

# Meshless Vault Suspension VIA Permanent Suture to the Sacral Promontory During Laparoscopic Hysterectomy: A Prospective Pilot Study of Safety and Efficacy

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Received: March 05, 2026; Accepted: March 12, 2026; Published: March 18, 2026

## ABSTRACT

**Objective:** To evaluate the feasibility, safety, and 12-month efficacy of a novel meshless laparoscopic vault suspension technique using permanent suture anchored to the sacral promontory in high-grade uterine prolapse.

**Methods:** A prospective pilot study was conducted on 10 women (POP-Q Stage III/IV) undergoing Total Laparoscopic Hysterectomy (TLH). Apical support was achieved using #2 Ethibond permanent suture, suspending the vaginal vault to the anterior longitudinal ligament (ALL) at the sacral promontory. A strategic peritoneotomy was performed to lateralize the ureter, ensuring surgical safety.

**Results:** All procedures were completed laparoscopically with a mean operative time of  $85 \pm 15$  minutes. No intraoperative complications or ureteral injuries occurred. At 12-month follow-up, the recurrence rate for vault prolapse was 0% (all patients POP-Q stage  $\leq 1$ ), and subjective patient satisfaction was 9.8/10 on a Visual Analogue Scale.

**Conclusion:** This “Suture Sacrocolpopexy” provides the anatomical durability of a promontory anchor while eliminating mesh-related risks (erosion, infection, dyspareunia) and minimising ureteral complications. The technique is cost-effective and highly reproducible, making it a viable alternative to traditional mesh-based repairs.

## Introduction

Uterovaginal prolapse, particularly Stage III and IV, significantly impacts quality of life. While Total Laparoscopic Hysterectomy (TLH) is a standard intervention, it carries a 12–30% risk of subsequent vaginal vault prolapse due to weakened apical support.

Mesh-augmented sacrocolpopexy remains a “gold standard” for apical support; however, synthetic grafts introduce risks of mesh erosion (10–20%), chronic pelvic pain, and dyspareunia. Conversely, native-tissue repairs like Uterosacral Ligament Suspension (USLS) are associated with a 5–10% risk of ureteral obstruction. Following global FDA warnings on transvaginal mesh, there is an urgent need for effective, mesh-free alternatives. This study introduces a novel technique developed at Jaipur Doorbeen Hospital that leverages the strength of the sacral promontory without synthetic mesh [1-5].

## Materials and Methods

This prospective pilot study was conducted at Jaipur Doorbeen Hospital, Jaipur, India, from January 2024 to December 2024. Ethical approval was obtained from the Institutional Review Board (IRB No. JDH/2024/001).

## Inclusion & Exclusion Criteria

Included patients were aged 40–70 with symptomatic Stage III or IV prolapse. Patients with prior apical repairs, malignancy, or a BMI  $> 35$  kg/m<sup>2</sup> were excluded.

## Surgical Technique

- Vault Closure:** Following standard TLH, the vaginal vault was closed in a single layer using #1 Vicryl continuous sutures.
- Initial Apical Anchor:** A #2 Ethibond permanent suture was used. A partial-thickness bite was taken at a right angle

**Citation:** Sushila Saini. Meshless Vault Suspension VIA Permanent Suture to the Sacral Promontory During Laparoscopic Hysterectomy: A Prospective Pilot Study of Safety and Efficacy. *J Gastro Endosc.* 2026. 4(1): 1-2. DOI: doi.org/10.61440/JGE.2026.v4.46

through the vaginal vault apex and the uterosacral ligament (USL), and the knot was secured.

3. **Continuous Plication:** The suture was then continued as a continuous plicating stitch into the USL, effectively shortening and reinforcing the native support as it progressed toward the sacrum.
4. **Ureteral Lateralisation:** A peritoneotomy “nick” was performed between the USL and the ureter. This allowed for the physical lateralisation of the ureter, moving it safely away from the intended plication line.
5. **Promontory Exposure:** At the sacral promontory, the overlying peritoneum was nicked, and fatty areolar tissue was dissected to expose the Anterior Longitudinal Ligament (ALL).
6. **Final Suspension:** A full-thickness bite was taken into the ALL at the upper outer quadrant. The Ethibond suture was secured to suspend the vault firmly to the promontory.
7. **Closure:** Reperitonealization was performed to cover the permanent suture. Intraoperative cystoscopy confirmed bilateral ureteral patency.

## Results

Ten patients (mean age  $52 \pm 7$  years, mean BMI  $26 \pm 3$  kg/m<sup>2</sup>) completed the 12-month follow-up.

Outcome Measure	Value (n=10)
Mean Operative Time (min)	$85 \pm 15$
Ureteral Injury	0%
Recurrence (POP-Q > Stage 1)	0%
Mean Satisfaction (VAS 1-10)	$9.8 \pm 0.4$

## Discussion

This meshless technique leverages native anatomy for durable apical suspension by anchoring to the robust sacral promontory—a site significantly stronger than the uterosacral ligaments alone.

### Comparison to Sacrocolpopexy

While sacrocolpopexy is often cited as the “gold standard,” it requires significant dissection of the presacral space and involves a permanent foreign body (mesh). Our method provides the same secure anchor of the sacral promontory but preserves the physiological flexibility of the vaginal vault. By avoiding mesh, we eliminate the 10–20% risk of erosion and chronic dyspareunia reported in graft-based series.

## The Peritoneotomy Innovation

A critical component of this study is the “technical safeguard” provided by the peritoneotomy. Peer reviewers frequently express concern regarding ureteral kinking or accidental plication during promontory anchoring. By performing a strategic nick and physically lateralizing the ureter, we converted a high-risk manoeuvre into a controlled dissection. Our 0% ureteral injury rate (compared to 5–10% in standard USLS) validates this approach.

## Surgical Precision

The use of #2 Ethibond with a partial-thickness right-angle bite through the vault and USL creates a biomechanically sound anchor. The continuous plicating suture then creates a reinforced bridge between the vault and the ALL. This “Suture Sacrocolpopexy” ensures that the tension is distributed along the entire length of the repaired ligament rather than a single point, reducing the risk of tissue pull-through.

## Economic Impact

In the Indian healthcare context, the cost-effectiveness is profound. While mesh kits can exceed ₹20,000, a single Ethibond suture costs approximately ₹500, making high-quality surgical care accessible to a broader demographic at Jaipur Doorbeen Hospital.

## Conclusion

This novel suture-based, meshless vault suspension is feasible, safe, and effective for preventing prolapse recurrence post-TLH. It offers the anatomical durability of a promontory anchor with the safety profile of a mesh-free, native-tissue approach.

## References

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