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Original Article

# Barbed Versus Conventional Suture: A Randomized Trial for Suturing the Endometrioma Bed After Laparoscopic Excision of Ovarian Endometrioma

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**ABSTRACT** **Objectives:** To determine whether the unidirectional knotless barbed suture can be used to control bleeding from the endometrioma bed after laparoscopic excision of ovarian endometrioma, and to detect whether the use of the unidirectional barbed suture is associated with shorter suturing time of the endometrioma bed compared with the continuous conventional smooth suture with intracorporeal knot tying.

**Design:** Randomized clinical trial (Canadian Task Force classification I).

**Setting:** Tertiary hospital.

**Patients:** Forty patients with unilateral ovarian endometrioma (mean diameter, 3–10 cm) were randomized in a 1:1 ratio to the barbed suture group or the conventional suture group.

**Interventions:** The endometrioma bed was sutured either with unidirectional barbed suture (V-Loc 180; Covidien, Mansfield, MA) or conventional suture (Vicryl; Ethicon, Somerville, NJ). Two layers of continuous sutures were used to control bleeding from the endometrioma bed and to reapproximate the ovarian edges.

**Measurements and Main Results:** The degree of suturing difficulty was evaluated by the surgeons using a visual analog scale (VAS) ranging from 1 (least difficult suturing) to 10 (most difficult suturing). Operating time and suturing time were significantly shorter in the barbed suture group (43.3 ± 10.54 vs 52.8 ± 9.69 minutes; $p = .005$ and 8.85 ± 2.52 vs 15.7 ± 4.12 minutes; $p < .001$, respectively). Suturing with barbed suture was less difficult than suturing with conventional suture (3.68 ± 1.37 vs 4.77 ± 1.56; $p = .025$). Intraoperative blood loss was similar in the 2 groups. No perioperative complications were reported in either group. A nonsignificant decrease in serum anti-mullerian hormone (AMH) levels was observed after the operation in the barbed suture group and the conventional suture group (3.04 ± 1.5 vs 2.52 ± 1.31 ng/mL; $p = .252$ and 2.76 ± 1.48 vs 2.13 ± 1.14 ng/mL; $p = .139$, respectively). The rate of decline in serum AMH levels after the operation was 18.32% in the barbed suture group and 22.84% in the conventional suture group.

**Conclusion:** The unidirectional knotless barbed suture (V-Loc) facilitates suturing of the endometrioma bed after laparoscopic excision of ovarian endometrioma. Compared with conventional smooth suture (Vicryl), the unidirectional barbed suture reduces the time needed to suture the endometrioma bed and the total operating time. Journal of Minimally Invasive Gynecology (2016) 23, 962–968 © 2016 AAGL. All rights reserved.

*Keywords:* Barbed suture; Conventional suture; Endometrioma; Endometriosis; Laparoscopy; Ovarian reserve; Suturing time

Ovarian endometrioma is a pseudocyst arising from the growth of ectopic endometriotic deposits within the ovary [1]. Ovarian endometriomas are usually seen in women of reproductive age. Pelvic pain, dyspareunia, rectal and urinary symptoms, and infertility are the main complaints of patients with ovarian endometriomas [2].

Surgery is typically indicated in patients with severe pain not responding to medical therapy, in infertile women, and before in vitro fertilization–embryo transfer [3]. Surgical management of ovarian endometriomas can be performed using open, laparoscopic, or robotic approaches. In recent years, laparoscopy has become the gold standard for the management of ovarian endometriomas [4]. Laparoscopy has several advantages over open surgery, including lower

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analgesia requirement, faster patient recovery, shorter hospital stay, and less hospital costs [5]. Moreover, laparoscopic surgery is less expensive than robotic surgery.

Laparoscopic procedures for treatment of ovarian endometriomas comprise excision of the endometrioma or ablation of the cyst wall with laser or electrocoagulation. A recent meta-analysis comparing excision of endometrioma with ablation of the cyst wall revealed that the excision of ovarian endometrioma is associated with less recurrence of the endometrioma, less recurrence of symptoms, and higher spontaneous pregnancy rates in patients with infertility [6].

After laparoscopic excision of ovarian endometrioma, bleeding usually occurs from the endometrioma bed, and hemostasis is achieved via bipolar coagulation, suturing, or hemostatic sealant. Studies comparing the effect of bipolar coagulation with suturing of endometrioma bed on ovarian reserve revealed that bipolar coagulation is more detrimental to ovarian reserve [7,8]. A recent meta-analysis revealed that the use of bipolar coagulation to control bleeding from the endometrioma bed is associated with a greater decline in the ovarian reserve compared with other hemostatic methods (suturing or hemostatic sealant) [9].

Suturing and knot tying are challenging laparoscopic skills that require extensive training [10,11]. Barbed suture is a new type of suture introduced to facilitate laparoscopic suturing. Three types of barbed sutures are currently available on the market: Quill (Angiotech Pharmaceuticals, Vancouver, BC, Canada), Stratafix (Johnson & Johnson, New Brunswick, NJ) and V-Loc (Covidien, Mansfield, MA). The Quill and Stratafix are bidirectional barbed sutures that have 2 needles swaged onto both ends of the suture. The V-Loc is a unidirectional knotless barbed suture that has a loop at 1 end of the suture and a needle swaged onto the other end [10–13].

Compared with conventional smooth suture, barbed suture has external barbs that anchor the suture to the tissues and prevent the retrograde movement of suture thread during suturing. Consequently, laparoscopic suturing can be readily performed without the need for suture locking, without applying traction on suture thread by the assistant, and without tying knots at both ends of the suture line [10–13].

In gynecology, barbed sutures have been used in minimally invasive myomectomy, hysterectomy, and sacrocolpopexy. There is a growing body of evidence suggesting that the use of barbed sutures in these procedures facilitates laparoscopic suturing and significantly reduces suturing time, total operating time, and intraoperative blood loss [10–13].

Although the efficacy and safety of barbed sutures have been demonstrated in various gynecologic surgeries [10–13], to date no studies have evaluated the use of barbed sutures in controlling bleeding from the endometrioma bed after laparoscopic excision of ovarian endometrioma.

The aim of the present study was to determine whether the unidirectional knotless barbed suture can be used to control bleeding from the endometrioma bed after laparoscopic excision of ovarian endometrioma, and to detect whether use of the unidirectional barbed suture is associated with shorter suturing time of the endometrioma bed compared with the continuous conventional smooth suture with intracorporeal knot tying.

## Materials and Methods

This prospective randomized controlled trial was conducted at Aljazeera Hospital, Giza, Egypt between December 2014 and March 2016. The study protocol was approved by the Institutional Ethics Committee, and informed consent was obtained from each patient participating in the study.

To date, no studies in the literature have reported the time required to suture the ovarian endometrioma bed by conventional or barbed sutures. We reviewed video recordings of the last 30 laparoscopic excisions of endometrioma performed at our center by the investigators (U.F and K.E), to calculate the time needed to suture the endometrioma beds by continuous conventional suture (Vicryl) with intracorporeal knot tying. The mean ± SD time taken to suture the ovarian endometrioma bed was 15.54 ± 5.22 minutes. We considered a 30% difference in suturing time between the barbed suture group and the conventional suture group to represent a clinically significant difference. To detect this difference in suturing time between the 2 groups, 20 patients needed to be recruited to each study arm to achieve a study power of 80% at a significance level of 0.05 (as measured at https://www.sealedenvelope.com/power/continuous-superiority).

Forty women of reproductive age with an ultrasound-confirmed diagnosis of unilateral ovarian endometrioma were recruited to the study. The indications for laparoscopic excision of endometrioma were severe pain not responding to medical therapy and infertility. The exclusion criteria were age <20 years or >42 years, endometrioma mean diameter <3 cm or >10 cm, the presence of severe pelvic adhesions, uterine myoma requiring excision, previous ovarian cystectomy or myomectomy, use of hormonal treatments within 4 months before surgery, pelvic inflammatory disease, coagulation defects, pregnancy, infertile patients with anti-mullerian hormone (AMH) level <2 ng/mL, compromised cardiopulmonary status and contraindications for general anesthesia.

Patients were randomly allocated in a 1:1 ratio to the barbed suture group or the conventional suture group using a computer-generated randomization sequence and sequentially numbered, opaque, sealed envelopes. The randomization sequence and the sealed envelopes were prepared by a colleague not directly involved in the study. Envelopes were opened sequentially by the study nurse in the operating theater just before the start of the operation to allocate the patients to the assigned group.

Transvaginal ultrasound examination was performed before surgery to confirm the diagnosis of endometrioma, to measure the dimensions of the endometrioma, and to measure the antral follicle count (AFC; number of ovarian follicles 2–10 mm in diameter).

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