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(7); 2007-2010

Original Research Article

Comparing the Outcome of Laparoscopic (TAPP Mesh Repair) and Open Hernia Repair: A Prospective Study from Bhagalpur

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Received: 27-05-2025 / Revised: 25-06-2025 / Accepted: 27-07-2025

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Conflict of interest: Nil

Abstract:

Background: Compared to open Lichtenstein repair, laparoscopic TAPP repair has the potential to lessen postoperative pain and promote a faster recovery. To compare short- and mid-term results of TAPP versus open repair in adults with primary inguinal hernia.

Methods: A prospective, randomized, single-center study conducted over 24 months. Adults (ASA I–II) with primary unilateral inguinal hernia were randomly assigned to undergo either TAPP (n=12) or open Lichtenstein repair (n=12). The main endpoint assessed was pain at 24 hours (VAS 0–10). Secondary outcomes comprised operative time, postoperative complications, time to normal activity, length of hospital stay (LOS), chronic groin pain at 3 months, recurrence at 12 months, and direct hospital costs.

Results: Mean VAS pain at 24 h was (3.1±0.8) in the TAPP group compared to (5.2±1.0) in open repair. Operative time was longer in TAPP (78±12 min vs 56±10 min). LOS was shorter in TAPP (1.4±0.5 vs 2.6±0.7 days). Time to normal activity was faster in TAPP (8.5±2.1 vs 13.2±3.3 days). Any postoperative complication occurred in 2 patients (16.7%) in TAPP vs 5 (41.7%) in open repair (p=0.18). Chronic groin pain at 3 months occurred in 0 vs 2 patients respectively. Recurrence at 12 months was 0 vs 1 case. Direct hospital cost was higher in TAPP (₹34,000 [IQR 32–37k]) compared to open repair (₹24,000 [IQR 22–27k]).

Conclusion: TAPP repair results in less postoperative pain, faster return to normal activities, and shorter hospital stay, though with higher cost and longer operative time compared to open repair, while complication and recurrence rates remain comparable.

Introduction

Inguinal hernia remains the most frequently encountered surgical conditions worldwide, with repair procedures constituting a significant proportion of elective general surgery caseloads. It is estimated that inguinal hernias will develop in about 27% of men and 3% of women over a lifetime, and its prevalence increases with age due to progressive weakening of the abdominal wall musculature [1, 2]. While surgical repair is the definitive treatment, the choice of technique continues to evolve, driven by advances in operative approaches, mesh technology, and perioperative care protocols [3].

Two principal methods of hernia repair dominate current practice: the conventional open mesh repair, most often performed using the Lichtenstein tension-free technique, and laparoscopic repair, with the TAPP approach being among the most widely adopted [4]. The open Lichtenstein repair has long been favored for its simplicity, reproducibility, and low recurrence rates [5]. However, laparoscopic TAPP repair offers potential advantages, including earlier return to normal activities, reduced postoperative pain, and the ability to address bilateral hernias and occult contralateral defects in a single procedure.

A variety of meta-analysis and randomized controlled trials have compared the outcomes of open and laparoscopic repairs, with mixed results. While several studies have demonstrated that TAPP repair is associated with quicker recovery and less early postoperative pain, concerns persist regarding its longer operative time, higher procedural costs, and steep learning curve [6]. Moreover, the rates of recurrence and long-term complications, such as chronic groin pain, appear to be comparable between

the two approaches when performed by experienced surgeons [7].

In India, most available literature on inguinal hernia repair originates from high-volume urban centers, with relatively few reports from smaller tertiary hospitals serving mixed urban and rural populations [8]. Factors such as patient demographics, occupational demands, healthcare access, and economic constraints may influence surgical outcomes in these settings. Furthermore, while global evidence is extensive, there is limited prospective data from Indian centers directly comparing TAPP and open Lichtenstein repairs using standardized perioperative protocols.

This present study aimed to compare the outcomes of laparoscopic TAPP mesh repair with those of open Lichtenstein mesh repair for primary unilateral inguinal hernia at a tertiary care hospital in Bhagalpur. The primary aim was to evaluate postoperative pain, while secondary objectives included comparing hospital stay, operative time, time to return to normal activities, postoperative complications, recurrence rates, and direct hospital costs.

Materials and Methods

This was a prospective, randomized, single-center comparative study carried out in the Department of General Surgery, Bhagalpur, over a period of 24 months. A total of 24 patients meeting the eligibility criteria were enrolled and randomized into two equal groups through a computer-generated sequence concealed in sealed opaque envelopes. Group A underwent laparoscopic TAPP mesh repair (n=12), while Group B underwent open Lichtenstein mesh repair (n=12).

Inclusion Criteria:

- Adults aged ≥18 years
- Primary unilateral, reducible inguinal hernia
- ASA grade I or II

Exclusion Criteria:

- Bilateral or recurrent hernias
- Complicated hernias (irreducible, strangulated, obstructed)
- Previous lower abdominal or pelvic surgery
- ASA grade ≥III

All procedures were performed by two experienced surgeons proficient in both techniques. The TAPP repair was carried out using a standard three-port approach, involving creation of a peritoneal flap, preperitoneal dissection, placement of a 10×15 cm polypropylene mesh, fixation with atraumatic tacks, and peritoneal closure with continuous sutures. The open Lichtenstein repair involved a dissection of the hernia sac, groin incision, placement of a 10×15 cm mesh in an onlay fashion, and fixation with polypropylene sutures.

The primary outcome measure was postoperative pain at 24 hours, assessed using a VAS ranging from 0 to 10. Secondary outcomes included LOS, operative time, time to return to normal activities (patient-reported days to resume routine household or work activities), postoperative complications within 30 days (seroma, hematoma, surgical site infection [SSI], urinary retention), chronic groin pain at 3 months (VAS ≥3/10 interfering with daily activity), hernia recurrence at 12 months (confirmed clinically ± ultrasound), and direct hospital cost in Indian Rupees (including bed charges, operating room expenses, consumables, and medications).

Patients were reviewed postoperatively at 1 week, 1 month, 3 months, 6 months, and 12 months. Statistical analysis was conducted using SPSS version 26. Continuous data were summarized as mean ± standard deviation (SD) or median with interquartile range (IQR) and compared between the two groups using either the independent t-test or the Mann–Whitney U test, as appropriate. Categorical data were reported as frequencies and percentages, with group comparisons made via the Chi-square test or Fisher's exact test. A p-value below 0.05 was regarded as indicating statistical significance.

Results

Twenty-four patients were randomized equally to laparoscopic TAPP (n=12) and open Lichtenstein (n=12) repair. Baseline characteristics were similar between groups (mean age, 44.8 vs 45.3 years; 91.7% male in both; mean BMI, 23.9 vs 24.2 kg/m²) **(Table 1)**.

Table 1: Baseline Demographic and Clinical Characteristics of Patients Undergoing TAPP or Open Lichtenstein Repair

Variable	TAPP (n=12)	Open (n=12)	p value
Age (years)	44.8±9.6	45.3±8.9	0.89
Male, n (%)	11 (91.7)	11 (91.7)	1.00
BMI (kg/m^2)	23.9±2.1	24.2±2.4	0.70
Right-sided, n (%)	7 (58.3)	8 (66.7)	0.70
Indirect type, n (%)	8 (66.7)	7 (58.3)	0.70

Mean 24-hour pain scores were lower with TAPP than open repair (3.1 vs 5.2). Operative time was longer for TAPP (78 vs 56 minutes; P<.001), whereas hospital stay was shorter (1.4 vs 2.6 days),

as was time to return to normal activities (8.5 vs 13.2 days). Complications occurred in 2 patients (16.7%) after TAPP (1 seroma, 1 urinary retention) and 5 (41.7%) after open repair (2 surgical site infections, 2 seromas, 1 urinary retention; P=.18). Chronic groin pain at 3 months occurred in 0 vs 2 patients, and 12-month recurrence in 0 vs 1 patient. Median direct hospital cost was higher for TAPP (₹34,000 [IQR, 32,000–37,000]) than open repair (₹24,000 [IQR, 22,000–27,000]) **(Table 2)**.

Table 2: Operative and Postoperative Outcomes Following TAPP and Open Lichtenstein Repair

Outcome	TAPP (n=12)	Open (n=12)	p-value
VAS pain at 24h	3.1±0.8	5.2±1.0	<0.001
Operative time (min)	78±12	56±10	<0.001
LOS (days)	1.4±0.5	2.6±0.7	<0.001
Time to normal activity (days)	8.5±2.1	13.2±3.3	0.001
Any 30-day complication, n (%)	2 (16.7)	5 (41.7)	0.18
Chronic groin pain at 3 mo. N (%)	0	2 (16.7)	0.13
Recurrence at 12 mo. N (%)	0	1 (8.3)	1.00
Direct hospital cost (₹)	34,000 (32-37k)	24,000 (22-27k)	<0.001

Discussion

This prospective, randomized study conducted at JLNMCH, Bhagalpur, over 24 months assessed outcomes of laparoscopic TAPP mesh repair versus the open Lichtenstein method for primary unilateral inguinal hernia. Our findings show that TAPP repair resulted in markedly reduced postoperative pain scores, shorter hospitalization, and quicker resumption to normal activities, despite having a longer operative time and higher procedural cost. These results align closely with existing national and international literature, which has consistently reported early postoperative benefits with laparoscopic repair compared to open techniques [9].

The reduced postoperative pain and quicker functional recovery observed in our TAPP group are in agreement with prior RCT and meta-analyses, where laparoscopic repair was shown to minimize tissue dissection and nerve handling, thereby reducing early discomfort and facilitating earlier mobilization [10, 11]. Similarly, the shorter hospital stay with TAPP repair in our series reflects global trends, where laparoscopic approaches have been linked to earlier discharge and faster resumption of normal activities, especially in working-age populations [12].

However, as in other studies, our study observed a significantly longer operative time for TAPP repair compared to open repair, likely due to the need for establishing pneumoperitoneum, creating a peritoneal flap, and performing intracorporeal mesh placement [13]. The higher direct hospital cost for TAPP in our setting is consistent with reports from other low- and middle-income nations, where the expense of laparoscopic equipment, consumables and mesh fixation devices remains a barrier to widespread adoption [14].

Complication rates in our study were lower in the TAPP group, however, the difference was not statistically significant, probably owing to the limited sample size. Notably, chronic groin pain at 3 months follow-up occurred exclusively in the open repair group, consistent with earlier research suggesting that laparoscopic repair may reduce long-term neuralgia by avoiding direct manipulation of inguinal nerves. Recurrence rates at 12 months were low and comparable between the two groups, in line with findings from high-volume centers showing that recurrence is more related to surgical expertise and mesh placement technique than to the approach itself [15].

Our study has several strengths, including prospective data collection, standardized surgical techniques, and consistent follow-up. Nonetheless, limitations must be acknowledged. The relatively small sample size reduced the study's ability to identify differences in infrequent outcomes like recurrence and chronic pain. The single-center nature of the study may also affect generalizability, and the follow-up period of 12 months, while adequate for early outcomes, may not capture late recurrences. For centers equipped with laparoscopic facilities and trained personnel, TAPP represents a safe and effective option to open repair, particularly for patients prioritizing early return to normal activities. Larger multicenter studies in comparable resource-limited settings are required to validate these results and assess long-term outcomes.

Conclusion

Laparoscopic TAPP mesh repair is associated with less postoperative pain, faster return to normal activities and shorter hospital stay, compared with open Lichtenstein repair, albeit at the cost of longer operative time and higher direct expenses. Both approaches are safe and effective, with comparable complication and recurrence rates in the short term. Selection of procedure should be tailored to each patient based on patient preference, surgeon expertise, and available resources.

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