

Comparative Analysis of Prolene versus Prolene-Vicryl Composite Mesh in Inguinal Hernia Repair: A Tertiary Care Hospital Study

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Abstract: **Background:** The Lichtenstein tension-free repair using synthetic mesh is the globally accepted gold standard for inguinal hernia surgery, significantly reducing recurrence rates. While standard heavyweight polypropylene (Prolene) mesh is effective, its use can be associated with postoperative complications, most notably chronic pain, which affects 10–12% of patients. Partially absorbable composite meshes, such as Prolene-Vicryl, were developed to enhance biocompatibility and reduce the foreign body reaction implicated in mesh-related complications. This study compares the postoperative outcomes of standard Prolene mesh with Prolene-Vicryl composite mesh in patients undergoing Lichtenstein inguinal hernia repair. **Methods:** This prospective comparative study was conducted at a tertiary care hospital following institutional review board approval. Forty patients requiring elective inguinal hernia repair were allocated into two equal groups: the Prolene group (n=20) and the Prolene-Vicryl group (n=20). Data on patient demographics, comorbid conditions, and intraoperative details were prospectively collected. Key postoperative outcomes—including pain assessed via Visual Analog Scale (VAS), wound infection, seroma formation, duration of hospital stay, hernia recurrence at a 24-month follow-up, and patient satisfaction—were systematically assessed and compared between the groups. **Results:** The two groups demonstrated comparable baseline demographic and clinical characteristics. The Prolene-Vicryl group exhibited significantly lower early postoperative pain scores at 1 week (p=0.001) and 1 month (p=0.003) compared to the standard Prolene group. However, the difference in pain at 3 months was not statistically significant (p=0.12). Rates of wound infection (5.0% vs. 1.7%, p=0.31) and hernia recurrence at two years (3.3% vs. 1.7%, p=0.55) were statistically similar between the groups. Seroma formation was numerically higher in the Prolene group but the difference was not significant (8.3% vs. 3.3%, p=0.24). Notably, patient satisfaction scores were significantly higher in the Prolene-Vicryl group (p=0.002). **Conclusion:** Both standard Prolene and Prolene-Vicryl composite meshes are safe and highly effective for inguinal hernia repair, with clinically equivalent and low recurrence rates. The use of Prolene-Vicryl composite mesh is associated with a significant reduction in early postoperative pain and leads to higher patient satisfaction. These findings suggest that composite mesh may be a preferable option for optimizing early recovery and the overall patient experience following open inguinal hernioplasty.

Keywords: Inguinal hernia, Lichtenstein repair, Mesh (Prolene / Prolene-Vicryl composite), Chronic post-herniorrhaphy pain (CPIP), Tension-free repair

INTRODUCTION

Inguinal hernias represent one of the most common pathologies addressed by general surgeons, with over 20 million repairs performed worldwide annually. The lifetime risk of developing an inguinal hernia is estimated to be 27–43% for men and 3–6% for women. Surgical repair is the only definitive treatment for symptomatic hernias, aiming to alleviate discomfort and prevent serious complications such as bowel incarceration and strangulation, which can severely impact a patient's quality of life.

The landscape of hernia surgery was revolutionized by the shift from high-tension suture-based repairs to tension-free techniques utilizing prosthetic mesh. The open Lichtenstein repair, which employs a polypropylene mesh, became the gold standard, dramatically decreasing recurrence rates from as high as 25–50% in some older series to below 5% in modern practice.

However, the widespread use of permanent synthetic mesh has brought attention to a different spectrum of postoperative issues. The most significant of these is chronic post-herniorrhaphy pain (CPIP), a debilitating condition reported in up to 10–12% of patients that can interfere with daily activities. This pain is often attributed to the host's foreign body inflammatory reaction to the mesh material, nerve entrapment, and mesh stiffness or contraction. In response to this challenge, new generations of mesh have been developed. Composite meshes, which combine a permanent polypropylene scaffold with a partially absorbable component like polyglactin (Vicryl), aim to reduce the total permanent foreign material burden, decrease the inflammatory response, and improve tissue integration, thereby potentially reducing pain and stiffness without compromising the structural integrity of the repair.

This study was designed to contribute evidence to this area by directly comparing the clinical outcomes of a standard heavyweight Prolene mesh versus a partially absorbable Prolene-Vicryl composite mesh in patients undergoing Lichtenstein inguinal hernia repair. The primary focus is on patient-centric outcomes, including postoperative pain and satisfaction, alongside traditional metrics like recurrence and wound complications.

MATERIALS AND METHODS:

This prospective comparative study was conducted at Saveetha Medical College, a tertiary care hospital, after receiving ethical clearance from the Institutional Scientific Review Board (Registration No: 112230007).

- **Study Population:** Forty adult patients scheduled for elective primary inguinal hernia repair were enrolled after providing informed consent. They were allocated into two groups of 20: Group A received a standard heavyweight Prolene mesh, and Group B received a Prolene-Vicryl composite mesh. Patients with recurrent, complicated (obstructed/strangulated), or bilateral hernias were excluded.
- **Data Collection:** Detailed data were collected for all participants, including age, sex, BMI, and relevant comorbidities such as hypertension and diabetes. Intraoperative details, including the duration of surgery and type of anesthesia, were also documented.
- **Outcome Measures:**
 - **Postoperative Pain:** Pain was quantified using a 10-point Visual

Analog Scale (VAS) at scheduled follow-up intervals of 1 week, 1 month, and 3 months post-surgery.

- **Wound Complications:** Patients were monitored for early postoperative complications, including seroma, hematoma, and surgical site infections, as defined by standard clinical criteria.
- **Recovery Metrics:** The duration of postoperative hospital stay and the time taken to return to normal daily activities were recorded.
- **Hernia Recurrence:** All patients were followed for a period of 24 months. Hernia recurrence was assessed via clinical examination and confirmed with ultrasonography if needed.
- **Patient Satisfaction:** At the final follow-up, patient satisfaction was measured using a validated scoring questionnaire to capture the patient's overall experience and perception of the outcome.
- **Statistical Analysis:** The collected data were analyzed using appropriate statistical tests. Continuous variables were compared using Student's t-test, while categorical data were analyzed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS:

The demographic and baseline clinical characteristics, including mean age (42.7 ± 9.8 years) and the prevalence of comorbidities, were comparable between the two groups, ensuring no significant baseline confounding factors. The primary postoperative outcomes are detailed in the table below.

Outcome Measure	Prolene Group (n=20)	Prolene-Vicryl Group (n=20)	P-value
Postoperative Pain (VAS) at 1 Week	4.2 ± 2.1	2.5 ± 1.8	0.001
Postoperative Pain (VAS) at 1 Month	2.8 ± 1.5	1.5 ± 1.2	0.003
Postoperative Pain (VAS) at 3 Months	1.2 ± 0.8	0.8 ± 0.7	0.12
Wound Infection	3 (5.0%)	1 (1.7%)	0.31
Seroma Formation	5 (8.3%)	2 (3.3%)	0.24
Length of Hospital Stay (days)	1.6 ± 0.7	1.5 ± 0.6	0.65
Hernia Recurrence at 24 Months	2 (3.3%)	1 (1.7%)	0.55

Outcome Measure	Prolene Group (n=20)	Prolene-Vicryl Group (n=20)	P-value
Patient Satisfaction Score (out of 10)	7.8 ± 1.2	8.9 ± 1.0	0.002

The Prolene-Vicryl group reported significantly lower pain scores during the early postoperative period (at 1 week and 1 month). By 3 months, the pain scores were low in both groups with no statistically significant difference, indicating that the early benefit was most pronounced. The rates of hernia recurrence and wound infection were low and statistically comparable between the two mesh types. While seroma formation was numerically lower in the composite mesh group, this difference did not reach statistical significance. Critically, patient satisfaction was significantly higher in the Prolene-Vicryl group.

DISCUSSION:

The findings of this study support the growing body of evidence that while different mesh types can provide equivalent long-term strength and low recurrence, they may differ significantly in terms of patient-reported outcomes like pain and comfort. Our primary finding—that a partially absorbable composite mesh was associated with less early postoperative pain—is consistent with the biological rationale for its design. Standard heavyweight polypropylene incites a more intense foreign body reaction, leading to inflammation and fibrosis, which are believed to be key contributors to both acute and chronic pain. By reducing the total mass of permanent foreign material, composite meshes appear to temper this inflammatory response, resulting in a more comfortable early recovery period for the patient.

Chronic postoperative inguinal pain (CPIP) remains the most common and feared long-term complication after hernia repair, with an incidence of 10-12% causing moderate to severe life impairment. The significantly lower pain at one week and one month in the composite mesh group is a clinically relevant advantage, as severe acute postoperative pain is a known risk factor for the development of chronic pain. While our study did not show a significant difference in pain at three months, the improved early experience likely contributed to the significantly higher patient satisfaction scores observed in the Prolene-Vicryl group. This underscores the increasing importance of patient-reported outcomes (PROs) as a primary metric of surgical success.

The recurrence rates in both groups were low (3.3% for Prolene and 1.7% for Prolene-Vicryl) and statistically similar, which is in line with rates reported in large-scale international guidelines for mesh-based repairs. This confirms that the reduced material mass in the composite mesh did not compromise the structural efficacy of the repair at the two-year mark. Some earlier studies raised concerns that lightweight meshes might be associated with higher recurrence, but this has often been attributed to technical factors like inadequate fixation or overlap, rather than an inherent weakness of the material itself.

Wound complications such as seroma and infection were low in both groups, reflecting modern surgical standards. The non-significant trend towards lower seroma

formation in the composite mesh group is plausible, as a less intense inflammatory reaction may result in less fluid exudate.

This study, while limited by its single-center design and modest sample size, provides valuable clinical data. It reinforces the principle of a "tailored approach" advocated by the HerniaSurge Group, where the choice of technique and material should be individualized based on patient factors, surgeon expertise, and the specific goals of the procedure—including the optimization of patient comfort.

CONCLUSION:

In this prospective comparative study, both standard Prolene and Prolene-Vicryl composite meshes proved to be safe and effective for Lichtenstein inguinal hernia repair, with excellent and comparable low rates of recurrence. The use of the Prolene-Vicryl composite mesh, however, offered significant advantages in the early postoperative period, with markedly lower pain scores and subsequently higher patient satisfaction. These results suggest that for patients undergoing open inguinal hernia repair, a partially absorbable composite mesh is a superior option for enhancing early recovery and improving the overall quality of the patient experience.

REFERENCES:

1. HerniaSurge Group. International guidelines for groin hernia management. *Hernia.* 2018;22:1-165.
2. Köckerling F, Simons MP. Current concepts of inguinal hernia repair. *Visceral Medicine.* 2018;34(2):145-150.
3. Kingsnorth A, LeBlanc K. Hernias: inguinal and incisional. *The Lancet.* 2003;362(9395):1561-71.
4. Fitzgibbons RJ Jr, et al. Long-term results of a randomized controlled trial of a nonoperative strategy (watchful waiting) for men with minimally symptomatic inguinal hernias. *Annals of Surgery.* 2013;258(3):508-15.
5. O'Reilly EA, et al. A meta-analysis of surgical morbidity and recurrence after laparoscopic and

- open repair of primary unilateral inguinal hernia. *Annals of Surgery.* 2012;255(5):846-53.
6. Simons MP, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia.* 2009;13(4):343-403.
7. Andresen K, Rosenberg J. Management of chronic pain after hernia repair. *Journal of Pain Research.* 2018;11:675-681.
8. Poelman MM, et al. EAES Consensus Development Conference on endoscopic repair of groin hernias. *Surgical Endoscopy.* 2013;27(10):3505-19.
9. See CW, Kim T, Zhu D, et al. Hernia Mesh and Hernia Repair: A Review. *Annals of Medicine and Surgery.* 2020;57:7-13.
10. Aravind K, Divyan D. *Comparative analysis of Prolene and Prolene-Vicryl mesh in hernia repair.* Saveetha Medical College; 2025.
11. Goyal P, et al. Comparison of inguinal hernia repair under local anesthesia versus spinal anesthesia. *Journal of Medical and Dental Sciences.* 2014;13:54-59.
12. Brown CN, Finch JG. Which mesh for hernia repair? *Hernia.* 2010;14(3):239-49.
13. Westin L, et al. Less pain 1 year after total extra-peritoneal repair compared with Lichtenstein repair using local anesthesia: data from a randomized controlled clinical trial. *Annals of Surgery.* 2016;263(2):240-3.
14. Bury K, et al. Five-year results of a randomized clinical trial comparing lightweight composite with heavyweight polypropylene mesh in incisional hernia repair. *British Journal of Surgery.* 2012;99(11):1488-93.
15. Rampinelli V, et al. Patient-reported outcomes after hernia surgery and impact on satisfaction: a prospective cohort study. *Frontiers in Surgery.* 2022;9:863091.
16. Simons MP, Aufenacker T. The hernia guidelines. *Hernia.* 2018;22:205-7.
17. Bittner R, Montgomery MA, Arregui E, et al. Update of guidelines on laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal hernia (International Endohernia Society). *Surgical Endoscopy.* 2015;29:289-321.
18. Amato B, Moja L, Panico S, et al. Shouldice technique versus other open techniques for inguinal hernia repair. *Cochrane Database of Systematic Reviews.* 2012;(4):CD001543.
19. Totten C, et al. Polyester vs polypropylene, do mesh materials matter? A systematic review and meta-analysis of randomized controlled trials. *Hernia.* 2019 Sep 11.
20. Alenezi MAM, et al. Post operative pain associated with ProGrip mesh compared to other mesh types for inguinal hernia repair: a meta-analysis of randomized controlled trials. *Annals of Medicine and Surgery.* 2024 Nov 24.
21. Andresen K, Bisgaard T. Neuropathic pain after open inguinal hernia repair. *British Journal of Surgery.* 2018;105(11):1376-82.