e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(12); 3068-3074

Original Research Article

Comparative Assessment of Laparoscopic Transabdominal Preperitoneal (TAPP) Mesh Repair and Open Lichtenstein Repair for Inguinal Hernia: A Prospective Observational Study at a NMCH, Patna

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Received:12-10-2025 / Revised: 15-11-2025 / Accepted: 28-12-2025

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Conflict of interest: Nil

Abstract:

Background: One of the most frequent operations in general surgery is the correction of inguinal hernias. Although open Lichtenstein tension-free repair has long been considered the gold standard, laparoscopic techniques are becoming more popular, especially Transabdominal Preperitoneal (TAPP) repair. Comparative information on perioperative outcomes in Eastern India's resource-constrained environments is still scarce, nevertheless.

Objectives: The purpose of this study was to compare the clinical results of open inguinal hernia surgery vs laparoscopic TAPP mesh repair in terms of length of hospital stay, postoperative pain, complications, and time to resume regular activities.

Materials and Methods: From September 2023 to September 2025, a prospective comparative study was carried out in the Department of General Surgery, Nalanda Medical College and Hospital, Patna. Randomization was used to divide fifty patients with unilateral primary inguinal hernias into two groups: Group A had laparoscopic TAPP surgery (n = 25) and Group B had open Lichtenstein repair (n = 25). Six months were spent tracking postoperative results. Chi-square and Student's t-tests were used in the statistical study.

Results: The TAPP group's mean operating time was 70.8 ± 9.6 minutes, which was substantially longer than the Open group's (55.2 ± 8.4 minutes; $p < 0.001$). At 24 hours, however, the TAPP group's postoperative pain levels were significantly reduced (VAS: 2.3 ± 0.9 vs. 4.5 ± 1.2; $p < 0.001$). Patients in the TAPP group returned to regular daily activities faster (7.6 ± 2.4 days vs. 14.2 ± 3.6 days; $p < 0.001$) and had a shorter mean hospital stay (1.9 ± 0.7 days vs. 3.5 ± 1.0 days; $p < 0.001$). The open repair group saw more overall complications (40%) than the TAPP group (8%). In neither group was a recurrence observed.

Conclusion: Laparoscopic TAPP repair has better perioperative results than open repair, including less pain, shorter hospital stays, and quicker functional recovery, although requiring a longer operating time. In tertiary care settings, it is a secure and efficient substitute for primary inguinal hernias.

Keywords: Inguinal hernia; Laparoscopic TAPP; Lichtenstein repair; Postoperative pain; Surgical outcomes.

Introduction

About 5% of people may experience an inguinal hernia at some point in their lives, making it a major surgical burden worldwide. In order to relieve symptoms and avoid consequences like obstruction or strangulation, surgical correction is the last resort [1]. Pure tissue repairs gave way to tension-free mesh repairs in the development of hernia surgery, which dramatically decreased recurrence rates. Because of its low recurrence rate, cost-effectiveness, and repeatability, Lichtenstein tension-free mesh repair is currently considered the standard open approach [2].

Despite its effectiveness, open repair is often linked to significant postoperative morbidity, such as wound infection, acute and chronic groin pain, and a protracted recuperation period that lowers the patient's productivity. Laparoscopic procedures, particularly the Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) repairs, have become practical substitutes with the introduction of minimally invasive surgery. In these procedures, a mesh covering the entire myopectineal orifice is placed in the preperitoneal space via the posterior method. Reduced postoperative discomfort, enhanced cosmesis, and an earlier return

to work are among the benefits mentioned in the literature [3].

However, the need for general anesthesia, increased equipment expenses, and a more difficult learning curve for surgeons sometimes prevent laparoscopic hernia treatment from becoming widely used in developing nations. As a result, the decision between open and laparoscopic repair frequently relies on hospital resources and surgeon skill. There is a dearth of data from tertiary care facilities in this particular area, despite the abundance of comparative research in Western literature. The purpose of this prospective study was to assess whether the advantages of the laparoscopic technique warrant its use in this particular clinical situation by comparing the safety and effectiveness of laparoscopic TAPP mesh repair vs open inguinal hernia repair in a teaching hospital in Patna, Bihar.

Aims and Objectives

Aim: To compare open inguinal hernia surgery with laparoscopic TAPP mesh repair in terms of surgical and functional results.

Objectives

1. To compare the mean operative time between the two surgical techniques.
2. To evaluate the severity of postoperative pain using the Visual Analog Scale (VAS).
3. To compare the duration of hospital, stay between the two groups.
4. To assess the incidence and spectrum of postoperative complications.
5. To determine the time required for patients to return to normal daily activities.
6. To monitor short-term recurrence rates over a six-month follow-up period.

Materials and Methods

Study Design and Setting: The Department of General Surgery at Nalanda Medical College and Hospital in Patna carried out this prospective observational comparison study between September 2022 and September 2024.

Sample Size and Grouping: Fifty individuals with unilateral primary inguinal hernias were recruited and split into two groups at random:

- Group A (n = 25): Laparoscopic TAPP mesh repair
- Group B (n = 25): Open Lichtenstein mesh repair

Selection Criteria

Inclusion Criteria: Individuals with ASA physical status I or II with unilateral primary inguinal hernias between the ages of 18 and 65 who gave written informed consent.

Exclusion Criteria: Individuals with ASA physical status III or IV, coagulopathy, complex hernias (obstructed or strangulated), bilateral or recurring hernias, or prior lower abdominal surgery.

Preoperative Evaluation: Every patient had a thorough clinical assessment as well as standard testing, such as an electrocardiogram, chest radiography, coagulation profile, liver and kidney function tests, and a complete blood count. When necessary, inguinoscrotal ultrasonography was conducted.

Surgical Techniques

Laparoscopic TAPP Repair: Performed under general anesthesia using a standard three-port technique. After creating pneumoperitoneum, the peritoneum was incised, the preperitoneal space dissected, and the hernia sac reduced. A 15 × 10 cm polypropylene mesh was placed and fixed, followed by closure of the peritoneal flap.

Open Lichtenstein Repair: Performed under spinal anesthesia. Following standard inguinal incision and dissection, the hernia sac was managed and a polypropylene mesh placed using the Lichtenstein tension-free technique.

Outcome Measures

- Operative time: skin incision to skin closure
- Postoperative pain: assessed at 24 hours using VAS (0 to 10)
- Hospital stays: number of postoperative inpatient days
- Return to normal activity: ability to perform routine daily activities without assistance

Statistical Analysis: Student's t-test was used to evaluate continuous variables, which were reported as mean ± standard deviation. Categorical variables were compared using Chi-square test. Statistical significance was defined as a p-value of less than 0.05.

Results

All 50 patients completed the study and follow-up.

Demographic Profile:n The two groups were comparable in terms of age, sex, and hernia laterality.

Table 1: Baseline Demographic and Clinical Characteristics

Parameter	TAPP (n = 25)	Open (n = 25)	p-value
Mean age (years)	41.6 ± 10.8	43.2 ± 11.4	0.62
Sex (Male/Female)	24 / 1	23 / 2	0.55
Right-sided hernia	14 (56%)	15 (60%)	0.78
Left-sided hernia	11 (44%)	10 (40%)	—

Operative Time

Table 2: Comparison of Operative Time

Procedure	Mean time (minutes) ± SD	p-value
TAPP	70.8 ± 9.6	< 0.001
Open	55.2 ± 8.4	

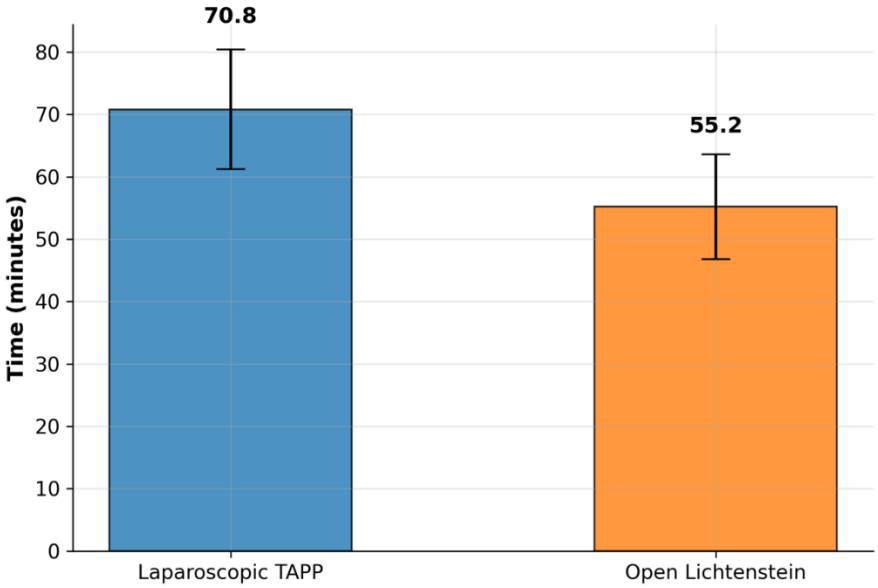

Figure 1: Comparison of mean operative time between laparoscopic TAPP repair and open Lichtenstein repair

Postoperative Pain

Table 3: Postoperative Pain Scores at 24 Hours

Group	Mean VAS score ± SD	p-value
TAPP	2.3 ± 0.9	< 0.001
Open	4.5 ± 1.2	

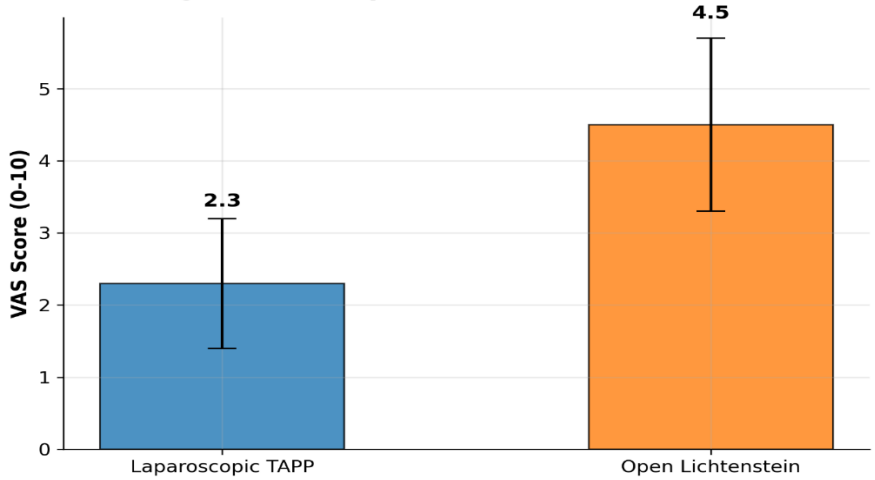

Figure 2: Comparison of postoperative pain scores (VAS) at 24 hours between laparoscopic and open repair groups

Hospital Stay and Recovery

Table 4: Hospital Stay and Return to Activity

Parameter	TAPP	Open	p-value
Hospital stays (days)	1.9 ± 0.7	3.5 ± 1.0	< 0.001
Return to normal activity (days)	7.6 ± 2.4	14.2 ± 3.6	< 0.001

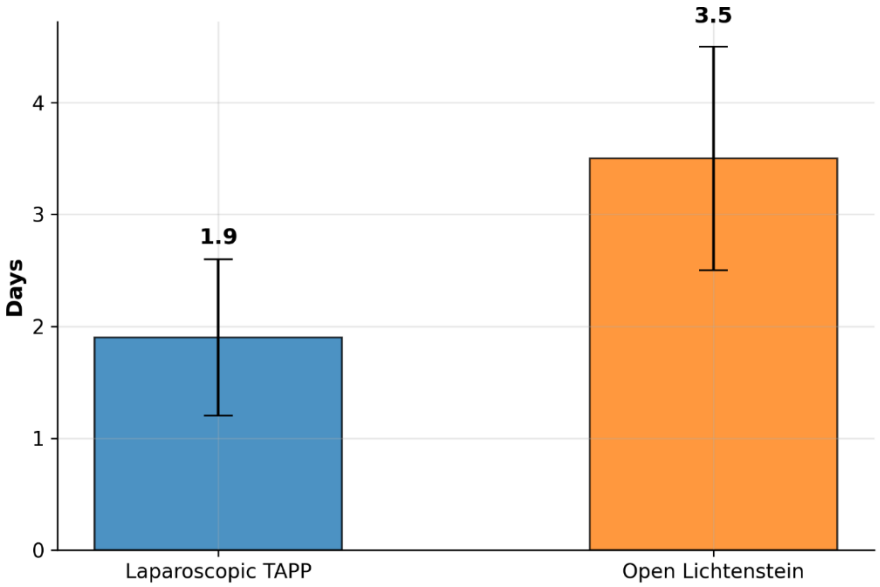

Figure 3: Comparison of postoperative hospital stay between laparoscopic TAPP repair and open Lichtenstein repair

Postoperative Complications

Table 5: Postoperative Complications

Complication	TAPP	Open
Seroma	1	3
Wound infection	0	2
Hematoma	1	2
Chronic groin pain	0	3
Total	2 (8%)	10 (40%)

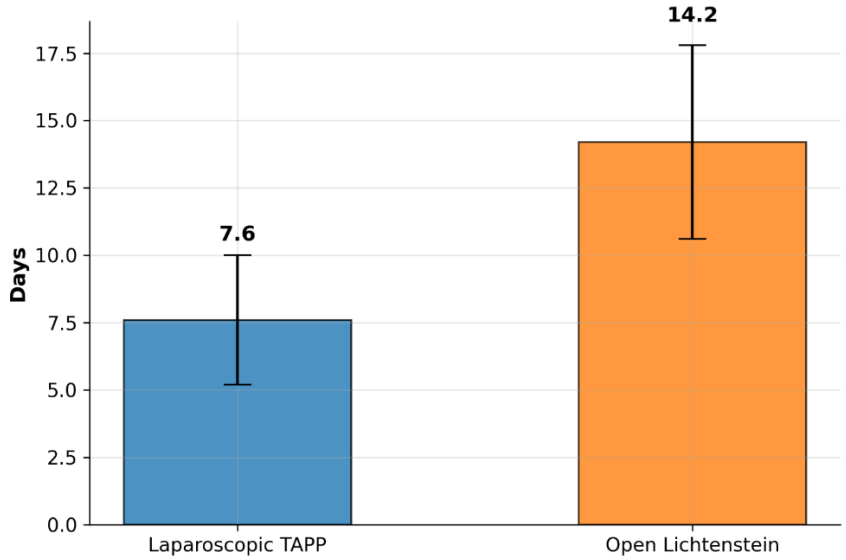

Figure 4: Comparison of time to return to normal daily activities between the two study groups

No recurrence was observed in either group during the six-month follow-up.

Discussion

In a tertiary care setting in Eastern India, the current prospective comparative study assessed the short-term and perioperative functional results of open Lichtenstein repair and laparoscopic Transabdominal Preperitoneal (TAPP) mesh repair for primary unilateral inguinal hernia. The data reveal that although laparoscopic TAPP repair is linked with a longer operational length, it gives considerable advantages in terms of postoperative discomfort, duration of hospital stay, complication rates, and early return to regular activities. These data align with results from previous meta-analyses, randomized trials, and international guidelines [4–7].

In this study, the TAPP group's mean operating time was substantially longer than that of the open repair group. Previous investigations have consistently revealed similar outcomes. In a large multicenter randomized experiment, Neumayer et al. found that, especially in the early learning phase of the technique, laparoscopic inguinal hernia repair needed a longer surgical length than open mesh repair [4]. Due to the technical difficulty of preperitoneal dissection, mesh placement, and peritoneal closure, the EU Hernia Trialists Collaboration also reported longer operating times for laparoscopic procedures [6]. Nonetheless, several writers have highlighted that as surgeons get more skilled, operating times drastically drop. Studies by Bittner et al. and Schmedt et al. showed that the operative time for TAPP repair is comparable to that of open repair once the learning curve is overcome, indicating that longer operative duration is a temporary restriction rather than a long-term drawback of the laparoscopic approach [3,8].

Early mobilization, overall satisfaction, and patient comfort are all significantly impacted by postoperative pain. Compared to patients undergoing open Lichtenstein repair, those undergoing laparoscopic TAPP repair had considerably lower pain scores 24 hours after surgery. Previous research provides substantial support for this conclusion. Compared to open repair methods, laparoscopic inguinal hernia surgery is linked to less early postoperative pain, according to a Cochrane systematic review by McCormack et al. [5]. Smaller incisions, less tissue handling, and avoiding significant inguinal canal dissection are all responsible for the decreased pain seen following TAPP surgery.

Additionally, there is a greater chance that sensory nerves such the ilioinguinal, iliohypogastric, and vaginal branches of the genitofemoral nerve will be harmed or trapped during open repair. The greater frequency of chronic groin pain seen in the open repair group in the current study is consistent with Poobalan et al.'s identification of nerve damage and mesh fixation as significant contributors to chronic groin pain following open hernia repair [9].

In comparison to the open repair group, the laparoscopic TAPP group's hospital stay was noticeably shorter. This observation is consistent with worldwide recommendations and the results of several randomized trials. According to the HerniaSurge Group guidelines, minimally invasive hernia repair, especially for simple primary inguinal hernias, is linked to quicker healing, earlier ambulation, and shorter hospital stays [7]. While open repair frequently requires longer hospital stays due to wound discomfort, seroma formation, and increased analgesic requirements, laparoscopic patients are discharged quicker due to reduced postoperative pain, less wound-related problems, and early mobilization.

An early return to regular daily activities is a crucial functional outcome, particularly for populations of working age. Patients having TAPP repair in the current study returned to their regular activities far sooner than those in the open repair group. Neumayer et al. and McCormack et al. found similar results, showing an earlier return to work and a quicker functional recovery after laparoscopic inguinal hernia surgery [4,5]. Due to specialized equipment and the requirement for general anesthesia, laparoscopic repair is frequently associated with higher initial procedural costs. However, a number of studies indicate that these costs may be offset in the long run by lower indirect costs associated with shorter convalescence and an earlier return to productivity [7].

In the current study, postoperative problems were considerably more common in the open Lichtenstein repair group. Higher rates of seroma, wound infection, hematoma, and persistent groin pain were linked to open repair. These results are in line with those of Schmedt et al. and the EU Hernia Trialists Collaboration, who found that open mesh repair resulted in more wound-related morbidity than laparoscopic procedures [6,8]. By making fewer incisions and positioning the mesh in the preperitoneal area, the laparoscopic technique minimizes contact with subcutaneous tissues and lowers the risk of wound infection. Furthermore, posterior mesh implantation minimizes tissue damage while providing consistent coverage of the myopectineal orifice during TAPP healing.

Over the course of the six-month follow-up period, neither group saw a recurrence. Existing research indicates similar recurrence rates for laparoscopic and open mesh repairs when carried out by skilled surgeons, despite the fact that this time frame is insufficient to draw conclusions regarding long-term recurrence. Both TAPP and Lichtenstein repairs offer long-lasting results with low recurrence rates when proper surgical technique and mesh

implantation are guaranteed, according to the HerniaSurge Group guidelines and long-term follow-up studies [7].

The results of this study are especially pertinent when considering tertiary care facilities in areas with low resources, like Eastern India. The results show that laparoscopic TAPP repair can be safely and successfully carried out in such settings when sufficient infrastructure and experience are available, despite worries about increased costs, longer operating times, and technical difficulties. This study's better postoperative results provide credence to the growing international agreement that minimally invasive hernia repair should be more widely used in facilities with the necessary equipment [3,7].

Limitations

This prospective comparison study has advantages, but there are certain drawbacks that need to be noted. The most significant drawback is the comparatively small sample size of fifty patients, which could reduce the study's statistical power and limit how broadly the results can be applied. Furthermore, because this was a single-center study carried out at a tertiary care teaching hospital, the findings might represent regional patient demographics, surgeon specialization, and institutional practices.

The six-month follow-up period was insufficient to properly evaluate long-term consequences such chronic postoperative pain and late recurrence. Longer follow-up is necessary for thorough evaluation because recurrence and chronic discomfort may appear more than a year after inguinal hernia repair, according to several studies [7,9].

Due to the nature of surgical treatments, blinding patients and surgeons was not possible even though randomization was used. This could have introduced performance and observer bias, especially in subjective outcome measures like postoperative pain evaluation. Additionally, a rigorous cost-effectiveness analysis was absent from the study. Although the initial expenses of laparoscopic repair are greater, indirect costs associated with an earlier return to work and a shorter hospital stay were not measured, which would have allowed for a more thorough economic analysis.

To further validate the results and bolster the evidence foundation for laparoscopic inguinal hernia repair in resource-constrained settings, future research with bigger sample sizes, multicenter involvement, longer follow-up periods, and cost-effectiveness analyses are advised.

Conclusion

When treating primary unilateral inguinal hernias, laparoscopic Transabdominal Preperitoneal (TAPP) mesh repair is a safe and efficient substitute for open Lichtenstein surgery. The laparoscopic method offers substantial benefits in terms of decreased postoperative pain, a shorter hospital stays, a lower incidence of postoperative complications, and an earlier return to regular daily activities, although being linked to a greater operating length.

The results of this study are in line with worldwide guidelines, systematic reviews, and previously published randomized trials that support the use of laparoscopic procedures for inguinal hernia repair where sufficient infrastructure and skill are available. Laparoscopic TAPP repair can be effectively used in tertiary care settings, even those in areas with limited resources, with positive perioperative results and increased patient satisfaction.

The current study's findings suggest that, in carefully chosen patients, laparoscopic TAPP repair should be the recommended surgical procedure for primary unilateral inguinal hernia. Patients having inguinal hernia repair may have better surgical results and a higher quality of life if this approach is widely used and systematic training programs are implemented to help overcome the learning curve.

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