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Combining situ-morcellation with continuous-fill-mattress suture in laparoscopic myomectomy

A surgical approach of choice for patients with large uterine fibroids

Bo Li, MD, Shitai Zhang, MD, Ningye Ma, MD, Yisheng Jiao, MD, PhD, Yang Zhou, MD, Sha Ni, MD, Xue Han, MD, Xiaomo Liu, MD, Ling Ouyang, MD, PhD*

Abstract

Background: To investigate the efficacy and advantage of combining situ-morcellation with continuous-fill-mattress suture compared with conventional morcellation and suture in laparoscopic myomectomy.

Methods: One hundred sixteen patients who underwent laparoscopic myomectomy from March 2014 to October 2016. Interventions: Patients were divided into combining situ-morcellation with continuous-fill-mattress suture group (n=62) and conventional group (n=54), and subsequent statistical analysis the clinical data of the 2 groups.

Results: The combining situ-morcellation with continuous-fill-mattress suture group shows significantly decrease of surgery time, incision size, blood loss, postoperative drainage volume and time, postoperative vent time, hospital stay and the loss of hemoglobin value. Moreover, there is significant significance between the 2 groups in the surgery time ($P=.018$), the postoperative drainage volume($P=.000$), and the loss of hemoglobin value ($P=.000$).

Conclusions: The combining situ-morcellation with continuous-fill-mattress suture shows significant advantages in shortening surgery time and reducing blood loss compared with conventional group in laparoscopic myomectomy.

Abbreviation: LM = laparoscopic myomectomy.

Keywords: laparoscopic, myomectomy, suture, uterine fibroids

1. Introduction

Uterine fibroids are the most common benign tumors of female genital tract, accounting for 20% to 25% in reproductive age women. Most patients choose myomectomy because this surgical approach maintains not only fertility, but also the physiological function of uterus and the integrity pelvic floor. Currently, there are 3 ways to implement myomectomy: transabdominal surgery, vaginal surgery, and laparoscopic surgery.[1] Laparoscopic myomectomy (LM) has been widely used in clinical practice currently with the advantage of minimal trauma, rapid postoperative recovery, and light pain.

In the process of traditional LM, surgeons often confront with several major problems. First, long-time surgery may lead to more bleeding. Second, the difficulty and duration of operation is positively related with the size of fibroids due to the limited abdominal space. Moreover, in the process of morcellation, surgeons often require an assistant to fix the detached fibroids in abdominal cavity, which would increase the probability of fibroid fragments scattering and missing. With the increase of size and number, surgeons prefer transabdominal way to laparoscopic one, even convert to open during LM.[2] In order to reduce the surgery time and bleeding, while increasing the success probability of LM, there are many surgical techniques expect to explore and accumulate in the process of LM, such as the incision design of abdomen and uterine, selection of hemostasis method, morcellation, and suture method.

In this study, we improve the coventional methods into combining situ-morcellation with continuous-fill-mattress suture, compare the perioperative clinical factors, and analyze the application advantages of improved methods in LM.

2. Materials and methods

2.1. Subjects

A total of 116 patients enrolled in this study with LM in Shengjing Hospital of China Medical University from March 2014 to October 2016. There are 62 cases in the experiment group by the combining situ-morcellation with continuous-fill-

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Department of Obstetrics and Gynecology, Shengjing Hospital of China Medical University, Shenyang, China.

* Correspondence: Ling Ouyang, Department of Obstetrics and Gynecology, Shengjing Hospital of China Medical University, Shenyang 110004, China (e-mail: ouyang1964@163.com).

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Table 1

Compared the clinical parameters of the 2 groups.

Clinical parameters	Experimental group (n = 62)	Control group (n = 54)	*T* value	*P* value
Age, y	36.13 ± 11.16	37.93 ± 12.72	1.007	.319
BMI	22.09 ± 3.20	22.46 ± 3.07	0.699	.487
Pregnancy frequency	1.70 ± 1.28	1.52 ± 1.02	0.953	.345
Number of fibroids	1.65 ± 0.78	1.78 ± 0.82	1.044	.301
Mean fibroids diameter, cm	6.45 ± 2.30	6.84 ± 2.43	0.983	.330
Preoperative hemoglobin value, g/L	129.31 ± 13.40	125.05 ± 25.56	1.034	.306

mattress suture and 54 cases in the control group by the conventional method of morcellation and continuous suture. This study was approved by the Clinical Research and Ethics Committee at Shengjing Hospital of China Medical University.

Inclusion criteria: The number of uterine fibroids ≤3, the largest diameter of fibroid ≤12 cm, intramural or subserous fibroids; fertility requirements or require keeping uterus; Thinprep Cytology Test, ultrasound, gynecological preoperative examination exclude other gynecological diseases and surgical contraindications; neither blood transfusion nor other hematogenesis adopted during the perioperative period; and pathological diagnoses are uterine leiomyoma.

Exclusion criteria: The number of fibroids >3, ultrasound shows the largest diameter fibroid >12 cm, submucous fibroids or intramural fibroids convex to mucous, broad ligament fibroids, and other special parts fibroids; suspect pelvic severe adhesion; with severe diseases cannot tolerate laparoscopic surgery; suspect malignancy; and other surgical contraindications.

There are no statistical differences between the 2 groups ($P > .05$) in age, body mass index, pregnancy frequency, number of fibroids, mean fibroids diameter, and preoperative hemoglobin value (Table 1).

2.2. Operative procedures

Two groups of patients were given the same preoperative preparation, and we select the umbilica or above umbilica 1 cm as the puncture point. The pneumoperitoneum was established with carbon dioxide, which maintained the pressure in abdominal cavity at 13 mm Hg, and then select 2 lower abdominal puncture points on both sides as the operating channel. Inject hemostatic agent (pituitrin 6 U with 0.9% sodium chloride solution 20 mL) into the uterine fibroids pseudocapsule.

2.3. Experimental group

Directly clamp protruding parts of fibroids with the tooth of rotary cutter (Fig. 1A), gradually morcellation and remove the fibroids at the same time, the direction of the rotary cutter was parallel to the surface of uterine (Fig. 1B). By means of the combined effect between the internal tension from uterine contraction, the external force exerted by the tooth clamp and positive pressure in the abdominal cavity, the fibroids bulge out spontaneously from its pseudocapsule and surrounding myometrial junctions, and then clamp, pull, morcellate, and remove the fibroids in the meantime. We repaired the uterine incision in 2 layers. First, continuous suture the whole layer of the myometrium (Fig. 1C) and, second, continuous-fill-mattress suture in vertical or horizontal of the serosa and part of the myometrium. Compress and fill the fibroids cavity with pseudocapsule while tighten the suture (Fig. 1D). In short, 2 steps to complete.

2.4. Control group

Make a fusiform incision on the surface of fibroids, clamp and pull the fibroids while cut the pseudocapsule and surrounding

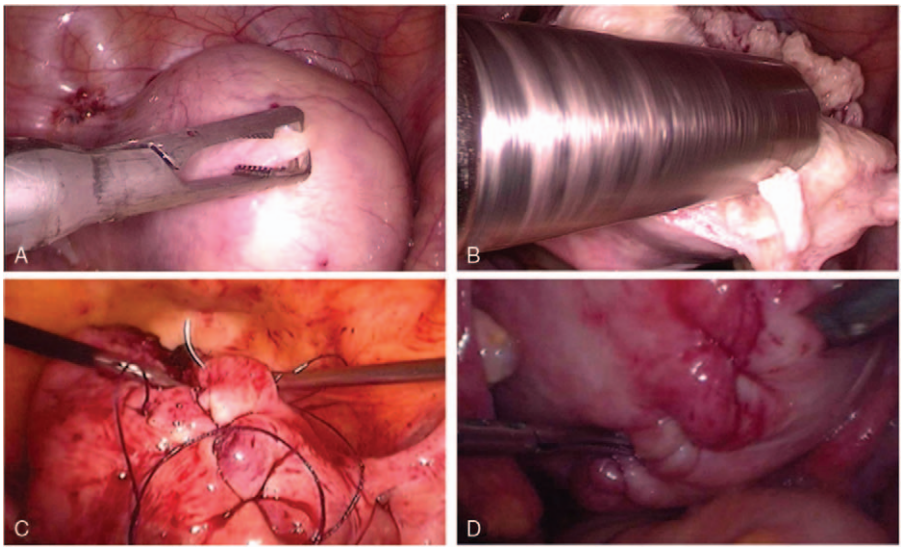

Figure 1. (A) Directly clamp protruding parts of fibroids with the tooth clamp. (B) The direction of morcellation was parallel to the surface of uterine. (C) Continuous-fill-mattress suture. (D) The surface of uterine incision after tighten the suture.

Table 2

Comparison of intraoperative data between 2 groups ($\bar{x} \pm s$, n).

Surgery-related indicators	Experimental group (n = 62)	Control group (n = 54)	*T* value	*P* value
Surgery time, min	96.47 ± 21.21	107.09 ± 18.51	2.436	.018
Intraoperative blood loss, mL	112.83 ± 22.43	120.05 ± 19.20	1.958	.056
Size of uterine incision, cm	6.11 ± 1.50	6.45 ± 1.17	1.557	.125

myometrial junctions with single-bipolar electrocoagulate alternately, remove fibroids from uterine and store them in posterior fornix or iliac fossa temporarily. Electrocoagulate to stop bleeding and exhaust the smoke during the process, prune the pseudocapsule, serosa, and myometrium. Repair the uterine incision with continuous suture the whole layer of the myometrium twice. Surgical-assistant bring up the free fibroids, the surgeon gradually morcellate and remove it out of abdominal cavity. In short, we need 3 steps to accomplish.

2.5. Observation and criteria

Operation time: from the moment established the operating channel to the end of surgery. Intraoperative blood loss: the total fluid volume in the aspirator minus the total volume of the rinse solution at the end of surgery. Uterine incision size: the length of each incision is measured with sterile sutures and add them up. Postoperative the patient vent time: from the end of surgery to the first time the patient feels vent. Postoperative intraperitoneal drainage: the total abdominal cavity drainage liquid volume before pull the drainage tube out. Postoperative drainage time: the end of surgery till the time when remove the drainage tube (indication for extubation: when drainage volume < 20 mL/24 h). The average postoperative hospital stay: from the day of surgery to discharge. The loss of hemoglobin in the 3rd day after surgery.

2.6. Statistical analysis

The statistical analysis software SPSS 19.00 is used for all analyses. All data are expressed as mean ± standard deviation. The data results are analyzed using the *t*-test. *P* value < .05 are considered statistically significant.

3. Results

3.1. Intraoperative data

Surgery time, the experimental group is much shorter than control group, and there is significant statistical difference between the 2 groups ($P < .05$). The experimental group shows less intraoperative blood loss than control group, but there is no statistical significance between the 2 groups ($P > .05$), and no statistically difference in the size of uterine incision ($P > .05$) (Table 2).

3.2. Postoperative data

The experimental group shows less drainage volume, less decrease of hemoglobin value, shorter postoperative venting, and drainage time. There are significant statistical difference between the 2 groups in drainage volume ($P = .000$ and $< .05$) and the loss of hemoglobin value ($P = .000$ and $< .05$), but there are no significantly statistical differences between the 2 groups in postoperative venting and drainage time ($P > .05$). There are no differences in average postoperative hospital stay between the 2 groups ($P > .05$) (Table 3).

4. Discussion

Laparoscopic surgery has been become the preferred approach used in various types of surgery. Compared with the traditional laparotomy surgery, laparoscopic surgery has many advantages such as lighter postoperative pain, less bleeding, less postoperative adhesions, shorter recovery time, and smaller incisions and scars.[3–5]

Simplifying 2 steps into 1 is the main merit of situ-morcellation, which can remove fibroids from uterus and abdominal cavity simultaneously. With the progress of situ-morcellation, the size of fibroids reduced gradually, the view of surgical field is fully exposed; therefore, the surgery time and the blood loss are reduced significantly. This approach is very valuable for the treatment of larger fibroids in LM, especially for uterine fibroids diameter larger than 10 cm.[6,7] The intrinsic tension of the uterus contraction is formed by hemostatic agent, the external force is formed by both the tooth clamp and positive pressure in the abdominal cavity. With the effect of the 2 forces at the same time, large fibroids can bulge from the convex part from the small incision gradually instead of large incision equal to diameter of fibroids in conventional method. This approach may avoid the shortcomings of uterine incision is the largest diameter of fibroids in conventional method.[8] The probability of fibroid fragments scattering and planting is reduced significantly, because the fibroids are in situ and fixed relatively; surgeons can complete the surgery all by himself without surgical assistant or the 4th operating channel which can shorten the surgery time and reduce the trauma of patients. Moreover, we can reduce the risk of surgical smoke pollution and heat damage, which was described as "smoke-free" surgery due to the less use of single-bipolar electrocoagulation. Although this approach has many advan-

Table 3

Comparison of postoperative data between 2 groups ($\bar{x} \pm s$, n).

Postoperative-related indicators	Experimental group (n = 62)	Control group (n = 54)	*T* value	*P* value
Postoperative vent time, h	9.18 ± 1.74	9.71 ± 1.70	1.859	.068
Postoperative drainage volume, mL	165.48 ± 31.74	208.61 ± 52.53	5.107	.000
Postoperative drainage time, h	84.79 ± 12.27	89.35 ± 19.82	1.356	.181
Average postoperative hospital stay, d	5.38 ± 1.35	5.54 ± 1.22	0.701	.486
Loss of hemoglobin value, g/L	2.69 ± 0.61	1.99 ± 0.43	7.423	.000

tages, it must be noted that it is a skilled operation which must be performed by the surgeons who have been strictly trained in LM. In the process of situ-morcellation, manipulation must be steady, in constant speed and the starting and ending point of rotary cutter must be in operative field at the same time. Fixing the rotary cutter and pulling fibroids out are the key points, pushing the rotary cutter into abdominal cavity is strictly prohibited in cases of damages to surrounding organs, vessels, and abdominal wall, surgeons must be carefully enough without any negligence.

Continuous-fill-mattress suture has the following advantages compared with the conventional method: Suture only in the serosa and part of the myometrium other than the whole layer of the myometrium deep into the tumor cavity, it can reduce needle resistance, exertion of tighten suture. The serosal surface of uterus incision anastomosed better, which could prevent the postoperative adhesion. No need to prune the extra part of the pseudocapsule, just fill them into the tumor cavity and suture them at the same, which effectively reduce the time and smoke.[9]

Our study compare 2 different approaches of morcellation and suture methods in LM, the results show that combining situ-morcellation with continuous-fill-mattress suture in LM has significant advantage compared to the conventional method in surgery time, intraoperative blood loss, postoperative drainage volume, and vent time. There are significant statistical differences in surgery time and postoperative drainage volume between the 2 groups. In the selected cases, there are no cases of subsidiary-injury and trans-laparotomy. There are 1 case and 2 cases of postoperative complications of fever in experimental group and control group separately, and they are all cured after anti-inflammatory treatment for 3 days, there are no significant differences between the 2 groups. We recommend further promotion of combining situ-morcellation with continuous-fill-mattress suture in LM, especially for large uterine fibroids.

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