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ORIGINAL RESEARCH

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A comparative study on myomectomy and total hysterectomy in the treatment of perimenopausal uterine fibroids

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Abstract

This study aims to compare the clinical efficacy of myomectomy and total hysterectomy in the treatment of perimenopausal uterine fibroids. 124 cases of uterine fibroids were randomly divided into a control group and a study group, each with 62 cases. The control group underwent a total hysterectomy. Study participants underwent a myomectomy. Both groups of patients were observed and compared for surgery-related indicators, quality of life scores, perimenopausal syndrome and inflammatory factors. The study group had a shorter operation time and less intraoperative blood loss ($p < 0.05$). Before operation, there was no significant difference in Quality of life Short Form 36 (SF-36) score, Interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α) and IL-10 between both groups ($p > 0.05$) at 6 months after operation, SF-36 score in both groups were higher than before operation, and IL-6, TNF-α and IL-10 in both groups were higher than before operation ($p < 0.05$). Perimenopausal syndrome incidence was significantly lower in the study group than in the control group ($p < 0.05$). Myomectomy is more suitable for treating perimenopausal uterine fibroids.

Keywords

Myomectomy; Total hysterectomy; Perimenopausal period; Uterine fibroids

1. Introduction

In current clinical practice, uterine fibroids are now considered a benign tumor of the female reproductive system. Most often, it affects middle-aged women (30~50 years old), particularly perimenopausal women. In female populations, the prevalence of uterine fibroids ranges from 5% to 10%, with perimenopausal women accounting for 40%–50% [1]. Symptoms of uterine fibroids may vary by patient, depending on the size, location and number of tumors. Here are several common symptoms, including (1) Abnormal menstruation: increased menstrual flow, irregular menstrual cycles and prolonged duration. (2) Pelvic pain: persistent pelvic pain, pressure or discomfort. (3) Frequent or urgent urination: urination is frequent or urgent when uterine fibroids compress the bladder. (4) Compressive symptoms: such as abdominal distension, constipation or difficulty defecating. (5) Infertility: uterine fibroids may affect endometrial embedding and conception. A clear understanding of the origin and pathogenesis of uterine fibroids remains elusive. However, estrogen levels and genetic factors may contribute to uterine fibroids. Estrogen is a major hormonal driver of uterine fibroid growth. In uterine leiomyomas, estrogen receptors are highly sensitive to stimulation, which is why uterine fibroids may enlarge at high estrogen levels. Uterine fibroids are also linked to genetic factors. An increased incidence of uterine fibroids is associated with family history, ethnic differences and mutations in multiple tumor-associated genes. Pathologically, uterine fibroids are composed of smooth muscle cells surrounded by fibrous connective tissue. They differ in size, shape and location. Additionally, there is a possibility of forming a single tumor nodule or multiple tumor nodules. Fibroids can grow into the intrauterine space (adenomyoma) or outside the uterus (myomas of the uterine wall). Based on previous clinical data, uterine fibroids are not treated exactly and both surgical and non-surgical treatment methods can be considered. In this case, surgery is preferred over non-surgical treatments [2]. Laparotomy was mostly used in surgery in the past. However, it is often resisted and rejected by patients due to its large invasiveness, slow postoperative recovery, and obvious pain, limiting its clinical application. With the development of minimally invasive techniques in recent years, laparoscopic surgery has become more common as a means of treating uterine fibroids due to the advantages of less invasiveness and rapid postoperative recovery [3, 4]. Myomectomy preserves the uterus or (and) ovaries and avoids some of the adverse clinical effects of a hysterectomy. Increasingly, patients with uterine fibroids have paid high attention to the issue of removing or retaining the uterus due to improvements in their quality of life and health and hygiene concepts. Even if they are already perimenopausal, they hope to preserve the uterus to the greatest extent possible [5]. Consequently, patients receiving treatment

in our hospital for uterine fibroids (all perimenopausal) underwent myomectomy or total hysterectomy in this study. Their overall efficacy was compared, which is reported as follows.

2. Materials and methods

2.1 Clinical data

124 patients with uterine fibroids admitted to our hospital from March 2022 to March 2023 were studied. They were randomly divided into a control group (n = 62) and a study group (n = 62). Clinical data between both groups did not differ significantly ($p > 0.05$) Table 1.

2.1.1 Inclusion criteria

(1) Patients were confirmed to have uterine fibroids by clinical examination (such as B ultrasound, *etc.*); (2) Patients had relevant surgical indications (① abnormal increase in menstrual volume or significantly prolonged menstruation; ② one or more abnormal menstrual conditions, such as irregular appearance in the vagina; ③ accompanied by typical symptoms like rectal or bladder compression); (3) patients were perimenopausal (determination criteria: age >40 years to 1 year after the last menstrual period; or menstrual cycle changes >1 time and the interval was more than 7 days); (4) no recent history of hormone medications (within 3 months before surgery); (5) patients were informed and signed the consent form.

2.1.2 Exclusion criteria

(1) More than 3 fibroids; (2) abnormal uterine bleeding required diagnostic curettage, which was confirmed by pathological examination with endometrial lesions; (3) organ function abnormalities (such as kidney, heart, *etc.*); (4) endocrine, immune system, breast disease; (5) malignant tumors in other parts or systems; (6) during pregnancy or lactation; (7) patients who had recently undergone treatment (within 3 months).

2.2 Method

In both groups, laparoscopic surgery was performed with general anesthesia, as well as a standardized lithotomy position. At the umbilical port, an incision (length controlled at 1 cm) was made, and then at the left and right lower quadrant positions, puncture holes (length maintained between 0.5 and 1.5 cm) were made, a carbon dioxide (CO_2) pneumoperitoneum was built, and standardized surgical procedures were performed.

The study group underwent a myomectomy. With monopolar electrocoagulation, the myometrium was incised until the patient's myoma capsule. Large grasping forceps or myoma drill were used in combination with atraumatic grasping forceps. Traction or countertraction was performed to remove the myoma tumor nucleus completely, meticulously and accurately; finally, an absorbable suture (Vicryl suture, model 0) was applied. The myometrium was used to perform suture closure, and the wound surface was cleaned to stanch bleeding.

In the control group, a total hysterectomy was done. With the vascular closure system, the electrocoagulation treatment for bilateral round uterine ligaments was performed, followed by this operation for proper ovarian ligaments and mesosalpinx. Finally, they were cut off. When this operation was completed, the bladder was cut off, the peritoneum was reflected, and then the bladder was pushed down appropriately (generally 2 cm). To perform electrocoagulation treatment on bilateral uterine veins, bipolar electrocoagulation was combined with scissors. Then they were cut off, and monopolar electrocoagulation was used to perform the cutting operation around the bilateral uterosacral ligament. The top of the vagina (ring) was cut off, and the uterine body was removed. Meanwhile, the cervix was removed. The vaginal stump was continuously sutured with the absorbable suture (No. 0). In both groups, both ovaries were preserved during the surgical procedure and no other surgical procedures were performed that could affect ovarian function.

After the operation, all vital signs of the patients were closely monitored. Oxytocin was given to promote uterine contraction in the study group, and antibiotics were continuously given to the control group (2 days).

2.3 Outcome measures

(1) Surgery-related indicators: Operation time, intraoperative blood loss, *etc.*

(2) Quality of life Short Form 36 (SF-36) was used to assess health status before and 6 months after operation. it consists of 8 dimensions, energy, general health, mental health, emotional function, social function, physical pain, physical function and vitality. The full score is 100 points. Quality of life is positively correlated with the score.

(3) Perimenopausal syndrome: It includes facial flushing, dreaminess/insomnia, but also decreased attention/inattention, moodiness/anxiety.

(4) Inflammatory factor indicators: Serum samples were collected from the two groups (in the same way as above, before surgery and at 1 and 3 days after surgery), and the following parameters were measured by enzyme-linked immunosorbent assay in the two groups: one was interleukin

TABLE 1. Clinical data between the 2 groups.

Group	Fibroid diameter (cm)	Uterine Volume (cm^3)	Fibroid location			Age (years)
			Intramural	Submucosal	Subserosa	
Study group (62 case)	(5.15 ± 1.36)	(1135.26 ± 105.31)	21	4	37	(48.31 ± 3.45)
Control group (62 case)	(5.12 ± 1.30)	(1132.69 ± 101.74)	19	3	40	(48.36 ± 3.27)
t/χ^2 value	0.126	0.138		0.360		0.083
p value	0.900	0.890		0.835		0.934

(IL)-6, the other was IL-10, and the third was tumor necrosis factor-α (TNF-α).

2.4 Statistical processing

Data were analyzed and processed by SPSS 27.0 (International Business Machines Corporation, Armonk, NY, USA). Measurement data conforming to the normal distribution were denoted by ($\bar{x} \pm s$). Medians (upper and lower quartiles) (M (Q1, Q3)) are used to describe measurement data that do not follow a normal distribution. The *t*-test (normal distribution) or rank sum test (non-normal distribution) was used. Enumeration data was presented as a number of cases and percentage (n (%)). The χ^2 test was used to compare enumeration data between groups. Differences were statistically significant when $p < 0.05$.

3. Results

3.1 Surgery-related indicators

Study group operation time and intraoperative blood loss were significantly lower than control group ($p < 0.05$) Table 2.

3.2 Quality of life score

Before operation, there was no significant difference in SF-36 score between the two groups ($p > 0.05$); 6 months after operation, both groups had higher SF-36 scores, with the study group having a significant difference over the control group ($p < 0.05$) Table 3.

3.3 Incidence of perimenopausal syndrome

Study group had a significantly lower incidence of perimenopausal syndrome than the control group ($p < 0.05$) Table 4.

3.4 Indicators of inflammatory factors

At 1 d and 3 d after surgery, both groups showed higher levels in IL-6, TNF-α and IL-10 after surgery. In comparing the groups, the study group had a significant higher score than the control group Table 5.

4. Discussion

Uterine fibroids are relatively common gynecological benign tumors treated with surgery. The two most common surgical methods are hysterectomy and myomectomy. For perimenopausal patients >40 years of age, hysterectomy can effectively control postoperative recurrence and improve life quality. This is in addition to radical treatment of uterine fibroids [6]. A key issue to be considered in clinical practice is that total hysterectomy treatment does not only result in fertility loss in patients. It also impacts patients' ovaries, mainly blood supply. Similarly, patients may develop anxiety, depression and other adverse psychological problems as a result of physical problems [7]. Numerous studies indicate that even if patients do not require fertility treatment, surgery should be avoided as the first option for treating fibroids to maximize therapeutic effect and safety. Therefore, it can minimize the impact on ovarian function and improve life quality [8].

Myomectomy (laparoscopic-assisted) in patients with uterine fibroids hardly affects postoperative gastrointestinal function recovery or on its level [9]. Some have argued that laparoscopic myomectomy has less oxidative damage than open myomectomy. Stress-related hormone parameters like angiotensin II and inflammatory factor levels showed smaller changes [10]. Another scholar emphasizes that laparoscopic myomectomy causes a small amount of stress response to the body. Patients not only have less pain, but recover faster after surgery [11] in this study, the study group had less intraoperative blood loss and a shorter operation time than the control group. This suggests that myomectomy (laparoscopic) is easier to perform, and has fewer complications, resulting in less pain and faster recovery.

More than 50% of the ovarian blood supply comes from the uterine artery. The removal od patients' uterus will change the hemodynamics of the ovary and change it, resulting in abnormal blood circulation at this site and even throughout the whole body. It adversely affects the ovary and corpus luteum development and develops various adverse conditions such as premature ovarian failure [12]. In contrast with patients who choose uterine preservation, some scholars claim that hysterectomy patients experience an earlier and a higher incidence of premature ovarian failure [13, 14]. Additionally, patients who undergo hysterectomy after surgery have significantly lower ovarian function indicators than those who undergo uterine preservation. Recent reports indicate a correlation between tubal inflammation and ovarian cancer incidence. Hence, total hysterectomy treatment needs to be combined with bilateral salpingectomy at the same time. This will impact their ovarian function in varying degrees [15]. follicle-stimulating hormone (FSH), luteinising hormone (LH) and estradiol (E2) are all commonly used indicators to evaluate sexual hormones. FSH, also known as follicle-stimulating hormone, is mostly secreted by the pituitary gland. Its production is usually controlled by hypothalamic gonadotropin-releasing hormone, and regulated by E2 feedback. Therefore, FSH plays a decisive role in the quality of reproductive function and ovarian function indirectly [11]. LH is also a gonadotropin (secreted by the pituitary gland) that promotes follicular development in women [11]. In gonadal cells, E2 is actually a glycoprotein gonadotropin (secreted by adenohypophyseal cells) that stimulates cholesterol and converts into sex hormones [12]. In this study, we found that FSH and LH at 3 and 6 months after operation in the control group were higher than before operation. However, there was no significant change in the study group. E2 level was lower in the control group than before operation, while there was no significant difference in the study group. In addition, FSH and LH in the study group were lower than in the control group at 3 and 6 months after surgery, while E2 was higher than in the control group. Results suggest that myomectomy causes less damage to ovarian function and lower levels of sexual hormones in patients. Study participants also scored higher on the SF-36 and were less likely to suffer from perimenopausal syndrome compared to the control group. Following myomectomy, the incidence of perimenopausal syndrome decreased and recovery was more ideal, enhancing life quality.

TABLE 2. Comparison of surgical indicators ($\bar{x} \pm s$).

Group	Procedure time (min)	Intraoperative bleeding (mL)
Study group (62 case)	54.86 ± 10.33	79.52 ± 10.01
Control group (62 case)	88.54 ± 12.06	144.05 ± 16.97
t value	16.701	25.789
p value	<0.001	<0.001

TABLE 3. SF-36 score comparison ($\bar{x} \pm s$).

Group	Before surgery	6 months after surgery	*t* value	*p* value
Study group (62 case)	56.31 ± 6.08	69.59 ± 9.12	9.540	<0.001
Control group (62 case)	56.37 ± 6.12	62.64 ± 8.41	4.747	<0.001
t value	0.055	4.411		
p value	0.956	<0.001		

TABLE 4. Comparison of incidence of perimenopausal syndrome.

Group	Facial flushing	Dreaminess/ insomnia	Attention decreased/Inattention	Moodiness/anxiety	Incidence (%)
Study group (62 case)	1	1	0	0	2 (3.23)
Control group (62 case)	2	4	2	1	9 (14.52)
χ^2 value					4.888
p value					0.027

TABLE 5. Comparison of inflammatory factors ($\bar{x} \pm s$).

Indicators	Study group	Control group	*t* value	*p* value
IL-6				
Before surgery	6.77 ± 1.28	6.72 ± 1.34	0.212	0.832
1 d after surgery	46.52 ± 3.15*	88.51 ± 4.22*	62.786	<0.001
3 d after surgery	12.72 ± 1.54*#	39.73 ± 2.24*#	78.239	<0.001
TNF-α				
Before surgery	22.21 ± 1.93	22.58 ± 2.07	1.029	0.305
1 d after surgery	27.35 ± 1.76*	38.18 ± 1.93*	32.648	<0.001
3 d after surgery	14.36 ± 1.51*#	19.40 ± 1.82*#	16.781	<0.001
IL-10				
Before surgery	3.61 ± 0.18	3.58 ± 0.26	0.747	0.457
1 d after surgery	17.21 ± 2.33*	10.67 ± 1.74*	17.708	<0.001
3 d after surgery	13.30 ± 0.34*#	8.68 ± 1.62*#	21.977	<0.001

*Note: *Compared with that before operation, $p < 0.05$, the differences were statistically significant; #compared with that at 1d after operation, $p < 0.05$, the differences were statistically significant. IL: interleukin; TNF: tumor necrosis factor.*

As found in studies, the level of inflammatory factors is closely related to the effect of surgical treatment of perimenopausal uterine fibroids [16]. Both IL-6 and TNF-α are secreted by monocytes and macrophages and play an important role in inflammation. Increased levels indicate more severe inflammatory responses [17]. For IL-10, it inhibits the production of these substances, so it exerts an anti-inflammatory effect [18]. Our findings showed that the levels of IL-6, TNF-α and IL-10 were increased at 1 day after surgery in both groups compared with before surgery, but decreased at 3 days after surgery. For IL-6 and TNF-α, the decrease was greater in the study group. IL-10 levels were higher in the study group than in the control group. Myomectomy appears to cause a milder traumatic stress reaction and is less likely to cause complications such as infection.

Moreover, the following should also be considered when performing myomectomy and total hysterectomy: (1) Size and number of uterine fibroids: Myomectomy is an option if the uterine fibroids are small and fewer in number, and the boundary with the uterine muscle fusion is clear. It preserves the uterus and maintains fertility. (2) Location and growth pattern of uterine fibroids: If the fibroids are deep within the uterine wall or form intramural fibroids, a total hysterectomy may be necessary. (3) Symptoms and clinical manifestations: In case of severe symptoms, such as severe menstrual bleeding, pelvic pain and frequent urination, a total hysterectomy need to be considered. (4) Age and fertility need: For nulliparous or fertile women, a myomectomy is a feasible option and can preserve the uterus if the uterine fibroids are small and anatomically clear. (5) Risk of malignant transformation of uterine fibroids: If uterine fibroids are at risk of malignant transformation, a total hysterectomy may be required to prevent underlying malignancy. Myomectomy or total hysterectomy should be decided by the patient and the physician based on their condition, symptoms, fertility needs and preferences.

This study has several limitations, including its size and source of cases. This is a single-center study, so results may vary. Furthermore, recurrence has not been examined. To draw a more comprehensive and objective conclusion, a multicenter study needs to be conducted to examine the scope of subjects. Moreover, recurrence was also observed and studied extensively. Reference was provided for clinical diagnosis and treatment of uterine fibroids.

5. Conclusions

For perimenopausal patients with uterine fibroids, myomectomy can reduce intraoperative blood loss and shorten the operation time compared with total hysterectomy. Myomectomy results in less disturbance of sexual hormones, a higher quality of life, a lower incidence of perimenopausal syndrome, and a milder response to traumatic stress. Therefore, this solution is ideal for treating perimenopausal uterine fibroids.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

JZ—designed the study and carried them out. JZ, JW and MW—supervised the data collection, analyzed the data, interpreted the data. JZ and XLW—prepared the manuscript for publication and reviewed the draft of the manuscript. All authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of Chengdu Second People's Hospital (20211230). Written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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