Evaluate the effectiveness of laparoscopic myomectomy without power morcellator

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Abstract

Aim: *To describe characteristics of uterine fibroids and evaluate the effectiveness of laparoscopic myomectomy.*

Methods: *Cross-sectional observative study in fifty-two patients underwent laparoscopic myomectomy at Department of Obstetrics and Gynecology, Hospital of Hue Medicine and Pharmacy University and Hue Central Hospital from 6/2019 to 6/2021. Inclusion criteria were patients with ≤ 5 fibroids, largest diameter did not exceed 10cm in diameter and no contraindication for laparoscopy. Patients were operated laparoscopically and manually morcellated by vaginal route, without electrical morcellator.*

Results: *Mean age was 42.3 ± 4.2 years old. The most common symptom was abnormal uterine bleeding (42.3%). The mean diameter was 66.8 ± 16.3 mm. The success rate of laparoscopic myomectomy was 98.1%. The mean operation time was 148.66 ± 51.4 min. Diameter ≥ 80mm, multiple fibroids (>5 fibroids) and operation time ≥ 180 min ($p < 0.05$) were associated factors of significant Hemoglobin drop and prolonged surgery.*

Conclusions: *Laparoscopic myomectomy had high success rate and low complication rate, however appropriate indication and experienced surgeon were necessary.*

Keywords: *uterine fibroids, laparoscopy, myomectomy.*

1. INTRODUCTION

Uterine fibroids are benign tumors that originate from uterine smooth muscle cells. Most fibroids are asymptomatic, leading to the prevalence and epidemiology of uterine fibroids not being fully studied. The prevalence of uterine fibroids is 20-50% in reproductive age women, especially the age group of 35-50 years old [1]. The common clinical symptoms of uterine fibroids are uterine abnormal bleeding, pelvic pain, or urinary disorders due to mass compression. A small percentage of uterine fibroids may be associated with infertility or other obstetric complications [2], [3], [4], [5].

Uterine fibroids are commonly encountered during the reproductive age, therefore, myomectomy is often the indication of choice in young patients who prefer fertility preservation. Laparoscopic myomectomy is now the common practice and has proven its effectiveness and feasibility through numerous studies. Myomectomy, in general, is usually indicated in patients with symptomatic uterine fibroids and/or who wish to preserve fertility. When choosing between the laparoscopic or laparotomic approach, the location and size of the fibroids are key factors to consider. Overall, the common indication for laparoscopic route is for single fibroids less than 15 cm in diameter, or no more than 3 fibroids with diameter less than 5 cm. However, in the hand of an experienced surgeon, combined with the modern equipment, the indications for this surgery can be extended to fibroids over 15 cm or even 20 cm in diameter, and multiple uterine fibroids are also no longer a limitation of this surgical route, according to several reports [6]. With reasonable indications, laparoscopic myomectomy offers a lower complication rate, faster recovery time and it is more aesthetic than laparotomic surgery [6], [7], [8]. In the long term, when evaluating criteria such as recurrence rate, pregnancy rate, and pregnancy outcome, laparoscopic surgery results in better or at least equivalent results when compared with open surgery in numerous research [8], [9]. This method has been evaluated worldwide for many years and proved its effectiveness. Recently, surgeons have expanded the indications of laparoscopic myomectomy for multiple fibroids, large uterine fibroids, or difficult positions such as fibroid in the isthmus of the uterus, the uterine horns or the broad ligaments [8], [10].

One of the difficulties of laparoscopic myomectomy, apart the myometrium reapproximation, is how to remove the solid specimen from the abdomen. The use of electronic power morcellator quickly became routine since it was introduced. However, due to the US Food and Drug Administration (FDA)'s warning statement regarding the risk of dissemination of occult malignancy, alternatives have been investigated such

as manual morcellation or mini-laparotomy removal [11], [12]. Although the results remained controversial, manual morcellation is still considered to be a safe and cheap approach, especially in low-resource setting.

This study was conducted to describe the characteristics of uterine fibroids patients having indication for laparoscopic myomectomy and to evaluate the surgical outcomes of laparoscopic myomectomy with manual morcellation.

2. MATERIALS AND METHODS

This was a prospective cohort study on 52 uterine fibroids patients having indications for surgery and fertility preservation, who were admitted to Hue University of Medicine and Pharmacy Hospital and Hue Central Hospital between March 2019 and June 2021. Indications for laparoscopic myomectomy were made based on the benefit and risk considerations in the patient.

Inclusion criteria: patients in reproductive age (30-50 years old), have no contraindications to myomectomy, and have a desire to preserve the uterus. Maximum tumor size ≤ 10 cm. Number of tumors ≤ 5. Patients who met the inclusion criteria were included in the study. The process of data collection began with history taking, performing a gynecologic examination, and ordering pre-operative laboratory tests. After completing the surgery, within 2 days after surgery, the patient was examined for postoperative status and postoperative complications. The data collection form was built on research objectives and research variables.

Laparoscopic myomectomy technique: the patient was under general anesthesia and placed in the Trendelenberg position. The surgeon makes an incision on the fibroid using a monopolar hook. The incision goes all the way to the end of the pseudocapsule, which is easily recognizable by its firm, whorled or trabeculate surface. The dissection layer will be visualized using two forceps: a laparoscopic Pozzi to clamp over the fibroids and a clamp at the margin of the myometrium. The two clamps will work on the principle of opposing force to peel the fibroids out. Re-approximate uterine muscle with Vicryl 1/0 thread, multi-layer suture is preferred because it helps to restore the anatomy of the defect better. During surgery, intravenous oxytocin or rectal misoprostol can be used to increase uterine contractions, which also significantly limit bleeding.

Manual morcellation: with the pince-en-coeur stretching the posterior cul-de-sac between the 2 uterosacral ligaments, the surgeon uses a monopolar hook to make a horizontal incision in the posterior cul-de-sac and inserts the pince-en-coeur in to clamp the specimen bag. The assistant can help by using the vaginal valve and Breisky valve to protect the bladder anteriorly and rectum posteriorly. The surgeon will cut the fibroid in the bag utilizing the same principle as the morcellator: Using spiral C-shaped cuts from the outside to the inside to shrink the mass. After removing the fibroid, the surgeon checks the integrity of the specimen bag and ends with closing the posterior pouch with Vicryl 2/0 thread.

Data processing: the collected data are managed by the program SPSS version 23.0. Qualitative variables are presented as percentages. Quantitative variables with a normal distribution are presented as mean ± standard deviation. Quantitative variables that are not normally distributed are presented as medians and intervals. Using the Kolmogorov-Smirnov test to test the normal distribution and the Levene test to analyze the homogeneity of variance. The mean values of normally distributed variables are compared using Student's test. The comparisons were statistically significant when $p < 0.05$.

The study protoctol was approved by the Ethic Committee for Biomedical Research of the Hue University of Medicine and Pharmacy (Nr H2019/160). Written informed consents were obtained from every patient included in the study.

3. RESULTS

Average age of the study population was 42.3 ± 4.2 years (range, 31 - 50 years), of which 71.2% belong to the age group of 35 - ≤ 45 years. Regarding the obstetric history, the group of patients with 2 or more children accounted for 75%, 1 child accounted for 21.2% and no children accounted for 3.8%. 48.1% of patients participating in the study had history of miscarriage (34.6% for 1 time and 13.5% for 2 times). Regarding the history of pelvic surgery, 23.1% of patients had previous surgery, mainly cesarean section (19.2%). The characteristics of study population are presented in Table 1.

Table 1. Demographics of study population

Age group	n=52	%
< 35 years old	3	5.8
35 - ≤ 45 years old	37	71.2
> 45 years old	12	23.1

BMI	n=52	%
Underweight (< 18.5 kg/m^2)	2	3.8
Normal (18.5 - 22.9 kg/m^2)	34	65.4
Overweight (23 - 24.9 kg/m^2)	9	17.3
Obese (> 25 kg/m^2)	7	13.4
Number of children	**n = 52**	**%**
0	2	3.8
1	11	21.2
≥ 2	39	75.0
Number of miscarriages	**n = 52**	**%**
0	27	51.9
1	18	34.6
≥ 2	7	13.5
Surgical history	**n = 52**	**%**
C-Section	10	19.2
Gynecologic surgery	1	1.9
Other	1	1.9
None	40	76.9

Table 2. Clinical characteristics of study population

Clinical presentation	n = 52	%
Abnormal uterine bleeding	22	42.3
Pelvic pain	21	40.4
Pressure symptoms	2	3.8
Infertility	1	1.9
Increase in size	20	38.5
Time of diagnosis	**n = 52**	**%**
Recent	25	48.1
≤ 1 year	14	26.9
> 1 year	13	25.0
Anemia	**n = 52**	**%**
No anemia	34	65.4
Mild	5	9.6
Moderate	10	19.2
Severe	3	5.8

The success rate of laparoscopic myomectomy was 98.1% (51/52 cases). The only failure case was a large posterior subserosal fibroid occupying all the Douglas cul-de-sacs, leading to immobile uterus. The average surgical duration was 148.6 ± 51.4 minutes (range, 50 - 280 minutes). The mean morcellation duration was 20.8 ± 10.0 minutes. The mean difference in hemoglobin before and after surgery was 1.0 ± 0.9 g/dl. Factors affecting the mean surgery duration were the largest fibroid's size ≥ 80 mm (p = 0.026) and the number of fibroids > 3 (p = 0.035). The factors affecting the hemoglobin drop were the number of fibroids ≥ 5 (p = 0.013) and the surgery duration ≥ 180 minutes (p = 0.001) (Table 4).

Regarding intraoperative and postoperative complications: 90.2% of surgeries were uneventful, there were 2 cases of subcutaneous emphysema (3.9%) and 3 cases of bleeding >500ml (5.9%); 92.2% of participants had no postoperative complications. There was only 1 case of wound edema (2.0%) and 1 case with uterine hematoma measuring > 3 cm in diameter (2.0%). The mean hospital stay was 4.7 ± 0.8 days.

Table 3. Characteristics of uterine fibroids

Number of fibroids	**n = 52**	**%**
1	35	67.3
2	6	11.5
≥ 3	11	21.2
Largest fibroid's size	**n = 52**	**%**
< 50 mm	10	19.2
50 - < 80 mm	28	53.8
≥ 80 mm	14	26.9
Largest fibroid's location	**n = 52**	**%**
Anterior	18	34.6
Posterior	19	36.5
Posterior	7	13.5
Isthmus	4	7.7
Other (Cornus, broad ligaments)	4	7.7
FIGO classification of the largest fibroid	**n = 52**	**%**
FIGO 4	12	23.1
FIGO 5	12	23.1
FIGO 6	19	36.5
FIGO 7	0	0.0
FIGO 8	2	3.8
FIGO 2-5	7	13.5
Classification	**n = 52**	**%**
Intramural	19	36.5
Subserosal	31	59.6
Other	2	3.8

Table 4. Associated factors of surgery parameters

Number of fibroids	**Hb drop**	**t**	**p**
< 5	0.98 ± 0.90	2.579	**0.013**
5	2.65 ± 0.92		
Surgical duration	**Hb drop**	**t**	**p**
< 180 minutes	0.79 ± 0.78	3.549	**0.001**
≥ 180 minutes	1.74 ± 1.04		
Largest fibroid's size	**Surgical duration**	**t**	**p**
< 80 mm	139.3 ± 51.1	1.020	**0.026**
≥ 80 mm	175.8 ± 43.7		
Number of fibroids	**Surgical duration**	**t**	**p**
3	143.1 ± 48.8	2.174	**0.035**
> 3	190.0 ± 56.6		

4. DISCUSSION

In this study, most patients had only 1 fibroid, accounting for 67.3%. The number of patients with multiple fibroids accounted for 32.7%, also a considerable proportion. The reason for this difference was that the cases of multiple fibroids are often opted for open surgery in order to save time and easily stop bleeding as bleeding has been more prominent with greater number of fibroids in laparoscopic surgery [13], [14]. However, when compared with other studies in the world, it can be seen that many authors have indicated laparoscopy in cases of multiple fibroids (one study reporting 11 uterine fibroids), this is a reason to encourage the expansion of laparoscopic indications in future studies [10].

When evaluating the patient's largest fibroids, more than half (53.8%) measured between 5-8cm, which is a suitable size for laparoscopic surgery. The average size on ultrasound scan was 66.8 ± 16.3 mm. When evaluating the classification of fibroids, more than half (59.6%) of the largest fibroids were subserosal. A study by author Dubuisson suggested that intramural fibroid was a factor that increases the failure rate of laparoscopic myomectomy, however, many recent studies have not shown an association between intramural fibroids and adverse surgical parameters [15], [16], [17]. Out of a total of 52 study subjects, only 1 case (1.9%) of surgery failure, which was defined as having to be converted to open surgery. Previous studies have shown even lower failure rates: Mallick et al. reported a rate of 0.62% in their study, whereas in another retrospective study of 514 laparoscopic fibroid removal patients by Bean et al., only 2/514 cases had to be converted to open surgery [6], [18] .

The size of the largest fibroid equal 80mm or more in our study was a factor affecting the surgery duration. This has also been discussed in many previous studies. Research by Movilla et al. showed that the factors affecting surgery duration were age, uterus size, number of fibroids, largest fibroid size and surgeon's experience [16]. In the study by Sizzi et al., which is considered to be the laparoscopic myomectomy study with the largest sample size to date (2050 patients), surgery duration was correlated with the largest tumor size, tumor number, but not affected by its location [19].

In this study, the drop in Hb before and after surgery changed significantly when the uterus had 5 fibroids and the surgery duration was over 180 minutes. Watrowski also reported correlation between Hb reduction and operative time, largest fibroid's size, total volume of fibroids and number of stitches, in which, operative time was the most prominent correlation factor ($r = 0.42$; $p < 0.001$) [17]. Sleiman in a 2020 systematic review also reported similar results [13]. In this study, surgical duration over 180 minutes significantly changed the difference in Hb ($p = 0.001$).

Ye and al. suggested that an increased operative time would give time for the blood to shift to the anatomical third compartment, or time for the interstitial space and omentum to absorb blood [14]. The number of fibroids removed will also affect the amount of blood loss, due to the increased damage to the uterine myometrium, limiting the effect of contraction to stop bleeding. In particular, intramural fibroids will increase the amount of blood lost because the depth of the defect will make it more difficult for the wound re-approximation, resulting in bleeding or formation of postoperative hematoma [14].

The morcellation time in our study was 20.8 10.0 minutes, primarily using the vaginal route. Numerous studies have compared the results of manual morcellation to conventional electric morcellator. All prior investigations revealed the similar low complication rates and favorable postoperative conditions, despite the fact that the morcellation time among these approaches has remained a matter of debate [20], [21], [21, 22]. Without using an electrical morcellator, the fibroids can be manually removed vaginally (using the posterior cul-de-sac incision) or abdominally (3cm small laparotomy). Current literature reports no difference in surgical result or morcellation time between the two approaches, therefore choosing the morcellation route is up to the surgeon's preference [12]. However, a randomized controlled study discovered that patients who had a vaginal morcellation experienced less pain than those who had an abdominal approach. On the other hand, these patients also did not experience an increased rate of complications, such as suture infection and pain during sexual activity, as some patients have concerns about [23].

The postoperative condition of the patients was also stable, without any serious postoperative complications, similar to the results from previous studies that the rate of organ damage was extremely low [6], [18]. The above results have shown the effectiveness and safety of laparoscopic myomectomy, especially without the use of a morcellator. In addition, the study also found the influence of a number of factors such as size and number of tumors on the surgery duration and the hemoglobin drop after surgery, which helps to guide the surgeons decide the optimal surgical route.

However, the limitation of the study lies in the convenient sampling method and the absence of a control group, which makes it difficult to evaluate the advantages and disadvantages of laparoscopic myomectomy compared with open surgery. In addition, in the future, it is also necessary to further evaluate the quality of life, recurrence rate and fertility status of

patients in the study population to have an objective and accurate view regarding the long-term results of this surgery.

5. CONCLUSIONS

To conclude, laparoscopic myomectomy had a high rate of success and also a low complication prevalence, however, it required trained, highly skilled surgeons and approriate indications to deliver best outcomes.

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