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CLINICAL ARTICLE

A new type of absorbable barbed suture for use in laparoscopic myomectomy

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ABSTRACT

Objective: To compare effectiveness, feasibility, and suturing time required between an absorbable barbed wire (V-Loc) uterine suture and a classic continuous suture with intracorporeal knots among women undergoing laparoscopic myomectomy. *Methods:* From January 2010 to February 2011, women with single symptomatic intramural myoma were prospectively enrolled in a single-center study at a university hospital in Rome, Italy. A control group with characteristics meeting the criteria for study inclusion was retrospectively identified from the hospital databases. In the prospective group uterine wall defects were closed with V-Loc suture, whereas in the control group they were closed by classical continuous suture with intracorporeal knots. Data were analyzed via Student *t* test, Mann–Whitney *U* test, and Fisher exact test. *Results:* The mean operative time was shorter in the V-Loc (51 ± 18.1 min) than in the control (58 ± 17.8 min) group. Suturing time was significantly lower in the V-Loc than in the control (9.9 ± 4.3 versus 15.8 ± 4.7 min; $P = 0.0004$) group. Both intraoperative bleeding and drop in hemoglobin were significantly lower in the V-Loc group ($P = 0.0076$ and $P = 0.0176$, respectively). *Conclusion:* Use of a barbed suture may aid surgeons during laparoscopic suturing by reducing operative time, suturing time, and blood loss.
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1. Introduction

Uterine leiomyomas are benign smooth-muscle tumors arising from the myometrium [1]. They are often asymptomatic, but in approximately 30% of cases they are associated with metrorrhagia and abnormal uterine bleeding [2]. In women who wish to preserve fertility, myomectomy has been traditionally performed by laparotomy. In the past few decades, however, various endoscopic alternatives with different advantages have become widely used for removing myomas, including laparoscopic, hysteroscopic, and robotic surgery [3–5]. Nevertheless, hemorrhage during myomectomy remains a major challenge to gynecologic surgeons [6].

Many methods have been used to minimize bleeding during myomectomy, including ligation of the uterine artery [7], injection of vasoconstrictor [8], and oxytocin [9], but the time for suturing the uterine defects remains the principal factor that influences intraoperative uterine bleeding [10,11]. As a result, endoscopic suturing is the main operative step of laparoscopic myomectomy. To aid surgeons during laparoscopic suturing, a new type of intracorporeal absorbable barbed suture (V-Loc, TM 90, Covidien, Mansfield, MA) has been introduced in gynecologic surgery with good results [12–15].

The aim of the present study was to compare effectiveness, feasibility, and time required between uterine suture with an absorbable barbed wire and classic continuous suture with intracorporeal knots during laparoscopic myomectomy.

2. Materials and methods

From January 10, 2010, to February 21, 2011, women presenting with a single symptomatic intramural myoma with a sonographically diagnosed free myometrium margin (distance between the deeper part of the myoma and the endometrial cavity) of 0.5 cm or more were enrolled in a single-center study conducted at the Campus Bio Medico University of Rome, Rome, Italy. All women gave informed consent for participation in the study, and approval from the institutional ethics committee was obtained.

The study inclusion criteria were a reproductive age of more than 18 years; largest diameter of the myoma of 3–5 cm; absence of any other gynecologic pathology at preoperative ultrasound examination; a hemoglobin level of 12 or more; and a WHO performance status of less than 1. The exclusion criteria were presence of subserosal, submucosal, posterior, or intraligamentous myoma; previous pelvic surgery; previous or present gynecologic neoplasms; psychiatric pathologies precluding informed consent; coagulation defects or concurrent anticoagulant therapy; liver disease; previous treatment with an analog of gonadotropin-releasing hormone, contraindications for general anesthesia; a body mass index (BMI, calculated as weight

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in kilograms divided by the square of height in meters) of more than 35, ongoing or recent history of pelvic inflammatory disease; and menopausal status.

Preoperative assessment included complete history, physical and gynecologic examination, laboratory work-up, electrocardiogram, chest radiograph, and pelvic ultrasound.

Menorrhagia was defined as bleeding for more than 7 days, or using more than 10 pads or tampons per day during the menstrual cycle. Pelvic pain was defined as symptoms of pelvic pressure, lower back pain, or both—with or without increased urinary frequency—causing dysfunction in daily life, as reported subjectively by the patients. Women were counseled about the possibility of laparotomy if any part of surgery could not be completed laparoscopically and the risk of hysterectomy if uncontrollable hemorrhage occurred.

Before surgery, all patients were submitted to mechanical bowel preparation, and deep venous thrombosis prophylaxis with low molecular weight heparin. Short-term antibiotic prophylaxis was performed 2 hours before surgery. No gonadotropin-releasing hormone analogs were administered before surgery. The surgical technique was performed under general anesthesia.

All procedures were performed by senior surgeons. For all patients, the uterine wall was closed by a continuous intracorporeal suture using 2–0 V-Loc on a P-12 needle. The use of V-Loc wire eliminated the need for knot tying. No adhesion barrier was left in the peritoneal cavity.

Hemoglobin concentration was determined the day before surgery and 24 hours after surgery. Time to complete uterine suture, time to tie a single knot to secure the V-Loc suture, length of the uterine incision, all other operative data, all intraoperative and postoperative complications, and length of hospital stay were recorded.

Complications were classified as follows: a drop in hemoglobin to less than 4 g/dL, intraoperative or postoperative bleeding needing transfusion, bladder injury, and bowel or ureter complications leading to repeated surgery or hospital readmission were considered major complications; postoperative hematomas, cystitis, postoperative fever, and manipulator injuries were considered minor complications. Conversion to laparotomy was defined as the need for standard laparotomy at any time during the procedure because of either complications or technical difficulties. Blood loss was evaluated both by intraoperative estimated blood loss and by hemoglobin drop (ΔHb). Blood loss was estimated by the waste irrigation fluid volume (mL) minus the volume of normal saline used for irrigation (mL). Postoperative fever was defined as a temperature greater than 38 °C on 2 occasions at least 6 hours apart but within 24 hours, starting 24 hours after surgery. Transvaginal pelvic ultrasound was routinely performed in the absence of symptoms at hospital discharge.

A control group of consecutive patients with features meeting the inclusion criteria was retrospectively identified from the hospital databases. Among all patients selected for the control group, laparoscopic myomectomy was performed as previously explained. Surgical operative data were recorded by watching the video of each surgical operation and by extracting information from the databases. In the control group, hysterorrhaphy was performed in a double layer with 0-polyglactin on a sharp curved needle in a continuous manner using intracorporeal knot tying to secure each end of the suture. Data regarding the patient's history, characteristics, and outcome were available from chart reviews of the hospital.

Data were analyzed via Student *t* test, Mann–Whitney *U* test, and Fisher exact test. Statistical analyses were performed using MedCalc (MedCalc Software, Mariakerke, Belgium). A *P* value of less 0.05 was considered statistically significant.

3. Results

From January 10, 2010, to February 21, 2011, 26 patients with a single symptomatic intramural myoma were assessed for eligibility. Of these, 19 (73%) met all of the inclusion criteria, signed informed consent, and were enrolled prospectively in the barbed suture (V-Loc) group). Among the 7 excluded patients, 3 did not meet the inclusion criteria (2 for adnexal pathology found at preoperative ultrasound, and 1 for myoma size >5 cm) and 4 refused to participate in the study. Twenty patients were retrospectively selected for the control group. The clinical characteristics of both groups are shown in Table 1. Both groups were homogeneous, with no significant differences regarding the dimension of myomas at preoperative ultrasound.

Table 1
Comparison of demographic and clinical characteristics among patients in the 2 study groups [a].

Variable	V-Loc group (n = 19)	Control group (n = 20)	*P* value
Age, y	32.5 ± 6.1 (21–42)	32.3 ± 6.1 (21–41)	0.8992
BMI	24.6 ± 3.3 (19–29)	24.1 ± 3.8 (18–32)	0.5454
Previous live birth	14 (73)	14 (70)	>0.99
Menorrhagia [b]	13 (68)	15 (75)	0.7311
Pelvic pain [b]	11 (58)	9 (45)	0.5273
Diameter of myoma, cm	3.8 ± 0.8 (2–5)	4.1 ± 0.9 (2–5)	0.4439

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).
[a] Values are given as mean ± SD (range) or number (percentage) unless otherwise indicated.
[b] Some patients had more than 1 symptom.

All procedures were performed laparoscopically. Intraoperative bleeding was significantly lower in the V-Loc group than in the control group by both the estimated blood loss (113.7 ± 74.1 mL versus 168.6 ± 75.1 mL; $P = 0.0076$) and the hemoglobin drop (1.4 ± 0.5 g/dL in V-Loc vs 2.06 ± 0.7 g/dL in control group; $P = 0.0176$). No patient required a blood transfusion (Table 2).

The mean operative time for the whole surgical procedure was shorter in the V-Loc group (51.0 ± 18.1 minutes) than in the control group (58.0 ± 17.8 minutes), but the difference was not significant ($P = 0.0616$). There was no difference concerning the length of uterine incision between the groups. The mean time required for uterine suture was significantly lower in the V-Loc group than in the control group (9.9 ± 4.3 min versus 15.8 ± 4.7 min; $P = 0.0004$) (Table 2).

Regression analysis indicated that there was a significant reduction in the time needed to pass the needle through the wire's loop as the surgeon performed more interventions ($P<0.001$). The distribution of these times in a scatter diagram (Fig. 1) indicated that this operative step was learned by the tenth procedure, because all subsequent times to perform the passage were within the confidential interval of the regression line.

No laparotomic conversion or intraoperative complications occurred in either group. Similarly, no pelvic abscess or uterine hematomas were found in either group at postoperative ultrasound. There were no significant differences regarding ileus, postoperative complications, or discharge between the groups (Table 3).

Table 2
Comparison of intraoperative data among the 2 study groups[a].

Variable	V-Loc group (n = 19)	Control group (n = 20)	*P* value
Total operative time, min	51.0 ± 18.1 (35–105)	58.0 ± 17.8 (38–110)	0.0616
Time of uterine suture, min	9.9 ± 4.3 (5–22)	15.8 ± 4.7 (8–25)	0.0004
Hemoglobin drop, g/dL	1.4 ± 0.5	2.1 ± 0.7	0.0176
Length of uterine incision, cm	3.2 ± 0.6 (2–4)	3.4 ± 0.7 (2–4)	0.5977
Estimated blood loss, mL	113.7 ± 74.1 (23–260)	168.6 ± 75.1 (67–340)	0.0076
No. of laparotomic conversions	0	0	–

[a] Values are given as mean ± SD or mean ± SD (range) unless otherwise indicated.

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