Utility of baseball running suture using barbed string for prevention of adhesion formation after laparoscopic myomectomy: A propensity score-matched study

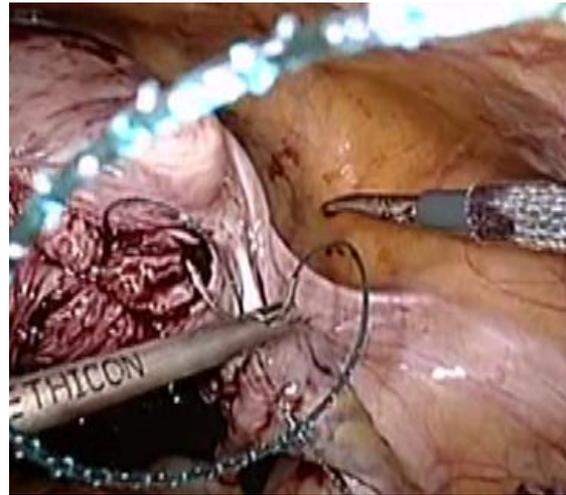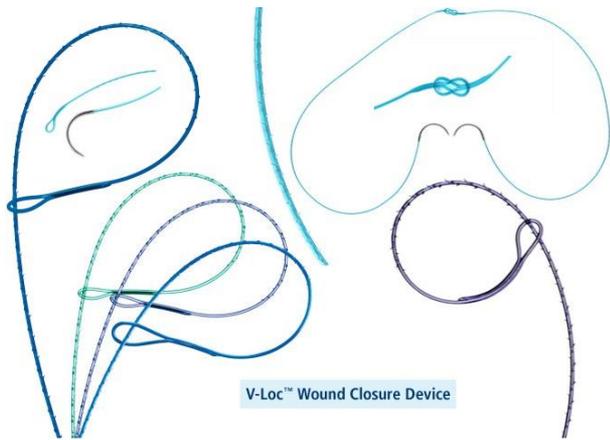Jun Kumakiri MD

Department of Obstetrics and Gynecology
Tokyo Women's Medical University

I declare no conflict of interest.

Introduction

Utility of barbed suture in laparoscopic surgery


V-Loc™ Wound Closure Device

Advantages

- ▶ Needless of knot tying
- ▶ Keeping appropriate tension without assistant
- ▶ Simplifying suturing procedure
- ▶ Reducing blood loss
- ▶ Shorten surgical duration

Consideration of barbed suture after laparoscopic myomectomy

- ✓ Postoperative bowel obstructions were sporadically reported.
- ✓ Potential risk of postoperative adhesion is demonstrated by animal model.
- ✓ There was no study concerning incidence of postoperative adhesion associated with barbed suture in human.
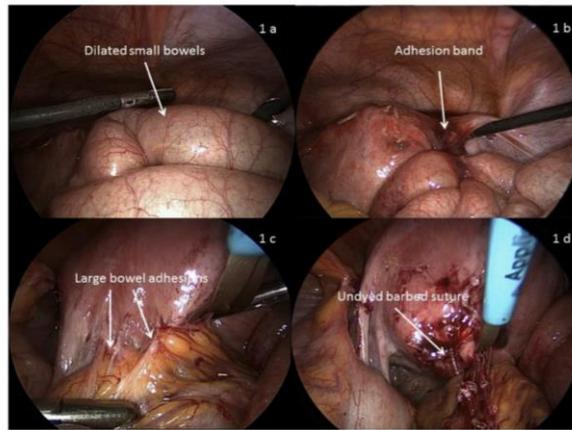
Small bowel obstruction from barbed suture following laparoscopic myomectomy-A case report. Lee ET et al. Int J Surg Case Rep. 2015;16:146-9.
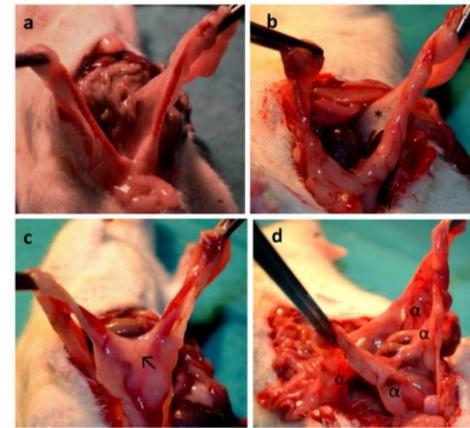
Comparison of barbed and conventional sutures in adhesion formation and histological features in a rat myomectomy model: randomized single blind controlled trial. Api M, et al. Eur J Obstet Gynecol Reprod Biol. 2015 Feb;185:121-5.

Aim of study

To assess the incidence of postoperative adhesion formation by baseball running suture adopted to barbed string compared to the conventional absorbable threads in laparoscopic myomectomy .

Materials and Methods

- **Design:** Retrospective propensity-matched analysis

- **Setting:** University hospital.

- **Patients:** Patients who underwent second-look laparoscopy (SLL) 6 months after laparoscopic myomectomy at our hospital between 2010 and 2014.

- **Interventions:** Running sutures with unidirectional barbed string or conventional absorbable threads were used to close surgical wounds enucleated a largest myomas in laparoscopic myomectomy.

Surgical procedures

- Four-puncture technique under general anesthesia with endotracheal intubation was used.

- All laparoscopic myomectomy procedures were intraperitoneal.

- The suture surface was covered with Interseed or Seplafilm to prevent adhesions.

Conventional suture

The myometrium and serosal layer was closed with a one-to-four layer continuous suture by absorbable threads [0-Polysorb with a 37-mm curved needle (Covidien, Mansfield, MA, USA)].

Barbed suture
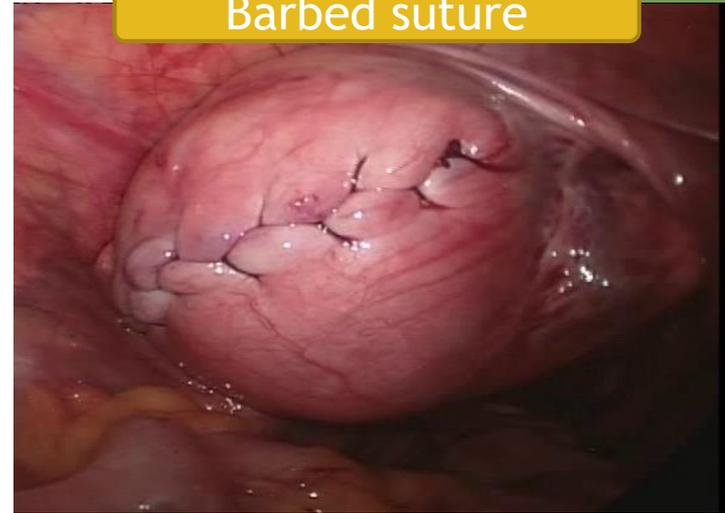
With use of a 0-V-Loc 45-cm TM 180 (Covidien, Mansfield, MA, USA), the first layer was sutured from right to left, and when the needle reached the wound edge, it was turned in the reverse direction, and the second layer was sutured from left to right. After closure of myometrium with one-to-three layer, the barbed suture in the serosal layer was completed as a baseball suture.

Second-look laparoscopy after laparoscopic myomectomy
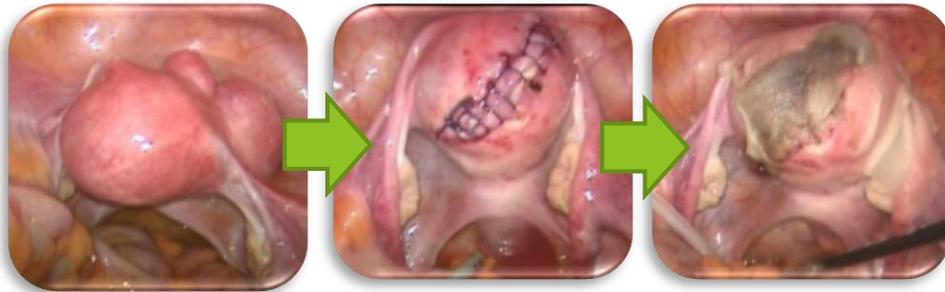
After 6 months

Micro-laparoscopic system was used for SLL. An 8 French Foley catheter was inserted into the endometrial cavity. Tubal patency was tested using indigo carmine dye.

➤ Characteristics of adhesions was referred to More Comprehensive Adhesion Scoring Methods.

➤ Number of locations of adhesion was counted.

➤ Severity of each wound adhesion was classified as follows: Type 0, none; Type 1, filmy; Type 2, dense; and Type 3, cohesive.

➤ Extend of each wound adhesion was classified as follows; grade 1, adhesion of <50% of wound; grade 2, adhesion of > 50% of wound; grade 3, adhesion covered entirety wound.

Statistics

▶ Propensity score (PS) matching (1:1) was used to adjust differences in surgical findings that could influence postoperative adhesion formation (including the diameter of the largest myoma, number of enucleated subserosal and intramural/submucosal myomas, number of sutured wounds on the anterior and posterior walls of the uterus, and type of adhesion barrier).

▶ Statistical analyses were performed via SPSS version 23 (IBM, Armonk, NY, USA). A Kolmogorov–Smirnov test was used to analyze the presence of normality for respective parameters. The propensity score was calculated by logistic regression model. Mann-Whitney U test or Unpaired t test was used to compare consecutive variables. Fisher exact test or x2 test was used to compare categorical variables. The data are expressed as mean ± SD or number (percentage).

Result of propensity score-matching for patients who underwent second-look laparoscopy after laparoscopic myomectomy

Patient who underwent SLL after LM
296 pts

Patients who not met the inclusion criteria
81 pts

Enrolled patients
(barbed : conventional = 28: 187)

1:1 Propensity score
matched allocation

Barbed suture
22 pts

Conventional suture
22 pts
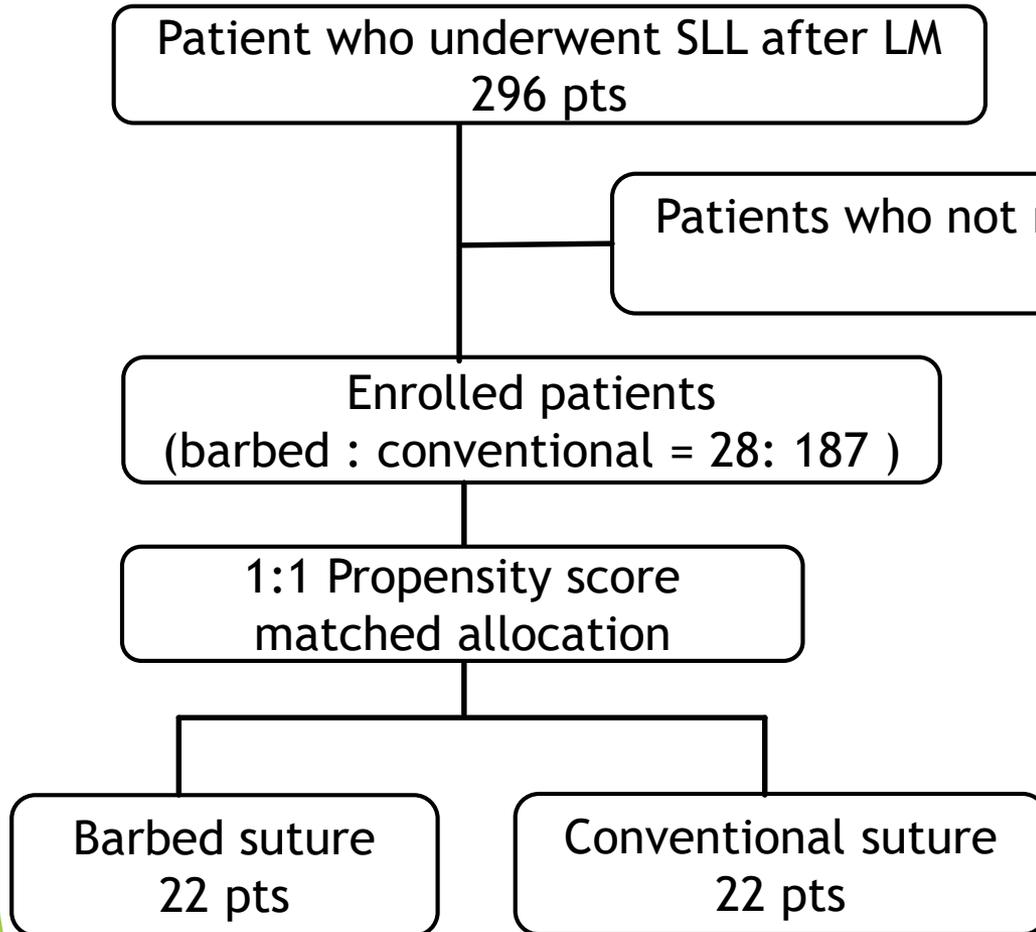
The propensity score model was well-calibrated (Hosmer–Lemeshow goodness-of-fit test, p = 0.787) with good discrimination (c-statistic = 0.693). Calipers of width equal to 0.01 of the standard deviation of the logit of the propensity score were used for matching.

Comparison of outcomes related to initial surgery between patients with barbed suture and with conventional suture (before matching)

		Barbed suture (n=28)	Conventional suture (n=187)	P value
Patients age (y)		35.3 ± 4.7	35.7 ± 3.5	0.8
Parity (%)		1 (3.6)	21 (11.2)	0.21
Gravity (%)		0 (0)	10 (5.3)	0.21
Preoperative GnRH agonist		28 (100)	182 (97.3)	
Number of enucleated myoma		3.4 ± 4.1	5.1 ± 5.2	*0.03
	Subserosal myomas	2.1 ± 3.0	3.2 ± 3.3	*0.04
	Intramural and submucosal myoma	1.3 ± 1.5	1.9 ± 2.6	0.42
Diameter of largest myoma (mm)		65.4 ± 18.8	74.3 ± 24.8	*0.04
Location of largest myoma	Anterior wall	15 (53.6)	97 (51.9)	0.87
	Posterior wall	13 (46.4)	90 (48.1)	
Number of sutured wounds		2.0 ± 1.2	2.3 ± 1.3	0.23
	Anterior wall	1.2 ± 1.0	1.1 ± 0.9	0.78
	Posterior wall	0.8 ± 0.5	1.2 ± 0.8	0.47
Depth of largest myoma	Subserosal	10 (35.7)	92 (49.2)	0.41
	Intramural	15 (53.6)	78 (41.7)	
	Submucosal	3 (10.7)	17 (9.1)	
Adhesion prevention	Sprafilm	9 (32.1)	15 (8.0)	*< 0.001
	Interceed	19 (67.9)	172 (92.0)	
Duration of surgery (min)		71.1 ± 31.9	107.7 ± 42.1	*< 0.001
Total blood loss (mL)		64.7 ± 104.3	136.0 ± 200.7	*0.001
Weight of specimens (g)		177.5 ± 188.8	236.8 ± 200.6	*0.02

Before propensity matching, number of enucleated myoma, diameter of largest myoma, total weight of were significantly larger in patients with conventional suture than with barbed suture. Total duration of surgery and blood loss were significantly longer and larger in patients with conventional suture than with barbed suture.

Comparison of outcomes related to initial surgery between patients with barbed suture and with conventional suture (after matching)

		Barbed suture (n=22)	Conventional suture (n=22)	P value
Patients age (y)		35.2 ± 4.9	34.3 ± 4.3	0.29
Parity (%)		1 (3.8)	1 (3.8)	-
Gravity (%)		0	0	-
Preoperative GnRH agonist		26 (100)	26 (100)	-
Number of enucleated myoma		3.6 ± 4.2	2.5 ± 2.4	0.34
	Subserosal myomas	2.3 ± 3.0	1.5 ± 2.1	0.44
	Intramural and submucosal myoma	1.3 ± 1.5	1.0 ± 0.7	0.81
Diameter of largest myoma (mm)		65.0 ± 18.6	68.9 ± 22.9	0.45
Location of largest myoma	Anterior wall	13 (50.0)	12 (46.2)	0.78
	Posterior wall	13 (50.0)	14 (53.8)	
Number of sutured wounds		2.1 ± 1.3	1.7 ± 0.9	0.24
	Anterior wall	1.2 ± 1.0	0.9 ± 0.7	0.21
	Posterior wall	0.8 ± 0.6	0.9 ± 0.5	0.58
Depth of largest myoma	Subserosal	10 (38.5)	8 (30.8)	
	Intramural	13 (50.0)	16 (61.5)	0.69
	Submucosal	3 (11.5)	2 (7.7)	
Adhesion prevention	Sprafilm	7 (26.9)	7 (26.9)	-
	Interceed	19 (73.1)	19 (73.1)	
Duration of surgery (min)		72.6 ± 32.6	106.9 ± 45.8	*0.004
Total blood loss (mL)		67.4 ± 107.9	114.2 ± 140.5	0.18
Weight of specimens (g)		180.6 ± 194.8	179.4 ± 146.4	0.61

After propensity matching, there was no significant difference in surgical outcomes between the two groups except for the total duration of surgery.

Comparison of outcomes of SLL between patients with barbed suture and with conventional suture

Variables		Overall			Matched pairs by propensity score		
		Barbed suture (n=28)	Conventional suture (n=187)	P value	Barbed suture (n=22)	Conventional suture (n=22)	P value
Patients with wound adhesions (%)		5 (17.9)	91 (48.7)	*0.002	5 (18.2)	8 (36.4)	0.31
Number of adhsions	1	5	88		5	7	
	2	0	3		0	1	
Type of wound adhesion	Type 1	1 (20)	10 (10.1)		1 (25)	2 (22.2)	
	Type 2	3 (60)	40 (42.6)	0.20	2 (50)	3 (33.3)	0.21
	Type 3	1 (20)	44 (46.8)		1 (25)	4 (44.5)	
Extend of wound adhesion	Grade 1	3 (60)	32 (34)		2 (50)	2 (22.2)	
	Grade 2	2 (40)	37 (39.4)	0.91	2 (50)	5 (55.6)	0.71
	Grade 3	0	25 (26.6)		0	2 (22.2)	
Adhesive organ	Omentum	1	10		1	3	
	Sigmoid colon	3	80		3	6	
	Small intestine	0	1		0	0	
	Appendix	0	1		0	0	
	Bladder	1	2		1	0	

SLL revealed that the number of patients with wound adhesion was significantly higher in patients with conventional suture than with barbed suture. However, there was no significant difference in number of patients with wound adhesion between propensity matched groups.

Conclusions

It is suggested that enucleated wound closure using the barbed suture facilitates the improvements of surgical outcomes in laparoscopic myomectomy. Our results indicate that the use of barbed string for wound closure in laparoscopic myomectomy reduces surgical duration and may not facilitate postoperative adhesion when used with appropriate closure and an adhesion barrier.