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The Use of Bidirectional Barbed Suture in Laparoscopic Myomectomy and Total Laparoscopic Hysterectomy

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ABSTRACT Bidirectional barbed suture is a new design that incorporates tiny barbs spaced evenly along the length of the suture cut facing in opposite directions from the midpoint. Unlike the smooth-textured traditional suture, the bidirectional barbs on this new product introduce a new paradigm in which wound tension is evenly distributed across the length of the suture line rather than at the knotted end. No knots are required with bidirectional barbed suture. We present a small case series with bidirectional barbed suture to close myometrial defects in laparoscopic myomectomies and vaginal cuffs in total laparoscopic hysterectomies. On the basis of our early experience, we are optimistic that this new suture material is a potentially valuable tool for gynecologic surgeons. Journal of Minimally Invasive Gynecology (2008) 15, 621–623 © 2008 AAGL All rights reserved.

The techniques and principles of gynecologic surgery have been relatively stable since the days of Ernest Wertheim, Howard Kelly, and Richard TeLinde in the early parts of the last century. The transition of laparoscopic surgery from a mostly diagnostic intervention to a fully operative procedure has, in turn, dramatically altered the way gynecologic procedures are performed and changed the equipment and devices that are used. Although much focus has been placed on coagulation and cutting devices and the limitless horizon for the robot, little attention has been paid to a basic element of surgery—suture material.

In January 2007, bidirectional barbed suture was introduced in the United States (Quill Self-Retaining System; Angiotech Pharmaceuticals, Inc., Vancouver, British Columbia). Although the suture material is relatively standard—polydioxanone (PDO), nylon, and polypropylene—the suture design is revolutionary. Rather than a traditional smooth monofilament or braided thread with a needle swedged on 1 end, this new suture consists of standard suture material with tiny barbs cut into the length of the filament in a helical array set facing in opposite directions from the midpoint with a needle on each end (Figs. 1 and 2). This novel configuration allows tissue to be reapproximated without the need to tie a surgical knot.

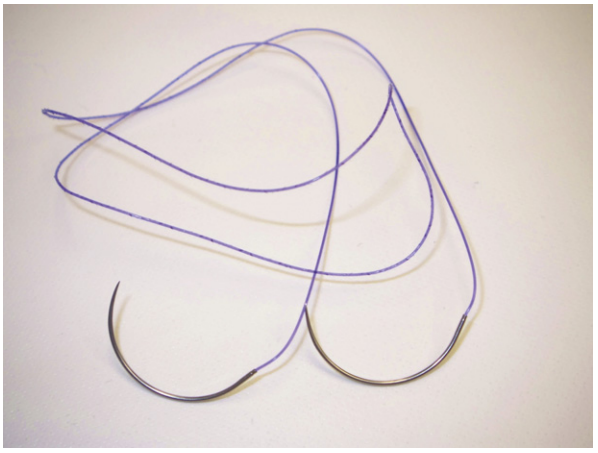

Fig. 1. Bidirectional barbed suture.

The bidirectional barbed suture was designed by a plastic surgeon with traditional open plastic surgical cases in mind. However, we believe its most profound impact may be on laparoscopic procedures where tissue approximation can be difficult and knot tying can be cumbersome. To that end, we now report the use of the bidirectional barbed suture in a small series of laparoscopic myomectomies and total laparoscopic hysterectomies.

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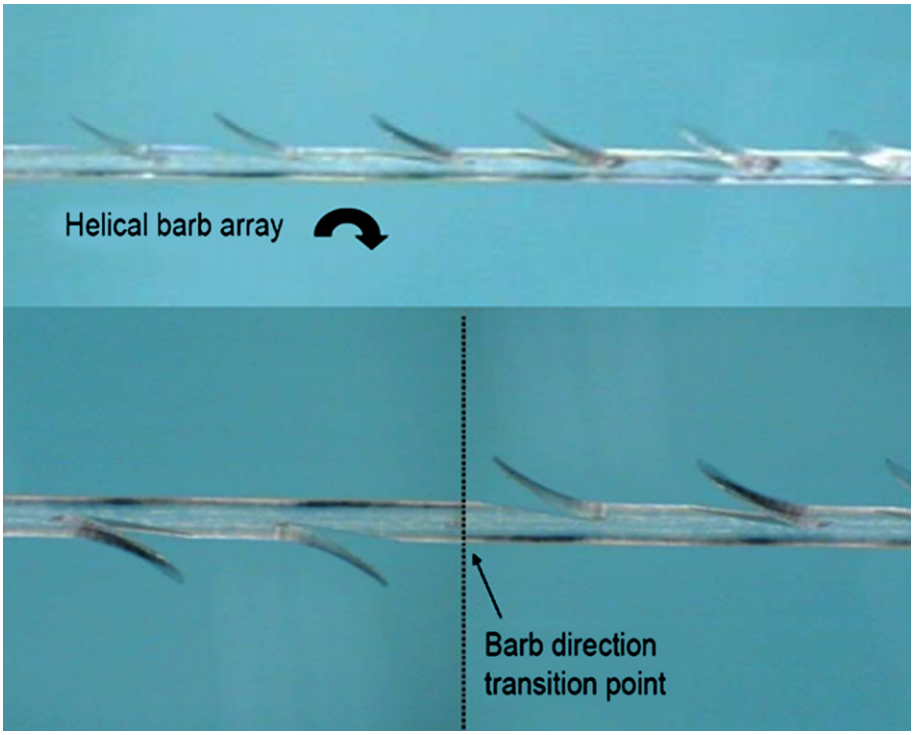

Fig. 2. Microscopic view of bidirectional barbed suture.

Description of Technique

Eight cases (5 laparoscopic myomectomies and 3 total laparoscopic hysterectomies) were reviewed. In the laparoscopic myomectomy cases, the myometrium was injected with dilute vasopressin, and the myomas were enucleated from the uterine wall with a Harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH) and blunt dissection. In cases in which the uterine cavity was entered (1 case), the endometrium was reapproximated with standard 2-0 polyglactin 910 suture secured with intracorporeally tied knots. The remainder of the myometrial defects were then closed with a 14-cm × 14-cm 0 PDO bidirectional barbed suture with a 36-mm half-circle taper point needle. The suture was started at 1 end of the defect and drawn through to the midpoint of the suture. The first layer was reapproximated, and the suture was passed through to the end of the distal end of the defect and cut without tying a knot. The next layer was then closed in the same fashion starting at the original end and finishing at the same end as the first layer and cutting the suture without a knot. Interestingly, the surgeons noted that reapproximating the myometrium was easier than with a traditional closure because the tissues remained approximated without recoil after the suture passed through them without any need for tension to be applied. All the myometrial defects were closed to the surgeon's satisfaction with good serosal reapproximation and excellent hemostasis.

The total laparoscopic hysterectomies were performed in a standard fashion with the bulk of the procedure completed with Harmonic scalpel and bipolar electrocautery. After removal of the uterus, the vaginal cuffs were closed with a 7-cm × 7-cm 0 PDO bidirectional barbed suture with a 36-mm half-circle taper point needle. Unlike the myomectomy defect closures, which were started at the ends, the vaginal cuff closures were started in the midline. The bidirectional barbed suture was passed thru the anterior and posterior cuff walls in the midline and then sutured laterally to one end. At the end, the suture was cut without a knot, and then the contralateral side was closed in an identical fashion. Again, all the closures were to the surgeon's satisfaction and were carefully evaluated transvaginally for integrity.

Discussion

Suture material has undergone two major revolutions: the introduction of a process for the sterilization of ''catgut'' in 1907 [1] and the introduction of absorbable, synthetic materials in 1970s [2]. With each of these changes the basic, smooth configuration of the suture material and the need for securing knots remained fixed. Bidirectional barbed suture introduces a new paradigm in which the tension on suture material is evenly distributed across the length of the filament rather than at the knots on the end. In this regard, in vitro, bidirectional barbed suture has been shown to outperform same-size conventional suture material in both tensile strength and wound holding capacity [3].

On the basis of our early experience with this suture material, we are optimistic that bidirectional barbed suture is a potentially valuable new tool for gynecologic and general surgical laparoscopic surgeons. As with any new product or

technique, careful evaluation with randomized trials will be needed before final conclusions can be reached.

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