Use of Barbed Suture in Laparoscopic Myomectomy with Large Posterior Myoma

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ABSTRACT

Objective: To assess the safety and efficacy of barbed suture laparoscopic myomectomy for large posterior myoma compared to conventional suture.

Study Design: Descriptive study.

Place and Duration of Study: Department of Gynecology, Affiliated Women and Children's Hospital of Ningbo University, Ningbo, Zhejiang, China between July 2019 and June 2020.

Methodology: All cases of laparoscopic myomectomy for large posterior myoma (≥8cm in the largest diametre) were retrospectively reviewed. The surgical technique was identical except the selection of suture material. A comparison between the barbed suture and conventional suture was performed in terms of clinical characteristics and surgical outcomes such as total operative time, suture time, intraoperative blood loss, and changes in hemoglobin concentration.

Results: A total of 48 eligible cases, 24 cases with barbed sutures and 24 cases with conventional sutures were included in the final analysis. Patients' clinical characteristics such as age, body mass index, number, and size of myomas were similar between the two groups. In patients with barbed sutures, the time for suturing, the total operative time, intraoperative blood loss, and the changes in hemoglobin concentration were significantly lower than in conventional sutures (all $p<0.05$). No significant differences in time for enucleation, time for morcellation, and postoperative complications were found between the two groups. Two patients with conventional sutures received postoperative emergent uterine artery embolization and three patients received a blood transfusion.

Conclusions: The use of barbed sutures could reduce the difficulty and enhance safety in laparoscopic myomectomy for large posterior myoma.

Key Words: *Barbed suture, Laparoscopy, Myomectomy, Posterior.*

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INTRODUCTION

Uterine myomas also referred to as fibroids or leiomyomas, are the most prevalent benign tumors affecting women of childbearing age.[1] Hysterectomy and myomectomy are the two main surgical treatments for symptomatic uterine myomas.[2] With the delay in childbearing and increasing concerns about life quality, myomectomy has been preferred over a hysterectomy in recent years. Laparoscopy is the most common route in myomectomy for the benefit of minimal trauma and fast recovery.

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Most complications of laparoscopic myomectomy (LM) are associated with excessive perioperative blood loss with the need for allogeneic transfusion, conversion to laparotomy, emergent vessel embolization, and even hysterectomy.[3] Repair of the myometrial defect left by enucleation, which depends mainly on suturing, is the crucial step in LM.[4] The speed and precision of this step largely determine the occurrence of excessive hemorrhage and the quality of healing.[4,5] With conventional suture, constant traction by an assistant and repeated tightening of the suture line by the operating surgeon to maintain the strength are required. Besides, the uneven distribution of strength along the suture line might cause loose in one part or tissue tearing in another part. In cases with large posterior myoma, the suture became more challenging as the space between the uterus and sacrum was largely occupied by the myoma.

The barbed suture was introduced into laparoscopic surgery to facilitate suturing in recent years. With this technology, evenly spaced tiny barbs in the suture line allow the suture to grab tissue without slide back. After hooking the annular coil component at the tail, the surgeon can continue to suture swiftly without any knotting.[6] This "self anchor" mechanism of the

barbed suture line allows the entire unit to be processed without knotting.[7,8] It has been increasingly used in gynecologic surgeries such as LM or vaginal cuff closure.[9,10] However, the safety and efficacy of barbed suture in LM for large posterior myomas have not been previously addressed.

Therefore, the aim of this study was to describe our experience with barbed sutures in LM for large posterior myomas and assess its safety and efficacy by comparison with a historical cohort.

METHODOLOGY

Medical records of patients with laparoscopic myomectomy at Affiliated Women and Children's Hospital of Ningbo University, Ningbo, Zhejiang, China between 1 July 2019 and 30 June 2020 were reviewed retrospectively. As barbed suture was only used after January 1 at 2020, the cases with barbed suture stand as the study group, while the previous cases with conventional suture stand as a historical cohort.

Data on the patients' clinical characteristics, intraoperative details, and surgical outcomes were collected. Inclusion criteria were age between 20 and 50 years; single intramural myoma located in the posterior wall or multiple myomas with dominant myoma located in the posterior wall, the maximal tumor diametre is larger than 8cm. Exclusion criteria were cases with a dominant subserosal or submucosal myoma; the previous history of myomectomy; and cases with concomitant complex surgical procedures such as severe adhesiolysis or resection for complicated endometriosis. The study protocol was approved by the Institutional Review Board.

As the protocol of LM in our department, ultrasound examination was routinely performed preoperatively to evaluate the number, size, and location of myoma. MRI examination was scheduled at the discretion of the attending surgeon to further delineate the myoma and obviate the possibility of leiomyosarcoma.

All surgeries were performed by two surgeons (Weifeng Zhang and Yi Lin), with experience in LM for 8 and 6 years respectively. The details of the surgery were as follows: the patient was placed in the supine or lithotomy position with general anesthesia. The diameter, number, and location of the myomas were inspected carefully after entry. Vasopressin or oxytocin was used to control blood loss. After a linear incision over the myometrium was made with a monopolar electrode, the myoma was fixed with a screw or forceps and pulled outward to expose the gap between the myoma and its capsule, the bleeding vessels were selectively coagulated with bipolar forceps, and then the myomas were enucleated.

Continuous running suturing with two layers was used in all cases. In conventional suture, Vicryl 1-0 suture (Ethicon, Somerville, NJ, USA) was used. While in cases with barbed sutures, a 30-cm 1-0 polyglyconate unidirectional barbed sutures with a 37-mm half circle needle (V-Loc 180; Covidien) was used. Finally, the enucleated myomas were removed transumbilically with knife morcellation. Intraoperative blood loss was evaluated by calculating the blood volume in the suction bottle.

Data were summarised and displayed with descriptive statistics. Continuous data was given as mean ±SD. Categorical data were presented as numbers (%). The data were compared between the two groups using student t-tests or Chi-square test. The p-value of less than 0.05 was considered statistically significant. Statistical calculations were performed using SPSS statistical software, version 21.0(SPSS, Inc., Chicago, IL, USA).

RESULTS

A total of 354 cases of LM were performed in our department. Only 48 eligible cases were included in the final analysis. As shown in Table I, the two groups were similar in baseline characteristics such as age, body mass index, marital status, parity, and menopausal status. The diametre of the largest myoma, the number of myomas, and the primary indication were also not significantly different (p>0.05 for all).

Table I: Patients baseline characteristics.

	Barbed suture (n=24)	Conventional suture (n=24)	p-value
Age (years)	40.7±6.3	40.9±5.7	0.867
Body mass index (Kg/m2)	22.0±2.5	22.0±2.4	0.922
Married	23(95.8%)	24(100%)	0.312
Menopause	2(8.3%)	0(0%)	0.149
Parity			0.312
Nulliparous	0(0%)	1(4.2%)	
Parous	24(100%)	23(95.8)	
Diameter of the largest myoma (mm)	85.4±17.3	87.1±4.1	0.650
Number of myomas	1.16±0.38	1.20±0.41	0.719
Main indication for myomectomy			0.673
Menorrhagia	7(29.2%)	6(25.0%)	
Pelvic pain or pressure	8(33.3%)	6(25.0%)	
Growth of myoma	9(37.5%)	12(50.0%)	

Table II: Surgical outcomes of LM in two groups.

	Conventional suture	Barbed suture	p-value
Total operative time (min)	83.8±14.2	75.3±8.5	0.015
Time for enucleation (min)	16.3±5.2	16.8±3.3	0.667
Time for suturing	26.6±8.5	21.0±5.6	0.010
Time for morcellation	24.5±6.2	22.5±6.1	0.274
Blood loss during operation (ml)	315±157	236±77	0.031
Change in hemoglobin concentration (mg/dl)	1.9±0.6	1.4±0.7	0.018
Postoperative hospital stay (days)	4.5±1.3	4.2±0.4	0.187
Need for blood transfusion	3(12.5%)	0(0%)	0.074

As summarised in Table II, the time for suturing was significantly shorter in the group of barbed sutures (21.0 ± 8.5 *vs.* 26.6 ± 5.6, p=0.01). The total operative time was also significantly shorter in the group of barbed sutures (75.3 ± 8.5 *vs.* 83.8 ± 14.2 minutes, p=0.015). There were no significant

differences in the time for enucleation or morcellation. The intraoperative blood loss and the change in hemoglobin concentration were both significantly lower with barbed sutures than conventional sutures. Besides, three patients with conventional sutures received blood transfusions.

No conversion to laparotomy or hysterectomy or visceral trauma occurred in all patients. However, 2 patients with conventional sutures received emergent uterine artery embolization for persistent bleeding. Besides, ileus was reported in 2 patients with conventional sutures and 1 patient with barbed sutures.

DISCUSSION

This study demonstrated that the use of barbed sutures could achieve favorable results in LM with large posterior myoma. Compared with conventional sutures, barbed sutures were significantly better in terms of surgical outcomes such as operation time and intraoperative blood loss.

In this experience, posterior myoma poses a significant challenge for laparoscopic surgeons. Al-Talib also reported that posterior intramural location is one of the factors contributing to the failure of LM.[11] However, after analysis of 126 cases of laparoscopic myomectomy, Movilla *et al*. concluded that myoma location was not associated with prolonged operative time.[12] This may be due to the fact that only the location of the myoma was assessed in their study. In this study, a combination of tumor location and size was assessed. Small posterior myoma may not be very difficult. However, the risk of LM may skyrocket as the size of myoma increases.

The major advantage of barbed suture is the ease of suture with less time consumed. In agreement with many previous studies,[9,10,13,14] the time for suturing was also significantly shorter with barbed sutures in this study. The overall time of surgery was also significantly shorted in this study. This may be due to the quick maneuver with barbed suturing. With the swift suturing, the bleeding of the myoma bed was controlled quickly. The quick control of bleeding provides the surgeon with a clear vision. Then the surgeon could accomplish the surgery with precise maneuvers and in less time.

Another advantage of barbed sutures could be favorable wound healing, which is directly related to the quality of suturing. As stated by Sah, the quality of wound closure with barbed sutures was better than with standard sutures.[15] There were several explanations. First, the even distribution of strength along the suture line obviates tissue trauma caused by excessive strength when tightening the suture line. Second, with a clear vision and less bleeding in surgery with barbed sutures, the quality of suturing improved accordingly.

The main concern about the use of barbed sutures is the increased cost. However, reduced surgical time and lower cost of anesthesia with barbed sutures may compensate for the increased cost.[10,13,14,16]

Complications of the gastrointestinal tract such as ileus are common after LM for posterior myomectomy. As reported by Tulandi *et al*., the rate of ileus after myomectomy ranged between 2-3%.[17] Usually the postoperative ileus could be treated successfully with conservative treatment such as gastrointestinal decompression. In our study, the overall rate of ileus was 6.2%. The higher rate of ileus may be due to the larger size of the tumor. We did not find a significant difference between cases with barbed sutures and conventional sutures.

Several limitations of this study need to be admitted. First, the data on barbed sutures were in the recent period, the more favorable outcomes may be due to the improvement in surgical technique. However, the two surgeons in this study already have extensive experience of LM before this study. Besides, other surgery-related factors such as time for enucleation or morcellation were not different between the two groups. Second, the small sample size and lack of long-term follow-up data were also limitations of the study. More cases need to be included. Besides, the quality of wound healing should be assessed by radiologic examinations and the rate of uterine rupture in future pregnancy during follow-up.

CONCLUSION

This study supports the use of barbed sutures in laparoscopic myomectomy for large posterior myoma. It could reduce the difficulty and enhance safety in this procedure.

ETHICAL APPROVAL:

Ethical approval of this study was obtained from the Ethics Committee of Women and Children's Hospital of Ningbo University prior to initiation of the study.

PATIENT'S CONSENT:

Due to the retrospective nature of the study, the data were collected from our hospital archive following receipt of Ethics Committee approval. As required under our hospital regulations, patient identifiers were removed before data analysis for confidentiality.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

WZ: Conception and design of work, the collection, and analysis of data, drafting and revision of work, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

YL: Collection and interpretation of the data, revision of work, and final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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