group. The success rate of the single-stage operation was obviously higher in the laparoscopy than hysteroscopy group. The duration of postoperative antibiotic use and the length of hospital stay were shorter in the hysteroscopy than laparoscopy group. The time to complete healing of the muscle layer was shorter in the hysteroscopy than laparoscopy group. The rate of intraoperative complications was lower in the hysteroscopy than laparoscopy group.

Conclusion: Both hysteroscopic and laparoscopic surgery have beneficial effects in the treatment of type II submucous myoma. Hysteroscopic surgery has the advantages of a short operative duration, low intraoperative bleeding volume, fast postoperative recovery, and high quality of life. Laparoscopic surgery involves many intraoperative complications and slow recovery of ovarian function.

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Introduction

Myoma of the uterus is a common benign tumour that is usually caused by uterine smooth muscle hyperplasia. It often affects women aged 30 to 50 years.[1] The main symptoms include increased menstrual blood volume, increased leucorrhoea, sterility, menostaxis, and abdominal pain.[2,3] Three types of myoma of the uterus have been identified based on the relationship between the myoma and the uterine muscle wall: submucous myoma, intramural myoma, and subserous myoma. The incidence of the submucous myoma subtype is particularly high.[4] Submucous myoma is a benign tumour. The myoma develops on the mucosal surface of the uterus and bulges into the uterine cavity, with the uterine mucosa covering the surface. According to the relationship between the myoma and the mesometrium, submucous myoma is divided into three types: type 0, type I, and type II.[5] Surgery is currently the main treatment method for myoma of the uterus. With the development of endoscopic technology, multiple endoscopic surgical methods have been developed to treat myoma of the uterus.[6] Laparoscopic myomectomy (LM) has a wide range of surgical indications, is minimally invasive, involves difficult suturing techniques, and results in uterine scarring.[7,8] Hysteroscopic transcervical resection of myoma (TCRM) also has some limitations, such as the potential for conversion to laparotomy and incomplete intraoperative resection in patients with larger or previously myomectomised submucosal myomas.[9,10] Many studies have been performed to compare the clinical outcomes of abdominal hysterectomy and laparoscopic or hysteroscopic surgery.[11] However, no final conclusions have been reached regarding the clinical outcomes, advantages, and disadvantages of laparoscopic and hysteroscopic surgery. In this study, the clinical outcomes and postoperative recovery of patients with type II submucous myoma treated by laparoscopic and hysteroscopic surgery were compared.

Methods

Ethical approval

This study was approved by the Institutional Ethics Committee of Harbin Medical University Cancer Hospital, and written informed consent was obtained from all participants. The study conforms to the Enhancing the QUAlity and Transparency Of health Research (EQUATOR) Network guidelines.

General data

Patients with type II submucous myoma who were treated at Harbin Medical University Cancer Hospital from June 2016 to December 2017 were assigned to the hysteroscopy group or the laparoscopy group using the random number table method. The inclusion criteria were as follows: the symptoms conformed to the clinical diagnostic criteria for submucous

myoma of the uterus;[12] the clinical symptoms were a prolonged menstrual period, increased menstrual blood volume, irregular bleeding, cramps, and sterility; the maximum diameter of the myoma was within 4×5 cm, indicating type II; the distance between the edge of the myoma and the serosal surface was >5 mm; surgery was indicated; and the patient wished to maintain her fertility and therefore required preservation of the uterus. The exclusion criteria were as follows: multiple myomas; severe heart, liver, or kidney dysfunction; another malignant tumour; a cervical neoplasm, submucous myoma, or broad ligament myoma. Comparison of the differences in the general data between the two groups showed no statistical significance (Table 1).

Surgical methods

Laparoscopy group. LM was applied in the laparoscopy group. After inducing general anaesthesia, a conventional puncture was performed to induce pneumoperitoneum with a carbon dioxide pressure of 12 to 14 mmHg. Four ports were established in the abdomen for placement of the surgical equipment. Six micrograms of diluted pituitrin were injected into the envelope of the myoma. The tumour was cut open lengthwise to the core, pulled, separated, and removed with a rotary cutting machine or forceps. The endometrium and muscle layer were then sutured. Finally, the ports were sutured closed.

Hysteroscopy group. TCRM was applied in the hysteroscopy group. The patient was asked to take the lithotomy position for exploration of the uterine cavity and expansion of the cervical canal. The electric cutting system of the hysteroscope was switched on, and the resectoscope was placed in the uterine cavity to observe the relationships among the position and size of the myoma and intima of the uterine cavity. The patients in this group wished to maintain their fertility. A needle electrode was used to decompose the mucous membrane and envelope of the myoma where it was protruding into the uterine cavity. During this procedure, an intravenous drip of oxytocin was administered to the patient. A ring-like electrode was used to gradually cut the tumour from the surface for clamping with the forceps. After the tumour had been reduced, it was removed with the forceps.

Observation indicators

Perioperative indicators. The perioperative indicators were the operative duration, intraoperative bleeding volume, success rate of the one-stage operation, duration of postoperative antibiotic use, time to complete healing of the muscle layer, and postoperative improvement in menstruation.

Intraoperative complications. The intraoperative complications were intraoperative bleeding, perforation of the uterus,

Table 1. Comparison of general data.

Group	n	Age (years)	Disease course (months)	BMI (kg/m^2)	Maximum tumour diameter (mm)
Laparoscopy group	68	45.24 ± 4.58	13.65 ± 2.18	23.1 ± 4.5	45.33 ± 10.32
Hysteroscopy group	68	45.11 ± 3.89	13.77 ± 1.84	23.7 ± 5.2	45.11 ± 9.24
t		0.144	0.122	0.401	0.244
P		>0.05	>0.05	>0.05	>0.05
95% CI		(−1.30, 1.56)	(−0.80, 0.56)	(−2.23, 1.03)	(−3.07, 3.51)

Data are presented as mean ± standard deviation. BMI, body mass index; CI, confidence interval.

transurethral resection syndrome, and subcutaneous emphysema.

Quality of life. The patients' quality of life was evaluated at 1, 3, and 6 months after surgery using the 36-Item Short Form Health Survey to assess eight dimensions (i.e., physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health) with a maximum score of 100.

Ovarian function. The indicators of ovarian function were tested as follows: 3 to 5 mL of fasting venous blood was collected 2 to 3 days before menstruation prior to the surgery and after 2 to 3 days of menstruation at 3 months after the surgery. The serum was separated for determination of the serum oestradiol (E_2) and follicle-stimulating hormone (FSH) levels via electrochemiluminescence.

Statistical methods

SPSS 22.0 statistical software (IBM Corp., Armonk, NY, USA) was used for the statistical analysis. Measurement data are expressed as mean ± standard deviation. An independent-samples t-test was used for intergroup comparisons, and a paired t-test was used for intragroup comparisons. Enumeration data are presented as rates. The X^2 test was employed for intergroup comparisons. A P value of <0.05 indicated that the difference was statistically significant.

Results

In total, 136 patients with type II submucous myoma were included in this study. The hysteroscopy group and laparoscopy group comprised 68 patients each.

Comparison of perioperative indicators

The operative duration was significantly shorter and the intraoperative bleeding volume was significantly lower in the hysteroscopy than laparoscopy group ($P < 0.05$). The success rate of the one-stage operation was significantly higher in the laparoscopy than hysteroscopy group ($P < 0.05$). The duration of postoperative antibiotic use and the length of hospital stay were significantly shorter in the hysteroscopy than laparoscopy group ($P < 0.05$). Comparison of the time to complete healing of the muscle layer between the groups also showed a significant difference ($P < 0.05$). However, comparison of the rate of improvement in menstruation after the surgery between the groups showed no significant difference (Table 2).

Comparison of intraoperative complications

The rate of intraoperative complications was significantly lower in the laparoscopy than hysteroscopy group ($P < 0.05$), as shown in Table 3.

Comparison of quality of life

The quality of life at 1, 3, and 6 months after the surgery was significantly better in the hysteroscopy than laparoscopy group ($P < 0.05$), as shown in Table 4.

Comparison of ovarian function indicators

In the hysteroscopy group, the 3-month postoperative serum E_2 level was lower than the preoperative serum E_2 level. The FSH level was higher in the hysteroscopy than laparoscopy group. These differences were statistically significant ($P < 0.05$), as shown in Table 5.

Table 2. Comparison of perioperative indicators.

Group	n	Operative duration (hours)	Intraoperative bleeding volume (ml)	Success rate of one-time operation	Duration of postoperative antibiotic use (days)	Length of hospital stay (days)	Time to complete healing of muscle layer (months)	Rate of postoperative improvement in menstruation
Laparoscopy group	68	29.55 ± 3.14	23.53 ± 2.31	68 (100)	3.20 ± 1.73	3.58 ± 2.44	4.22 ± 1.19	65 (95.58)
Hysteroscopy group	62	25.04 ± 1.24	17.41 ± 4.49	62 (91.18)	2.10 ± 1.33	2.26 ± 2.04	0.99 ± 0.36	60 (96.77)
t/X^2		11.016	4.783	4.359	4.157	3.423	17.780	0.316
P		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	>0.05
95% CI		(3.70, 5.32)	(4.87, 7.37)	(0.58, 1.79)	(0.57, 1.63)	(0.55, 2.09)	(2.93, 3.53)	(0.63, 1.81)

Data are presented as n (%) or mean ± standard deviation. CI, confidence interval.

Discussion

With the popularisation of minimally invasive technologies, LM and TCRM are gradually being applied in the clinical treatment of uterine myoma. These procedures are favoured by doctors and patients because of their advantages, such as minimal trauma, fast recovery, and few complications.[13] However, no final conclusions have been reached regarding the use of LM or TCRM in treating type II submucous myoma, which involves many operational difficulties. Research has shown that regardless of whether patients with submucous myoma undergo LM or TCRM, the intestinal wall can be fully preserved and the pelvic cavity suffers little interference. However, there are many requirements for the surgeon.[14]

In the present study, the operative duration was shorter and the intraoperative bleeding volume was lower in the hysteroscopy than laparoscopy group; in addition, the duration of postoperative antibiotic use, length of hospital stay, and time to healing of the muscle layer were shorter in the hysteroscopy than laparoscopy group. The above factors resulted in a better quality of life for patients who underwent TCRM than for those who underwent LM. TCRM requires no incision or suturing. In addition, TCRM induces less trauma. Thus, the operative duration and postoperative recovery time are minimised.[15] Chinese scholars have also reported that TCRM is better for the treatment of submucous myoma and allows a faster recovery time.[16] TCRM is suitable for type 0 and I submucous myomas. Excision of large type II submucous myomas requires more prudent selection of the surgical method.[5] In patients with a large myoma that is difficult to remove all at once, it is only necessary to remove at least 70% of the myoma; full removal should not be required. If necessary, a two-stage operation can be

Table 3. Comparison of intraoperative complications.

Group	n	Bleeding	Uterine perforation	Transurethral resection syndrome (mild)	Subcutaneous emphysema	Hypercapnia	Total
Laparoscopy group	68	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.47)	0 (0.00)	1 (1.47)
Hysteroscopy group	62	0 (0.00)	1 (1.61)	7 (11.29)	0 (0.00)	0 (0.00)	8 (12.90)
X^2							4.094
P							<0.05

Data are presented as n (%).

Table 4. Comparison of quality of life scores.

Group	n	1 month postoperatively	3 months postoperatively	6 months postoperatively
Laparoscopy group	68	57.24 ± 6.01	61.04 ± 4.98	65.32 ± 5.08
Hysteroscopy group	62	62.32 ± 5.84	65.78 ± 5.06	70.29 ± 5.21
t		3.929	4.327	4.426
P		<0.05	<0.05	<0.05
95% CI		$(-7.12, -3.04)$	$(-6.47, -3.01)$	$(-6.74, -3.20)$

Data are presented as mean $\pm$ standard deviation. CI, confidence interval.

considered. TCRM usually has advantages in the treatment of small-diameter submucous myomas with low surgical difficulty. However, it has some limitations in the treatment of large submucous myomas, such as the risk of uterine perforation, increased bleeding, and incomplete excision.[17,18] The main complications include intraoperative bleeding, uterine perforation, gynaecological transurethral resection syndrome (similar to transurethral resection of the prostate syndrome), and air embolism.[19] Complete TCRM could not be achieved at one time in six patients in the present study because of the large tumour size and intraoperative liquid absorption. Laparoscopic treatment of large submucous myomas could prevent complications such as incomplete excision, uterine perforation, and damage to a large area of the endometrium. Laparoscopic treatment creates small operative wounds and has little influence on the internal environment, thus contributing to the reduced rate of postoperative complications. Myomas and their corresponding surgical treatments can lead to ovarian and haemodynamic disorders affecting oestrogen release, resulting in abnormal sex hormone expression.[20,21]

After long-term recovery, menstruation can improve in patients undergoing both types of surgery. Hormone secretion kinetics have indicated that a decrease in the E_2 level and an increase in the FSH level are early changes involved in the decline of ovarian function.[22] Thus, LM and TCRM have different impacts on ovarian function in patients with a submucous myoma. Laparoscopic surgery has a low impact on patients because it does not obviously affect the tissues and organs around the myoma, does not affect the ovarian

Table 5. Comparison of ovarian function indicators before and after surgery

Group	E_2 (pg/ml) Before surgery	After surgery	t value	P value	95% CI	FSH (IU/L) Before surgery	After surgery	t value	P value	95% CI
Laparoscopy group	68.47 ± 7.11	44.88 ± 5.89	11.257	<0.05	(21.4, 25.78)	7.35 ± 1.44	11.45 ± 1.43	8.459	<0.05	(−4.58, −3.62)
Hysteroscopy group	67.30 ± 6.98	48.11 ± 6.11	12.347	<0.05	(16.88, 21.5)	7.25 ± 1.83	12.78 ± 1.98	7.124	<0.05	(−6.20, −4.86)
t	0.495	2.847				0.294	4.061			
P	>0.05	<0.05				>0.05	<0.05			
95% CI	(−1.25, 3.59)	(−5.30, − 1.16)				(−0.47, 0.67)	(−1.93, −0.73)			

Data are presented as mean ± standard deviation. CI, confidence interval; E_2, oestradiol; FSH, follicle-stimulating hormone.

blood supply, and helps to normalise oestrogen secretion.

Declaration of conflicting interests

The authors declare that there are no conflicts of interest.

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