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Barbed sutures:

The cutting edge of suture technology for gynecological surgery

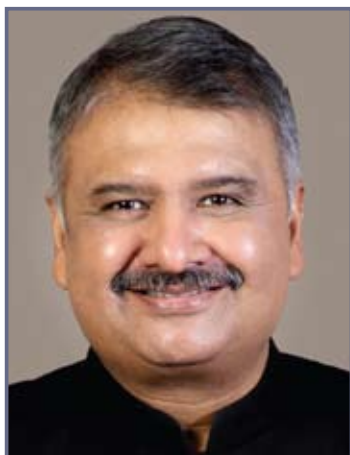


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Preface



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Barbed Sutures in Gynecological Surgeries

Barbed sutures represent a significant advancement in suture technology, offering unique advantages for gynecological surgery. Designed with barbs that anchor the suture into tissue without the need for knot-tying, these sutures streamline procedures, reduce surgical time, and enhance wound closure. In gynecological surgeries, including cesarean sections and other pelvic surgeries, barbed sutures help minimize tension, improve tissue approximation, and potentially reduce postoperative complications. As their use continues to grow, ongoing research aims to further validate their benefits and optimize outcomes in women's health surgeries.

Best wishes!



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BARBED SUTURES:

**The cutting edge of suture technology for
gynecological surgery**

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Problem statement for advanced gynecological surgery

Minimally invasive surgery, particularly laparoscopy, has revolutionized gynecological practices, becoming the preferred method for diagnostic and surgical procedures due to its ability to perform pelvic surgeries with smaller incisions compared to laparotomy.¹ Laparoscopy is the treatment of choice for conditions such as ectopic pregnancies, endometriosis, ovarian cysts, and hysterectomies. Studies show that it is generally safer, more cost-effective, and offers quicker recovery times than traditional open surgery. Its applications also extend to myomectomy and cancer staging and treatment.²

Recent advancements in laparoscopic techniques, including high-definition imaging, robotic assistance, miniaturized instruments, and innovative energy sources, have significantly improved surgical precision and patient outcomes. These technologies allow for intricate procedures through smaller incisions, resulting in less scarring, faster recovery, and fewer postoperative complications. Overall, these breakthroughs are redefining minimally invasive surgery and enhancing patient care.²⁻³

Despite advancements in laparoscopic surgery, suturing techniques have not significantly innovated, presenting several challenges. Monofilament sutures, commonly used in surgical procedures, often exhibit memory, leading to recoil or slipping, complicating manipulation and knot security.⁴ Surgical knots, while widely accepted, have notable disadvantages. They create a "tension gradient" that increases pressure around the knot, potentially disrupting uniform wound healing. The knot itself is the weakest point in the suture line, weakening the surrounding area by 35%-95% depending on the material. To prevent slippage, knots are often tied too tightly, which can cause necrosis and impaired wound healing. Furthermore, knots can incite an inflammatory response proportional to their size. In laparoscopic surgery, knot-tying is technically challenging and requires extensive training, yet these knots are often less secure than traditional hand-tied ones.⁵⁻⁶

An ideal suture should eliminate the need for knots to avoid complications like tension gradients, slippage, and foreign body reactions. Barbed sutures

address these issues with their unique design. While early unidirectional barbed sutures required a knot at one end, bidirectional barbed sutures eliminated this limitation. Initially used in plastic surgery for minimally invasive procedures, these sutures now have broader applications in wound closure, offering faster deployment, even tension distribution, and potentially improved cosmetic outcomes.⁷

Introduction to barbed sutures in gynecological surgery

EXPERT OPINION

Surgical knots should be minimized to avoid weak points in the suture line and uneven tension distribution, which can increase the risk of complications such as tissue necrosis and impaired wound healing.

Barbed sutures should be used in laparoscopic surgery to eliminate the need for knots, reduce complications like slippage and tension gradients, and streamline wound closure.

The introduction of knotless barbed sutures has significantly reduced the challenges associated with laparoscopic suturing, particularly in minimally invasive gynecologic surgery. These sutures, available in absorbable and nonabsorbable monofilament forms, are designed with barbs oriented opposite to the needle, preventing backward slippage and facilitating secure tissue approximation. Barbed sutures are available in both unidirectional (single needle) and bidirectional (needles at both ends with barbs reversing direction at the midpoint) configurations. They are now widely used in gynecologic procedures such as vaginal cuff closure during total laparoscopic, myometrial re-approximation following laparoscopic myomectomy, and for reducing operative time in laparoscopic sacrocolpopexy. Barbed sutures promote efficient and consistent wound closure by eliminating the need for knot tying and distributing tissue tension evenly across the suture line. Commercially available variants, provide comparable tensile strength and performance, despite differing in design.⁸

Why not knots?⁹⁻¹⁰

Surgical knots play an important role in tissue reapproximation and are hence a necessary evil needed to anchor smooth suture.

Issues associated with surgical knots

Reduced tensile strength: Surgical knots weaken sutures by 35%–95%, making them the weakest point due to slippage and elongation during tightening.

Uneven tension distribution: Knots create localized high tension, often leading to over-tightening, tissue necrosis, and impaired fibroblast proliferation.

Inflammatory response: Larger knots increase inflammation by introducing more foreign material, whereas smaller or knotless sutures improve healing.

Technical challenges: Knot-tying varies among surgeons, introducing inconsistencies that may compromise wound integrity and healing.

Advantages of barbed sutures: Eliminating knots for improved wound healing¹⁰

Barbed sutures overcome the disadvantages of traditional knots by providing a more uniform distribution of tension along the suture line without the need for knots (Figure 1). Unlike conventional sutures, which rely on knots to anchor and secure tissue, barbed sutures self-anchor at regular intervals, minimizing the high-tension spots found in knotted suture lines. This reduces tissue stress and promotes better wound healing by eliminating the risk of knot slippage, tissue necrosis, and excessive tension at specific points.

Tensile strength of barbed sutures: Enhanced performance in tissue closure

Tensile strength, or the force required to break a suture, is a key factor for surgeons. Several studies have compared barbed and smooth sutures in terms of strength.⁹

A veterinary study using a cadaveric canine gastropexy model compared the tensile strength of 2-0 and 3-0 glycomer 631 sutures with barbed sutures. Barbed sutures demonstrated higher load to failure, with failures occurring due to tissue tearing rather than suture breakage. This advantage was attributed to the barbs distributing force over a larger contact area, reducing tissue pressure.¹¹

Advantages of barbed sutures⁸

Figure 1 Advantages of barbed sutures

Elimination of knots	The absence of knots eliminates the weakest point in traditional sutures, reducing the risk of failure. It also simplifies suturing and enhances suture stability.
Uniform distribution of tension	Barbs evenly spaced along the suture distribute tensile strength uniformly, ensuring secure, and consistent wound closure.
Facilitated tissue approximation	Barbed sutures enable secure tissue approximation without knots, reducing the risk of tissue strangulation and ensuring faster, more consistent closure.
Time efficiency	Barbed sutures reduce closure time, benefiting procedures like vaginal cuff closure, myomectomy, and laparoscopic sacrocolpopexy, especially in minimally invasive and single-port surgeries.
Ease of learning	The technique is easily mastered, even by less experienced surgeons, with studies showing junior residents achieving competence in vaginal cuff closure after a brief training period.
Atraumatic closure	Barbed sutures reapproximate tissue edges atraumatically, minimizing tissue damage and promoting better healing.
Secure tissue anchorage	Unidirectional barbed sutures feature a welded closed loop at the end, simplifying initial anchoring to the tissue and enhancing stability during the procedure.

EXPERT OPINION

Barbed sutures should be preferred in selected laparoscopic gynecologic surgeries for their ability to eliminate knots, ensuring consistent tension distribution and reducing the risk of complications such as tissue necrosis.

The use of barbed sutures may be preferred since they help maintain tissue approximation under stress, minimizing the risk of suture failure.

Transforming surgical precision with spiral barbed sutures

The spiral barbed sutures signify a major leap in surgical suturing technology aimed at improving efficiency and security during tissue closure. Unlike traditional sutures that require knot tying, these devices utilize a unique spiral design with barbs that facilitate tissue approximation without the need for knots, offering a smoother and more consistent closure experience. These sutures enhance the efficiency, security, and consistency of tissue closure across a wide range of surgical procedures. Their adaptability makes them an invaluable tool in modern surgical practice.¹²

Figure 2 Features of spiral barbed sutures



More security

More consistent tension and approximation during closure



More efficiency

Strength and security of interrupted suturing without knot-related complications



More consistency

- No need to tie knots
- No need to have an assistant to follow the device

Design and technology

Spiral configuration

The spiral barbed sutures features barbs arranged in a spiral pattern, allowing for effective tissue grip. This design ensures that tension is maintained throughout the suturing process, enhancing closure security compared to conventional methods.¹²

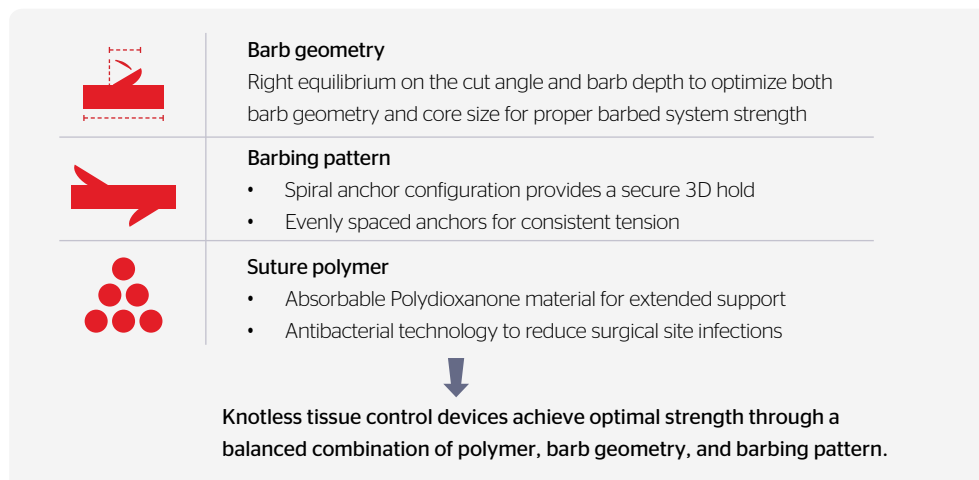
Bidirectional vs. unidirectional designs

- **Bidirectional Design:** This variant includes needles at both ends of the suture strand, allowing for tension management from the middle. It is particularly useful in larger or non-linear incisions.¹²
- **Unidirectional Design:** This option has a loop on one end and a needle on the other, providing an adjustable fixation loop that secures the device without tying knots. This design is ideal for procedures where additional tension control is necessary.¹²

Both designs are available with Antibacterial Technology (coated with Triclosan-Irgacare MP™), which helps mitigate risks associated with surgical site infections (SSI) by inhibiting bacteria commonly linked to such complications.¹²

Spiral knotless tissue control devices are versatile and can be utilized across various surgical specialties, including bariatrics, cardiovascular, colorectal, general surgery, hernia repair, neurosurgery, gynecology, orthopedics, plastics, urology, and vascular surgery. They are suitable for both open and minimally invasive procedures such as abdominoplasty, breast reconstruction, C-sections, coronary artery bypass grafting (CABG), hysterectomy, laparotomy, total knee and hip replacements, hernia repairs, and various colectomies. Specific applications also extend to complex closures like colpotomy and peritoneal closures, where maintaining precise tension and secure approximation is critical.¹²

In barbed sutures, the system's overall strength is influenced by three key factors: **barb geometry**, **barbing pattern**, and **suture polymer**.¹²



Together, these elements ensure that the knotless tissue control device provides secure, efficient, and durable tissue closure, tailored to various surgical requirements.¹²

Enhanced fascia closure: Superior tissue-holding strength with symmetric knotless control devices

The barbed sutures, specifically the absorbable and antibacterial variant designed for fascia closure, has demonstrated superior tissue-holding strength compared to traditional closure techniques (Figure 3). These sutures utilize a unique barbed design that allows for secure tissue approximation without the need for knots, which can introduce stress concentrations and potential failure points.¹²

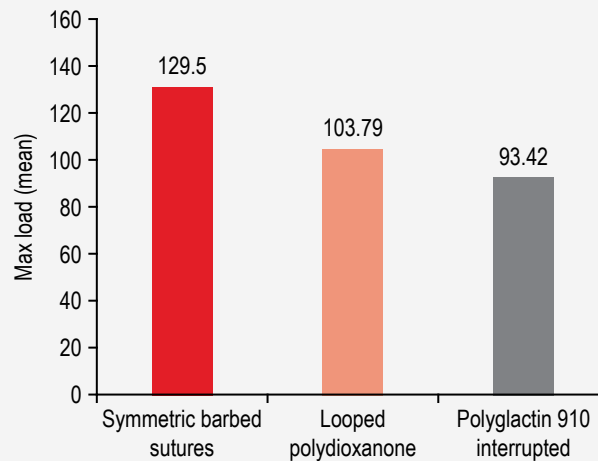
EXPERT OPINION

Spiral barbed sutures should be considered the optimal choice for enhancing efficiency, security, and consistency in tissue closure by eliminating the need for knot tying.

Barbed sutures can be widely adopted across various surgeries, making them versatile tools for both open and minimally invasive procedures.

Figure 3

Symmetric barbed sutures provide superior tissue-holding strength in fascia vs. traditional sutures



Studies indicate that these sutures provide enhanced tensile strength and wound holding capacity, making it particularly effective in high-tension areas such as fascia. The elimination of knot-tying streamlines the surgical process. It also reduces the risk of complications associated with traditional knot-tying. Overall, the use of these advanced knotless sutures represents a significant improvement in surgical techniques for soft tissue closure, offering both efficiency and reliability in clinical outcomes.¹²

Reducing surgical site infection risk: The advantage of symmetric barbed sutures with antibacterial technology

The absorbable barbed sutures featuring antibacterial technology has demonstrated a significant reduction in the risk of surgical site infections (SSIs). Studies indicate that these sutures exhibit both in vitro and in vivo antibacterial efficacy against common pathogens, including *Staphylococcus aureus* and *Escherichia coli*.¹²

Key findings

- **Antibacterial efficacy:** Sutures inhibited bacterial growth for over 23 days and retained properties after 36 months of storage.
- **In vivo performance:** Showed a 1.16-log reduction for *S. aureus* and 1.83-log for *E. coli* at surgical sites.
- **Tissue holding strength:** Knotless design ensured strong approximation, ideal for high-tension areas like fascia.

Symmetric polydioxanone sutures with antibacterial technology reduced surgical site infection risk compared to traditional sutures

Symmetric barbed sutures



In vitro activity:

- 17 days against *E. coli*
- 23 days against *S. aureus*

Traditional sutures



In vitro activity:

- No protection against *E. coli*
- No protection against *S. aureus*

EXPERT OPINION

Different tissues have unique wound closure requirements, and product selection should be guided by these needs to ensure optimal surgical outcomes.

Knotless barbed sutures represent a significant advancement in suturing techniques, offering enhanced security, efficiency, and versatility for various tissue types in both minimally invasive and open surgical procedures.

Tailoring wound closure solutions to meet tissue-specific needs

Different tissues have specific needs for optimal wound closure. For skin, the focus is on cosmesis and infection control. Fascia requires strength to prevent rupture and dehiscence. Muscle needs strong, secure closure to avoid complications, emphasizing tensile strength. Organ tissue requires precision and care to maintain health. Barbed sutures, designed to address these tissue-specific needs, ensure consistent tension and enhance security, strength, and efficiency in achieving precise surgical outcomes.¹²

A versatile barbed sutures portfolio

The barbed sutures portfolio represents a significant advancement in surgical suturing techniques, offering enhanced security, efficiency, and versatility for various tissue types in both minimally invasive and open surgical procedures.¹²

Tissue	Healing time	Symmetric Polydioxanone knotless suture	Spiral Polyglecaprone knotless suture	Spiral Polydioxanone knotless suture	Spiral Polypropylene suture
Skin (subcuticular)	1-2 weeks		✓		
Fat (subcuticular)	1-2 weeks	✓	✓	✓	
Fascia	3+ weeks	✓			
Muscle	4-6 weeks	✓		✓	✓
Organ	Varies	✓	✓	✓	✓
Hernia mesh	N/A				✓

Symmetric polydioxanone barbed sutures

The symmetric knotless barbed sutures are specifically designed to provide exceptional wound-closure strength for high-tension areas such as fascia, making it ideal for a variety of open, laparoscopic, and robot-assisted procedures. Its patented design features geometrically patterned symmetric knotless barbed sutures are designed for high-tension areas like fascia, making them ideal for open, laparoscopic, and robot-assisted procedures. Their patented geometrically patterned anchors provide reliable strength and security, outperforming traditional sutures like interrupted absorbable and continuous monofilament sutures. With superior tissue-holding strength and built-in antibacterial technology to prevent bacterial colonization for over seven days, these sutures address key risks in SSIs. Combining these advanced features, they optimize performance and improve surgical outcomes in high-tension fascia closures.¹²

Application in myomectomy

Uterine myomas, the most common benign tumors in the female reproductive system, affect about 25% of women and often cause symptoms like pelvic pain and abnormal bleeding. Surgical outcomes in myomectomy are influenced by suturing technique and hemorrhage risk. The ideal suture should ensure hemostasis, minimal tissue disruption, even tension, and reduced inflammation. While absorbable sutures are commonly used, performing intracorporeal knots in laparoscopic surgery requires advanced skills. The introduction of absorbable barbed sutures has improved outcomes by eliminating the need for intracorporeal knots while effectively controlling bleeding and enhancing tissue adherence.¹³

Why symmetric knotless suture is an ideal choice for laparoscopic myomectomy?

The symmetric knotless tissue control device is an ideal choice for myomectomy due to its design, which enhances surgical efficiency and patient outcomes. The knotless feature simplifies closure, reducing operative and suturing times by approximately 39% and blood loss by 63.6%. Its superior tissue-holding strength ensures secure closure in high-tension areas like the myometrium while minimizing tissue retraction. Additionally, the antibacterial technology helps reduce the risk of surgical site infections. The symmetrical design improves tension management, making it highly effective for laparoscopic myomectomy.^{12,14}

Gardella et al. conducted a meta-analysis to evaluate the role of barbed sutures in laparoscopic myomectomy, analyzing data from eight studies published until November 2017. The analysis included a total of 1,991 patients.¹³

EXPERT OPINION

Symmetric knotless barbed sutures should be used for high-tension wound closures, as their geometrically patterned anchors provide exceptional strength and stability.

Devices incorporating antibacterial technology can be preferred since they reduce the risk of surgical site infections.

Key Findings:

- **Blood Loss:** Barbed sutures significantly reduced estimated blood loss compared to traditional sutures, with a Standardized Mean Difference (SMD) of -0.650 (95% CI -1.420 to -0.119, $p = 0.098$).
- **Hemoglobin Drop:** There was a notable reduction in hemoglobin drop with barbed sutures (SMD -1.452, 95% CI -3.590 to 0.687, $p = 0.183$).
- **Suturing Difficulty:** The use of barbed sutures resulted in less difficulty during the suturing process (SMD -0.638, 95% CI -0.935 to -0.342, $p \leq 0.001$).
- **Suturing and Operative Time:** Barbed sutures significantly decreased both suturing time (SMD -1.197, 95% CI -1.848 to -0.549, $p \leq 0.001$) and total operative time (SMD -0.687, 95% CI -0.804 to -0.569, $p \leq 0.001$).
- **Length of Hospitalization and Complications:** Barbed sutures were associated with shorter hospital stays and fewer perioperative complications (SMD 0.708, 95% CI 0.503–0.996, $p = 0.048$).

The study concluded that barbed sutures significantly facilitate laparoscopic myomectomy by reducing operative and suturing times, estimated blood loss, and perioperative complications compared to traditional suture techniques.¹³

Giampaolino et al. evaluated the surgical outcomes of intracorporeal sutures in laparoscopic posterior myomectomy among 47 patients with single posterior intramural myomas (4–7 cm). The knotless barbed suture group demonstrated significantly shorter operative time (66.3 vs. 73 minutes; $p = 0.005$), reduced suturing time (8.8 vs. 15.5 minutes; $p = 0.001$), and less intraoperative bleeding ($p = 0.0012$). No significant difference in postoperative adhesion rates was observed between the groups (26.7% vs. 21.4%; $p = 0.5$). The study concluded that bidirectional barbed sutures should be preferred for improving efficiency without increasing adhesion risk.¹⁵

Application in hysterectomy

Total hysterectomy is one of the most performed gynecological procedures worldwide.¹⁶ A recent study (2020) indicated that hysterectomies constitute 6% of major surgeries. The procedure is performed in 3.2% of women aged 15–49, with a slightly higher prevalence of 3.6% among women aged 30–39. Notably, the prevalence increases significantly to 9.3% among women aged 40 years and older.¹⁷ In total laparoscopic hysterectomy, the most technically challenging aspect is the closure of the vaginal cuff, primarily due to the complexity of laparoscopic suturing techniques.^{9–10}

EXPERT OPINION

Barbed sutures should be considered in laparoscopic myomectomy to enhance surgical efficiency by reducing operative time, suturing time, and blood loss while ensuring secure tissue closure and minimizing complications.

Bidirectional barbed sutures should be preferred for improving efficiency without increasing adhesion risk.

Owing to the challenges of vaginal cuff closure during total laparoscopic hysterectomy, the ideal suture should minimize bacterial growth, cause minimal tissue reactivity, be pliable, and maintain adequate tensile strength for at least 3 to 4 weeks. **Barbed sutures** are particularly suited for this application, as they reduce operative times and simplify closure techniques. They minimize local tissue response and infection risk while providing uniform tensile strength across the cuff margins. The self-anchoring design allows for reapproximation of the wound tissue every 1 mm, ensuring balanced tension distribution.⁹⁻¹⁰

Figure 4

Challenges of hysterectomy

Risk of Bacterial Contamination:	The vaginal cuff is vulnerable to bacterial contamination from the vaginal vault, leading to febrile morbidity and infections such as vaginal cuff cellulitis and pelvic abscess.
Postoperative Complications:	Persistent granulation tissue at the vaginal cuff may result in postoperative issues like vaginal discharge and bleeding.
Need for Prolonged Suture Strength:	The wound is subjected to disruptive forces (e.g., coughing, sneezing, vomiting, constipation, and sexual intercourse), necessitating a suture with prolonged tensile strength.
Impact of Minimally Invasive Techniques	The use of thermal energy, rather than a cold knife, in minimally invasive procedures can reduce tissue viability at the cuff edges, potentially delaying wound healing.

Why spiral barbed suture is an ideal choice for hysterectomy?

The spiral barbed suture is an ideal option for vaginal cuff closure due to its unique design, enhancing tissue engagement and stability without knots. This reduces operative time, minimizes complications, and ensures effective tension distribution. Its pliability and reduced tissue reactivity make it particularly suited for laparoscopic procedures like total hysterectomy.¹²

A systematic review and meta-analysis evaluated the role of knotless barbed sutures in gynecologic surgery, focusing on their efficacy and safety compared to conventional sutures. The study included 1,991 patients across various laparoscopic and robotic procedures.⁸

Key findings:

- Suturing duration:** The use of knotless barbed sutures significantly reduced closure times, with durations ranging from 3.9 to 13 minutes, and a mean difference of 2.41 minutes during hysterectomies (95% CI, 1.23-3.59).
- Blood loss:** There was no statistical difference in estimated blood loss during hysterectomy; however, myomectomy results showed a significant reduction in blood loss ($p = 0.04$).

- **Vaginal cuff dehiscence:** No significant difference was found in the rates of vaginal cuff dehiscence (odds ratio = 1.63; 95% CI, 0.37-7.25).

The main benefits of barbed sutures include the absence of knots, even distribution of tissue strength, and reduced operative times. Knotless barbed sutures are safe and effective for vaginal cuff closure in laparoscopic hysterectomy, offering time-saving advantages without increasing postoperative complications.⁸

Application in adenomyectomy

Uterine adenomyosis, characterized by myometrial invasion of endometrial glands, can lead to symptoms such as dysmenorrhea, chronic pelvic pain, abnormal uterine bleeding, and subfertility. It is classified into focal and diffuse types. With a rising demand for uterus-conserving surgeries due to the desire to preserve fertility, conservative surgical options for adenomyosis have shown effectiveness in symptom management and improving pregnancy rates. However, there is no standardized adenomyomectomy technique.¹⁸

Kwack et al. introduced an advanced laparoscopic adenomyomectomy technique using transient occlusion of uterine arteries (TOUA) and barbed sutures to minimize blood loss and improve surgical outcomes.¹⁸

Key results

- **Operative time:** The average operation time was 70.11 minutes.
- **Blood loss:** The mean estimated blood loss during surgery was 88.88 mL.
- **Postoperative bleeding:** No major postoperative bleeding or complications were reported.
- **Complication rate:** The overall complication rate was low, with no conversions to laparotomy or major complications.
- **Pregnancy outcomes:** At the seven-month follow-up, 97.4% of patients experienced complete remission of dysmenorrhea, and 88.9% had complete remission of menorrhagia, indicating favorable outcomes for future pregnancies.

The study on advanced laparoscopic adenomyomectomy for focal uterine adenomyosis showed that the technique is safe and effective. The use of barbed sutures for suturing ensured secure closure of uterine layers, reducing intraoperative complications and improving surgical outcomes. The approach minimized blood loss and achieved high symptom remission rates, suggesting its potential for broader use in uterus-conserving surgeries.¹⁸

EXPERT OPINION

Barbed sutures should be considered for vaginal cuff closure in total laparoscopic hysterectomy due to their ability to simplify suturing, reduce operative time, and ensure even tension distribution, thereby improving surgical efficiency.

Spiral barbed sutures should be preferred for their knotless design, which enhances tissue engagement and minimizes tissue reactivity, making them particularly effective for laparoscopic hysterectomy.

Application in pelvic organ prolapse surgery

Pelvic organ prolapse (POP) significantly impacts the quality of life for women and is associated with high treatment costs. Its incidence is rising, and open abdominal sacrocolpopexy (ASC) is considered the gold standard for its treatment, offering lower recurrence rates and superior outcomes compared to the transvaginal approach.¹⁹

Laparoscopic sacrocolpopexy (LSC) however has become a safe and effective treatment for POP, demonstrating excellent short- and long-term results. This minimally invasive technique offers lower morbidity and decreased blood loss compared to ASC. However, it requires a learning curve of 15 to 24 cases to master, with suturing and knot tying being particularly challenging. Self-retaining barbed sutures (SBSs) have been successfully used in both open and laparoscopic surgeries to reduce operation time by eliminating the need for knot tying. Kallidonis aimed to evaluate the efficacy and safety of SBSs during the performance of LSC. The mean operative time was 99.75 minutes, with an average blood loss of 57.75 mL. One patient experienced bladder perforation, and three had transient fever postoperatively. Recurrences included one cystocele and three rectoceles.¹⁹

Using self-retaining barbed sutures during laparoscopic sacrocolpopexy is both safe and efficient, potentially leading to reduced operative times.¹⁹

Key takeaway points

Minimizing surgical knots

Surgical knots should be minimized to avoid weak points in the suture line and

EXPERT OPINION

Barbed sutures should be preferred in advanced laparoscopic adenomyomectomy for focal uterine adenomyosis, as they facilitate secure closure of the uterine layers, reduce intraoperative complications, and minimize blood loss.

Self-retaining barbed sutures should be preferred during laparoscopic sacrocolpopexy, as they are safe and efficient, potentially reducing operative times.

uneven tension distribution, which can increase the risk of complications such as tissue necrosis and impaired wound healing.

Unique benefits of barbed sutures

- Barbed sutures should be used in laparoscopic surgery to eliminate the need for knots, reduce complications like slippage and tension gradients, and streamline wound closure.
- Barbed sutures should be preferred in selected laparoscopic gynecologic surgeries for their ability to eliminate knots, ensuring consistent tension distribution and reducing the risk of complications such as tissue necrosis.
- The use of barbed sutures may be preferred since they help maintain tissue approximation under stress, minimizing the risk of suture failure.

Optimal choice for tissue closure

- Spiral barbed sutures should be considered the optimal choice for enhancing efficiency, security, and consistency in tissue closure by eliminating the need for knot tying.
- Barbed sutures can be widely adopted across various surgeries, making them versatile tools for both open and minimally invasive procedures.
- Barbed sutures should be preferred for their use of proven polymers with extended breaking strength retention (BSR) and optimized barb depth, providing tissue-holding strength statistically equivalent to traditional sutures.
- Symmetric barbed sutures should be prioritized for fascia closure, as they demonstrate superior tissue-holding strength compared to traditional techniques.
- Symmetric barbed sutures should be utilized to reduce the risk of surgical site infections, offering an advantage over traditional sutures.

Versatility in various tissue types

- Different tissues have unique wound closure requirements, and product selection should be guided by these needs to ensure optimal surgical outcomes.
- Knotless barbed sutures represent a significant advancement in suturing techniques, offering enhanced security, efficiency, and versatility for various tissue types in both minimally invasive and open surgical procedures.

- Symmetric knotless tissue control devices should be used for high-tension wound closures, as their geometrically patterned anchors provide exceptional strength and stability.
- Devices incorporating antibacterial technology should be prioritized to enhance performance and reduce the risk of surgical site infections.

Specific applications in gynecological surgery

- Barbed sutures should be considered in laparoscopic myomectomy to enhance surgical efficiency by reducing operative time, suturing time, and blood loss while ensuring secure tissue closure and minimizing complications.
- Bidirectional barbed sutures should be preferred for improving efficiency without increasing adhesion risk
- Barbed sutures should be considered for vaginal cuff closure in total laparoscopic hysterectomy due to their ability to simplify suturing, reduce operative time, and ensure even tension distribution, thereby improving surgical efficiency.
- Spiral barbed sutures should be preferred for their knotless design, which enhances tissue engagement and minimizes tissue reactivity, making them particularly effective for laparoscopic hysterectomy.
- Barbed sutures should be preferred in advanced laparoscopic adenomyomectomy for focal uterine adenomyosis, as they facilitate secure closure of the uterine layers, reduce intraoperative complications, and minimize blood loss.
- Self-retaining barbed sutures should be preferred for peritoneal closure during laparoscopic sacrocolpopexy, as they are safe and efficient, potentially reducing operative times.

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