
Barbed Suture Use in Minimally Invasive Gynecology: A Practical Guide

14

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14.1 Introduction

Barbed suture is a novel innovation in the field of suture materials with far-reaching implications for minimally invasive gynecologic surgeons. The advantages of barbed suture include its self-anchoring feature which may enhance even distribution of tension along the length of an incision (Rodeheaver et al. 2005). Additionally, secure tissue approximation and wound holding can be achieved without knots, significantly enhancing efficiency and ease of laparoscopic suturing (Einarsson et al. 2011a, b). Although a synthetic multibarbed suture was described as early as 1967 for use in tendon repairs (McKenzie 1967), this technology did not gain regular use until the early 2000s with its application to facial plastic surgery. With the introduction of Quill™ bidirectional barbed suture (Angiotech Pharmaceuticals, Inc., Vancouver, BC, Canada) in 2004 and V-Loc™ unidirectional barbed suture (Covidien, Mansfield, MA) in 2009, barbed suture has demonstrated widespread utility in surgical fields including gynecology, urology, orthopedic surgery, and reconstructive surgery.

14.2 Available Products

Barbed suture is created by cutting barbs into a monofilament suture material in roughly 1 mm increments (Fig. 14.1). Bidirectional barbed suture (Fig. 14.2) features a needle swaged onto

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Fig. 14.1 The Barbed suture



Fig. 14.2 Barbed suture with 2 needles

both suture ends, with barbs changing direction at the mid-point of the suture. Unidirectional barbed suture (Fig. 14.3) has a needle swaged onto one end, with a loop on the trailing end; after initiating the wound closure with an initial pass through tissue, the needle is passed through the loop to anchor the suture in place.

Various combinations of suture size, length, needle type, and monofilament material (including absorbable, delayed absorbable, and permanent options) are available in both bidirectional and unidirectional form. It is important to review the grading system employed by the barbed suture manufacturer to ensure a suture of sufficient strength is selected (Greenberg 2010). Some barbed suture (for example, Quill™ or STRATAFIX™ (Ethicon, Somerville NJ) suture)) is size-rated prior to the barbs being cut, and is equivalent in strength to smooth suture of one size smaller. Other barbed suture (for example, V-Loc™) is size-rated after barbs are cut into the

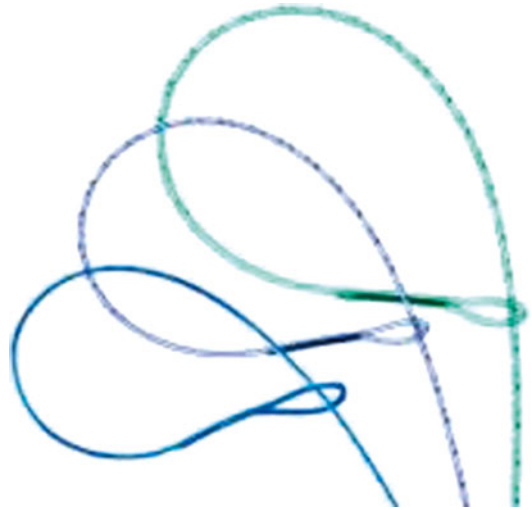


Fig. 14.3 Barbed suture with loop

material and of equal strength as the same size smooth suture.

14.3 Tips for Use in Gynecologic Laparoscopy

Barbed suture may be particularly useful for closure of the vaginal cuff at the time of total laparoscopic hysterectomy or trachelectomy. Several options for closure technique exist, depending on whether unidirectional or bidirectional barbed suture is chosen. Utilizing unidirectional suture, the surgeon may begin at one apex, anchor the suture via the loop on the trailing end, and move toward the other apex with continuous nonlocking bites. Once the full length of the vaginal incision has been re-approximated, it may be helpful to take several back bites toward the midline in order to further anchor the suture. Additionally, one may choose to utilize two separate unidirectional sutures, beginning at each apex with an individual suture, suturing toward the midline and taking overlapping bites in the middle.

When employing bidirectional barbed suture, the surgeon may begin in the middle of the incision, taking care to pull the suture through the tissue until resistance is met, indicating the mid-point of the suture where the barbs change direction (Fig. 14.4). One needle end of the suture

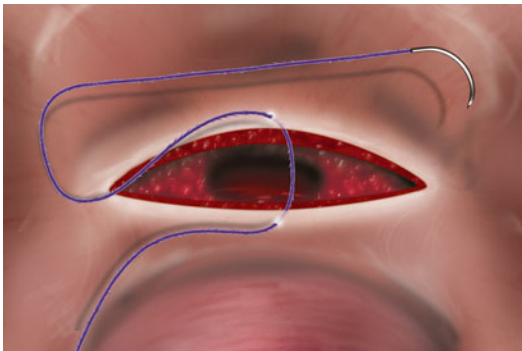


Fig. 14.4 Start in middle



Fig. 14.5 Suture left

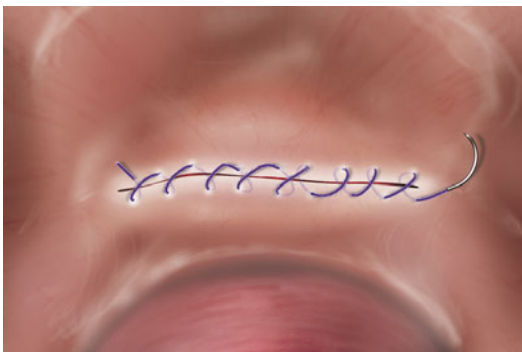


Fig. 14.6 Suture right with the other needle

is used to close toward the left of the incision, and the other to close toward the right (Figs. 14.5 and 14.6). Again, backbites may be helpful after completing closure to enhance suture anchoring. If a double-layer closure is desired, the bidirectional suturing is begun by placing the first bite at one apex, pulling the suture through until the

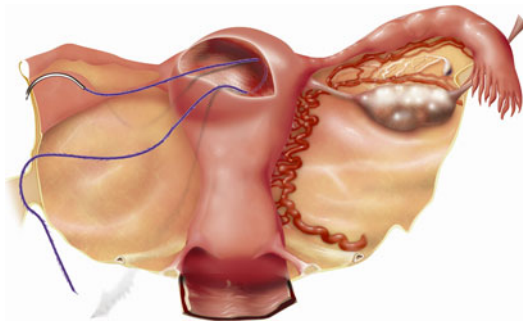


Fig. 14.7 Suture of deep layers

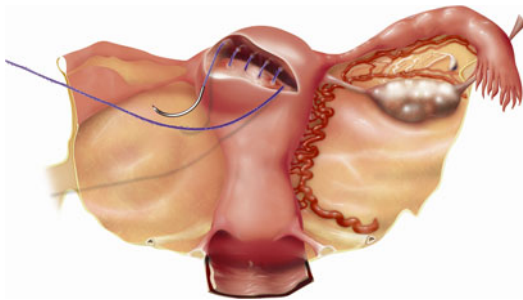


Fig. 14.8 Suture of deep layers

mid-point resistance is met, and suturing in a continuous fashion toward the other apex. The second half of the suture is then utilized to work in the same direction and create an imbricating layer. Favorable outcomes have been reported with the use of barbed suture for vaginal cuff closure, including decreased incidence of cuff dehiscence, postoperative vaginal bleeding, formation of granulation tissue, and vaginal cuff cellulitis (Siedhoff et al. 2011).

During laparoscopic myomectomy, hysterotomy closure is also greatly facilitated by use of barbed suture. If a surgeon chooses unidirectional barbed suture, the defect may be closed in standard multilayer fashion by continuous suturing techniques. With bidirectional barbed suture, the first half of the suture is used to close the deepest layer, with the second half utilized for closure of the more superficial layers (Figs. 14.7, 14.8 and 14.9). It may be helpful to tack the nonworking needle to the anterior abdominal wall when using a long bidirectional suture in order to avoid tangling of the suture ends

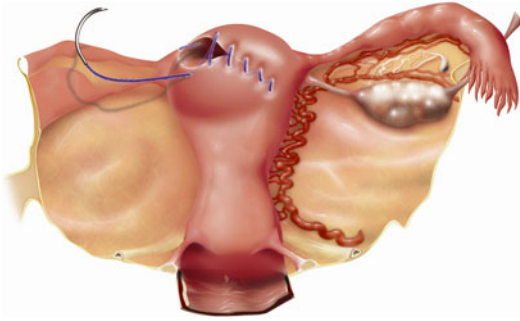


Fig. 14.9 Suture of serosa

(Einarsson and Greenberg 2009). The use of barbed suture for laparoscopic myomectomy has demonstrated benefits including facilitating ease of a complex suturing task and decreased time required for hysterotomy closure, with variable findings regarding reduction in blood loss (Einarsson and Greenberg 2009; Alessandri et al. 2010; Angioli et al. 2012).

Use of barbed suture has also been reported in the setting of uterosacral suspension procedures or during laparoscopic sacropexy for reapproximation of peritoneum and attachment of mesh (Einarsson and Greenberg 2009; Defieux et al. 2011; Ghomi and Askari 2010). One consideration when using barbed suture to attach mesh to the cervix and/or vagina during a sacropexy is the tendency for the barbs to cause bunching of the mesh material; clinical significance of this is not known.

Conclusions

Barbed suture is a useful tool for advanced laparoscopic gynecology. As with any innovative technology, it is important to be aware of potential for unforeseen complications. Bowel obstruction has been reported in cases involving barbed suture use; this may be related to leaving a long trailing end of barbed suture in the abdomen (Buchs et al. 2011; Donnellan and Mansuria 2011; Thubert et al. 2011). Surgeons are advised to trim the ends of barbed suture short so as to avoid this potential complication. Adhesion formation due to exposed barbs has also been investigated in a sheep model; no difference was found with

regard to adhesion formation with barbed compared to smooth suture (Einarsson et al. 2011a, b). Areas for further investigation include the incidence of uterine rupture during pregnancy following laparoscopic myomectomy with barbed suture and the occurrence of dyspareunia (or partner dyspareunia) following vaginal cuff closure with barbed suture.

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