



Barbed versus conventional suture in laparoscopic myomectomy: A randomized controlled study

Laparoskopik miyomektomide barbed ve konvansiyonel sütürlerin karşılaştırılması: Randomize kontrollü çalışma

Sezin Ateş Tatar¹, Burak Karadağ¹, Ceyda Karadağ², Gökçe Duranoğlu Turgut¹, Selim Karataş¹, Barış Mülayim¹

¹Antalya Training and Research Hospital, Clinic of Obstetrics and Gynecology, Antalya, Turkey

²Akdeniz University Faculty of Medicine, Department of Obstetrics and Gynecology, Antalya, Turkey

Abstract

Objective: To compare the surgical and clinical results of traditional absorbable polyglactin 910 and barbed sutures in laparoscopic myomectomy.

Materials and Methods: This single-center randomized study included 75 women who underwent laparoscopic myomectomy. The uterine wall defects were closed with a continuous conventional absorbable polyglactin 910 suture (Vicryl; Ethicon, Somerville, NJ, USA) in 41 women and with a unidirectional barbed suture (V-Loc 180; Covidien, Mansfield, MA, USA) in 34 women.

Results: The time required to suture the uterine wall defect was lower in the V-Loc group than in the Vicryl group ($p=0.007$). However, no significant difference was observed in the operative time between the two study groups. The intraoperative blood loss and need for postoperative blood transfusion were significantly lower in the barbed group than in the Vicryl group ($p=0.018$ and $p=0.048$, respectively).

Conclusion: In laparoscopic myomectomy cases, the unidirectional barbed suture is more effective than the conventional absorbable suture. Barbed sutures facilitate the suturing process and reduce the time required to suture the uterine wall defect, blood loss, and the need for postoperative blood transfusion.

Keywords: Absorbable sutures, barbed suture, laparoscopy, myomectomy

Öz

Amaç: Bu çalışmanın amacı laparoskopik miyomektomide geleneksel emilebilir poliglaktin 910 sütür ile barbed sütürlerin cerrahi ve klinik sonuçlarını karşılaştırmaktır.

Gereç ve Yöntemler: Bu tek merkezli randomize çalışmaya laparoskopik miyomektomi yapılan 75 kadın dahil edildi. Uterus duvar defektleri 41 kadında kontinue konvansiyonel emilebilir poliglaktin 910 sütür (Vicryl; Ethicon, Somerville, NJ, ABD) ile 34 kadında ise tek yönlü barbed sütür (V-Loc 180; Covidien, Mansfield, MA, ABD) ile kapatıldı.

Bulgular: Uterus duvar defektini suture etmek için gereken süre V-Loc grubunda Vicryl grubuna göre daha düşüktü ($p=0,007$). Ancak iki çalışma grubu arasında ameliyat süresi açısından anlamlı bir fark gözlenmedi. İntraoperatif kan kaybı ve postoperatif kan transfüzyonu ihtiyacı V-Loc grubunda Vicryl grubuna göre anlamlı olarak düşüktü (sırasıyla $p=0,018$ ve $p=0,048$).

Sonuç: Laparoskopik miyomektomi olgularında tek yönlü barbed sütür, geleneksel emilebilir sütürden daha etkilidir. Barbed sütürler sütürasyon sürecini kolaylaştırır ve uterus duvar defektini kapatmak için gereken süreyi, kan kaybını ve postoperatif kan transfüzyonu ihtiyacını azaltır.

Anahtar Kelimeler: Emilebilir sütür, barbed sütür, laparoskopi, miyomektomi

PRECIS: Barbed sutures facilitate the suturing process and reduce the time required to suture the uterine wall defect, blood loss, and the need for postoperative blood transfusion.

Address for Correspondence/Yazışma Adresi: Ceyda Karadağ MD,

Akdeniz University Faculty of Medicine, Department of Obstetrics and Gynecology, Antalya, Turkey

Phone: +90 534 594 22 64 **E-mail:** drceydakaradag@gmail.com **ORCID ID:** orcid.org/0000-0002-9557-0932

Received/Geliş Tarihi: 06.02.2023 **Accepted/Kabul Tarihi:** 16.04.2023

©Copyright 2023 by Turkish Society of Obstetrics and Gynecology

Turkish Journal of Obstetrics and Gynecology published by Galenos Publishing House.

Introduction

Myoma is the most common tumor in the uterus⁽¹⁾. Although it is usually asymptomatic, it can also present clinical problems such as abnormal levels of uterine bleeding, pelvic pressure/pain symptoms, or infertility⁽²⁾. Various medical and surgical methods have been used for treating myoma⁽³⁾. However, the most effective and curative treatment today is still surgery⁽⁴⁾.

Myomectomy can be performed abdominally, laparoscopically, or hysteroscopically. A comparison between laparoscopic and laparotomic surgery demonstrated that the former resulted in shorter hospital stays, faster recovery, less postoperative pain, and better cosmetic results⁽⁴⁾.

As with all myomectomy cases, excess bleeding is one of the most important complications of laparoscopic myomectomy^(5,6). Although many prophylactic methods have been used to reduce bleeding, no single method has had a 100% success rate, and research on new methods should be supported⁽⁷⁻⁹⁾.

In the case of myomectomy, suturing is the quickest and the most effective procedure to stop bleeding. Therefore, the use of a barbed suture in laparoscopic myomectomy was proposed to simplify suturing, which is the most challenging part of the operation⁽¹⁰⁾.

It is thought that a barbed suture will provide rapid and easy suturing due to its small spines, which hold onto the tissue well, do not loosen, and do not require intracorporeal suturing through the loop design at the other end of the suture⁽¹¹⁾. It is foreseen that intraoperative blood loss will be reduced due to this rapid and easy suturing technique⁽¹²⁻¹⁵⁾.

Although some previous studies have investigated the efficiency of the barbed suture in laparoscopic myomectomy, these studies were primarily retrospective⁽¹⁰⁻¹⁵⁾. The main aim of this study was to compare the frequently used Vicryl suture with the barbed suture in terms of intraoperative bleeding and suture time in laparoscopic myomectomy cases. Our secondary objectives are to compare the sutures in terms of the operation time, postoperative hemoglobin drop, and the need for postoperative blood transfusion. Thus, we objectively demonstrate the superiority of the conventional Vicryl suture, which is cheaper and more accessible, versus the newer and more expensive barbed suture.

Materials and Methods

This prospective, randomized clinical trial was conducted between May 2018 and May 2019 at the Antalya Training and Research Hospital. Approval was obtained from the hospital's local ethics committee before any study-related procedures were conducted (approval number: 8-16). The participants provided written informed consent before participation.

Study Population, Patient Sampling, and Randomization

Non-pregnant, reproductive age patients with myoma symptoms and indications for laparoscopic myomectomy were included in the study. The diagnosis of the myoma uteri was

classified according to the FIGO Leiomyoma Subclassification System⁽¹⁶⁾. Because H/S (Hysteroscopy) myomectomy was planned for type 0, 1, and 2 fibroids, these were excluded from the study. The study excluded types 7 and 8 fibroids because their suturation requirements were minimal. Type 3 fibroids were also excluded from the study due to the strong possibility of entering the endometrial cavity aggravating the suturation. Finally, multiple myomas were excluded from the study.

Patients with a single type 4, 5, or 6 fibroids and a uterine size reaching the maximum umbilicus level (20-W gestation size) were included in the study. Laparotomy was planned for larger uteruses.

Patients were randomized by 1:1 simple randomization using sealed envelopes. One day before the operation, the service nurse opened the envelope to determine the method to be used on the patient. During the procedure, the fibroids were repaired using Vicryl suture in the first group and barbed suture in the second group. Patients' demographic data (age, gravida, parity, previous abdominal surgery, and chronic diseases), intraoperative findings (operation time, myomectomy time, suture time, number of suture layers, amount of intraoperative bleeding, and fibroid weight), preoperative and postoperative hemoglobin/hematocrit values, postoperative blood transfusion requirements, and hospital stay duration were recorded.

Operation Procedure

All operations were performed by the same surgeon (BM). The first entry into the abdomen was made by direct trocar entry from the umbilicus or Lee Huang point according to the size of the fibroid, and a 10-mm laparoscope was placed in this port. The 30-degree optic was used in all cases to provide a wide viewing angle. Then, 5-mm accessory trocars were placed in the right and left lower quadrant and suprapubic area. Rumi II was used as the uterine manipulator. A Harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH, USA) was used to create the incision in the uterine serosa. A Vicryl (Ethicon, Somerville, NJ, USA) 0 USP 40-mm ½ taper needle suture was used for the Vicryl group patients. A V-Loc 180 (Covidien, Mansfield, MA, USA) 0 USP 37-mm ½ taper needle suture was used for the barbed suture group patients. One, two, or three layers were closed continuously depending on the depth of the fibroid inside the myometrium. All fibroids were morcellated with a Rotocut G1 electronic morcellator device (Karl Storz, Tuttlingen, Germany) and then removed from the abdomen.

Hemoglobin was measured the day before the operation and at the eighth postoperative hour. A cut-off value of <7 g/dL was determined for blood transfusion. Transfusion was performed in symptomatic patients with higher values.

Statistical Analysis

Data were recorded and analyzed using IBM SPSS Statistics for Windows (Armonk, NY: IBM Corp.). The Shapiro–Wilk test was used to determine the suitability of the data to the normal

distribution curve. Normally, distributed data are shown as means \pm standard deviations; non-normally distributed data are shown as medians and ranges. For categorical data, n (number/frequency) and percentages (%) are used. Parametric methods were used for the analysis of normally distributed variables, and non-parametric methods were used for the analysis of non-normally distributed variables. To compare two independent groups, the independent samples t-test, and Mann-Whitney U test were used. Categorical data were compared using the Chi-squared test. The data were analyzed at a 95% confidence level, and $p < 0.05$ was considered statistically significant.

Results

A total of 108 patients were included in the study; however, only 75 of them completed the study. The study flow diagram is presented in Figure 1. The two study groups were similar with respect to age, body mass index, previous abdominal surgeries, the weight of myoma, diameter of myoma, localization of myoma, and layers of suturation. Patients' demographic and clinical characteristics are shown in Table 1.

The perioperative findings are presented in Table 2. The suture time was significantly lower in the V-Loc suture group compared with the Vicryl suture group ($p = 0.007$). Similarly, blood loss and postoperative blood transfusion requirements were lower in the V-Loc group ($p = 0.018$, and $p = 0.048$ respectively). However, operative time, postoperative hemoglobin and hematocrit change, and hospital stay duration were similar between the two groups ($p > 0.05$ for all) (Table 2).

No organ or vessel injury was observed during the procedures. In three cases, conversion to laparotomy was required because of the restriction of the mobilization of the uterus, and these patients were excluded from the study.

Discussion

Unlike other randomized studies in the literature, this study was carefully planned to investigate the effectiveness of suturing,

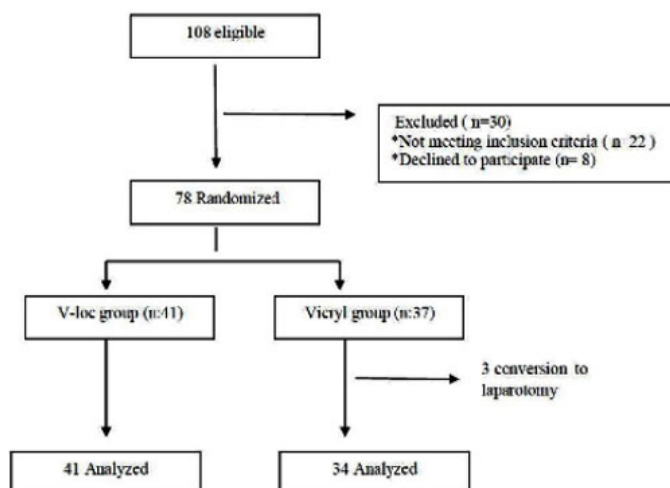


Figure 1. The study flow diagram

focusing only on an intraoperative hemorrhage. Therefore, the exclusion criteria were kept wide, and no medical or surgical methods were used to reduce bleeding. Additionally, all operations were performed by the same surgeon for the objective of the study, as the suturation procedure is directly dependent on the hand skills of the surgeon.

In line with other studies in the literature, the present study results indicate that barbed sutures shorten the suturation time in laparoscopic myomectomy cases, thereby reducing intraoperative bleeding and postoperative blood transfusion needs. The use of barbed sutures in laparoscopic myomectomy was first introduced by Greenberg and Einarsson⁽¹⁰⁾ in 2008. There have since been a few studies have investigating the efficiency of the barbed suture in laparoscopic myomectomy cases. Of these, only three were randomized clinical trials, and the rest were retrospective studies⁽¹⁷⁾.

The randomized studies by Alessandri et al.⁽¹¹⁾ and Ardovino et al.⁽¹⁴⁾ had similar designs. The amount of intraoperative

Table 1. Demographic values and characteristics

Characteristic	V-Loc suture (n=41)	Vicryl suture (n=34)	p-value
Age (years)	35.98 \pm 1.011	36.91 \pm 0.991	0.515
Weight (kg)	63 (48-90)	65 (50-97)	0.184
Height (cm)	161.76 \pm 0.918	161.09 \pm 1.041	0.631
Body mass index (kg/m ²)	23.4 (17.3-37.6)	25.9 (20.0-37.5)	0.160
Previous abdominal surgery (n, %)			
Yes	16 (39%)	11 (32.4%)	0.549
No	25 (61%)	23 (67.6%)	
Diameter of the myoma (cm)	7 (4-15)	7 (4-15)	0.643
Weight of removed myoma (g)	130 (35-435)	120 (37-453)	0.819
Localization of myoma (n, %)			
Corpus anterior	17 (41.5%)	12 (35.3%)	0.696
Corpus posterior	11 (26.8%)	8 (23.5%)	
Fundal	13 (31.7%)	14 (41.2%)	
Type of myoma removed (n, %)			
Type 4	13 (31.7%)	11 (32.4%)	0.696
Type 5	17 (41.5%)	12 (35.3%)	
Type 6	11 (26.8%)	11 (32.4%)	
Layers of suturation (n, %)			
1 layer	3 (7.3%)	4 (11.8%)	0.249
2 layers	36 (87.8%)	25 (73.5%)	
3 layers	2 (4.9%)	5 (14.7%)	
Data are presented as mean \pm SD, median (range), or n (%)			

Table 2. Intraoperative and postoperative results

Result	V-Loc suture (n=41)	Vicryl suture (n=34)	p-value
Operative time (min)	60 (30-150)	90 (30-150)	0.395
Myomectomy time (min)	25 (6-105)	30 (5-100)	0.454
Suture time (min)	15 (8-50)	23.5 (5.0-60.0)	0.007
Intraoperative blood loss (mL)	80 (10-320)	120 (20-500)	0.018
Hemoglobin change (g/dL)	1.9 (0.0-4.7)	2.1 (0.1-4.9)	0.116
Hematocrit change	5.0 (0.4-12.1)	5.8 (0.0-14.0)	0.056
Blood transfusion needed (n, %)	3 (7.3%)	8 (23.5%)	0.048
Hospital stay (days)	2 (2-4)	2 (2-4)	0.280

Data are presented as mean ± SD, median (range), or n (%)

hemorrhage was not quantitatively measured in either study; instead, hemoglobin decline was calculated to determine the amount of bleeding. However, the hemoglobin concentration is affected by many factors and does not objectively reflect the amount of bleeding. In both trials, the surgeries were performed by two different surgeons. Since the rate of suturation of each surgeon may be different, this may have been a confounding factor that impacted the suturation times^(11,14).

In a randomized study by Giampaolino et al.⁽¹⁵⁾, all operations were performed by the same surgeon. Thus, that study was like the current research. However, for all three of these studies, fibroids were not classified by type^(11,14,15). In one study, only the size of the fibroids was recorded⁽¹⁵⁾. However, it is known that difficulty in suturing after myomectomy is related to the area of the myoma in the myometrium, regardless of the size of the myoma.

In our study, the duration of the operations was the same in both groups because the surgeon was experienced in conventional intracorporeal suturation. If barbed suturing was performed by surgeons with less experience in intracorporeal suturing, the differences between the two types of sutures may be more evident.

Conclusion

This study revealed that the barbed suture facilitates suturing, shortens the suturing time and reduces the need for a postoperative blood transfusion by decreasing the amount of intraoperative bleeding during laparoscopic myomectomy. Additional studies involving less experienced surgeons with suturing could demonstrate its advantages more clearly.

Ethics

Ethics Committee Approval: Approval was obtained from the hospital's local ethics committee before any study-related

procedures were conducted (Antalya Training and Research Hospital - approval number: 8/16, date: 19.04.2018).

Informed Consent: The participants provided written informed consent before participation.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: B.M., Concept: S.A.T., B.K., Design: S.A.T., B.K., Data Collection or Processing: C.K., G.D.T., S.K., Analysis or Interpretation: S.A.T., C.K., G.D.T., Literature Search: B.K., Writing: S.A.T., B.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Marshall LM, Spiegelman D, Barbieri RL, Goldman MB, Manson JE, Colditz GA, et al. Variation in the incidence of uterine leiomyoma among premenopausal women by age and race. *Obstet Gynecol* 1997;90:967-73.
2. Bulun SE. Uterine fibroids. *N Engl J Med* 2013;369:1344-55.
3. Stewart EA. Clinical practice. Uterine fibroids. *N Engl J Med* 2015;372:1646-55.
4. Park KH, Chung JE, Kim JY, Kim YT. Endoscopic management of uterine myoma. *Yonsei Med J* 1999;40:583-8.
5. Chen I, Motan T, Kiddoo D. Gonadotropin-releasing hormone agonist in laparoscopic myomectomy: systematic review and meta-analysis of randomized controlled trials. *J Minim Invasive Gynecol* 2011;18:303-9.
6. Kalogiannidis I, Xiromeritis P, Prapas N, Prapas Y. Intravaginal misoprostol reduces intraoperative blood loss in minimally invasive myomectomy: a randomized clinical trial. *Clin Exp Obstet Gynecol* 2011;38:46-9.
7. Frederick J, Fletcher H, Simeon D, Mullings A, Hardie M. Intramyometrial vasopressin as a haemostatic agent during myomectomy. *Br J Obstet Gynaecol* 1994;101:435-7.
8. Wang CJ, Lee CL, Yuen LT, Kay N, Han CM, Soong YK. Oxytocin infusion in laparoscopic myomectomy may decrease operative blood loss. *J Minim Invasive Gynecol* 2007;14:184-8.
9. Sanders AP, Chan WV, Tang J, Murji A. Surgical outcomes after uterine artery occlusion at the time of myomectomy: systematic review and meta-analysis. *Fertil Steril* 2019;111:816-27.
10. Greenberg JA, Einarsson JI. The use of bidirectional barbed suture in laparoscopic myomectomy and total laparoscopic hysterectomy. *J Minim Invasive Gynecol* 2008;15:621-3.
11. Alessandri F, Remorgida V, Venturini PL, Ferrero S. Unidirectional barbed suture versus continuous suture with intracorporeal knots in laparoscopic myomectomy: a randomized study. *J Minim Invasive Gynecol* 2010;17:725-9.
12. Einarsson JI, Vellinga TT, Twijnstra AR, Chavan NR, Suzuki Y, Greenberg JA. Bidirectional barbed suture: an evaluation of safety and clinical outcomes. *JLS* 2010;14:381-5.
13. Angioli R, Plotti F, Montera R, Damiani P, Terranova C, Oronzi I, et al. A new type of absorbable barbed suture for use in laparoscopic myomectomy. *Int J Gynaecol Obstet* 2012;117:220-3.

14. Ardovino M, Castaldi MA, Fraternali F, Ardovino I, Colacurci N, Signoriello G, et al. Bidirectional barbed suture in laparoscopic myomectomy: clinical features. *J Laparoendosc Adv Surg Tech A* 2013;23:1006-10.
15. Giampaolino P, De Rosa N, Tommaselli GA, Santangelo F, Nappi C, Sansone A, et al. Comparison of bidirectional barbed suture Stratafix and conventional suture with intracorporeal knots in laparoscopic myomectomy by office transvaginal hydrolaparoscopic follow-up: a preliminary report. *Eur J Obstet Gynecol Reprod Biol* 2015;195:146-50.
16. Munro MG, Critchley HO, Broder MS, Fraser IS; FIGO Working Group on Menstrual Disorders. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. *Int J Gynaecol Obstet* 2011;113:3-13.
17. Gardella B, Dominoni M, Iacobone AD, De Silvestri A, Tinelli C, Bogliolo S, et al. What Is the Role of Barbed Suture in Laparoscopic Myomectomy? A Meta-Analysis and Pregnancy Outcome Evaluation. *Gynecol Obstet Invest* 2018;83:521-32.