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Research Article

Comparative Study of Lichtenstein Mesh Repair Vs Laparoscopic Hernia Repair

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ABSTRACT

Background: Inguinal hernia repair is one of the most common general surgical procedures worldwide. While Lichtenstein tension-free mesh repair is widely practiced, laparoscopic techniques (TAPP/TEP) offer potential advantages in terms of postoperative pain and recovery. This study compares the outcomes of Lichtenstein and laparoscopic hernia repair.

Methods: A prospective comparative study was conducted on 100 patients with primary unilateral inguinal hernia, divided into two groups: Lichtenstein repair (n=50) and laparoscopic repair (n=50). Operative time, postoperative pain (VAS score), hospital stay, complications, return to normal activity, and recurrence at 12 months were recorded and analyzed.

Results: The mean operative time was shorter in the Lichtenstein group (55 ± 8 min) than the laparoscopic group (75 ± 10 min, $p<0.001$). Postoperative pain at 24 hours was lower in the laparoscopic group (VAS 3.8 ± 0.9 vs 6.2 ± 1.1, $p<0.001$). Hospital stay and time to return to normal activity were also shorter with laparoscopy (2.1 ± 0.5 vs 3.5 ± 0.8 days, 8.2 ± 1.4 vs 13.5 ± 2.3 days; $p<0.001$). Complication rates were comparable (Lichtenstein 10%, laparoscopic 12%, NS), and recurrence at 12 months was 2% in the Lichtenstein group and 0% in the laparoscopic group (NS).

Conclusion: Both techniques are safe and effective for inguinal hernia repair. Laparoscopic repair provides advantages of reduced pain, shorter hospital stay, and faster recovery, while Lichtenstein repair remains a cost-effective, reliable option, particularly in resource-limited settings. The choice should be guided by patient factors, surgeon expertise, and available resources.

Keywords*: Inguinal hernia, Lichtenstein repair, Laparoscopic repair, TAPP, TEP, Postoperative outcomes*

INTRODUCTION:

Inguinal hernia is one of the most common surgical conditions encountered worldwide, accounting for approximately **75% of all abdominal wall hernias** and affecting about **27% of men and 3% of women during their lifetime** [1,2]. The repair of inguinal hernia is also one of the most frequently performed general surgical operations, with an estimated **20 million procedures carried out annually** [3].

Over the past century, numerous techniques for inguinal hernia repair have been described, ranging from tissue-based repairs such as the Bassini and Shouldice techniques, to mesh-based repairs that revolutionized outcomes by reducing recurrence rates [4]. The introduction of the **Lichtenstein tension-free mesh repair** in the late 1980s marked a turning point in hernia surgery. This open technique is simple, reproducible, and associated with low recurrence rates, making it the **"gold standard" of open hernia surgery** [5].

Parallel to these developments, the rapid advancement of minimally invasive surgery in the 1990s led to the evolution of **laparoscopic hernia repair techniques**, primarily **transabdominal preperitoneal (TAPP)** and **totally extraperitoneal**

(TEP) repairs. Laparoscopic approaches have gained popularity due to their advantages of reduced postoperative pain, early return to normal activities, improved cosmesis, and ability to address bilateral and recurrent hernias simultaneously [6,7]. Despite these benefits, laparoscopic repair has certain limitations including the requirement for general anesthesia, longer operative times, steep learning curve, and higher costs [8].

Several randomized controlled trials (RCTs) and meta-analyses have compared laparoscopic repair with Lichtenstein repair. While most studies consistently report **less postoperative pain and quicker recovery with laparoscopic repair**, open repair remains widely practiced due to its relative ease, cost-effectiveness, and applicability in resource-limited settings [9–11]. The long-term recurrence rates between the two methods are generally comparable, though data on chronic pain suggest some advantage for laparoscopic repair [12].

Given these considerations, the choice of surgical technique often depends on patient factors, surgeon expertise, and institutional resources. In developing countries, cost and availability of laparoscopic expertise often influence surgical decision-making. Thus, a comparative evaluation of these two widely used techniques remains relevant in guiding evidence-based clinical practice.

The present study aims to compare **Lichtenstein mesh repair** and **laparoscopic hernia repair** with respect to operative time, postoperative pain, hospital stay, complications, and recurrence, thereby contributing to ongoing discussions regarding the optimal approach for inguinal hernia repair.

MATERIALS AND METHODS:

Study Design and Setting

This was a **prospective, comparative study** conducted in the Department of General Surgery at a tertiary care hospital over a period of 12 months. The study was approved by the **Institutional Ethics Committee** and written informed consent was obtained from all participants.

Study Population

A total of **100 patients** diagnosed with primary uncomplicated inguinal hernia were included and divided into two groups:

- **Group A (n=50):** Patients underwent **Lichtenstein tension-free mesh repair**.
- **Group B (n=50):** Patients underwent **laparoscopic hernia repair** (Transabdominal Preperitoneal (TAPP) or Totally Extraperitoneal (TEP) approach based on surgeon's preference and expertise).

Inclusion Criteria

- Age between 18 and 70 years
- Primary, unilateral, reducible inguinal hernia
- Medically fit for anesthesia and surgery

Exclusion Criteria

- Bilateral or recurrent inguinal hernia
- Complicated hernia (incarcerated, obstructed, or strangulated)
- Previous lower abdominal or pelvic surgery
- Severe cardiopulmonary comorbidities precluding general anesthesia
- Patients unwilling to participate in the study

Preoperative Evaluation

All patients underwent detailed **history and clinical examination**. Preoperative workup included complete blood counts, renal and liver function tests, coagulation profile, ECG, chest X-ray, and ultrasonography (when required). The **American Society of Anesthesiologists (ASA) physical status** classification was recorded for risk assessment.

Surgical Techniques

1. Lichtenstein Mesh Repair (Group A):

- Performed under **spinal anesthesia**.
- A standard inguinal incision was made, hernia sac was dissected, reduced, and ligated.
- A **polypropylene mesh** (10 × 15 cm) was placed in the inguinal canal, anchored to the inguinal ligament below and conjoint tendon above, ensuring tension-free repair.
- Wound closed in layers with appropriate sutures.

2. Laparoscopic Repair (Group B):

- All procedures performed under **general anesthesia**.

- **TAPP repair:** Three ports (10 mm umbilical, two 5 mm lateral) were inserted. The peritoneum was incised, preperitoneal space dissected, hernia sac reduced, and a polypropylene mesh (10 × 15 cm) placed to cover the myopectineal orifice, followed by peritoneal closure.
- **TEP repair:** A balloon dissector was used to develop preperitoneal space, ports inserted under vision, sac reduced, and mesh placed to cover potential hernia sites.
- Mesh fixation was done with tackers or absorbable sutures as per surgeon's discretion.

Postoperative Care and Follow-up

- All patients received standard postoperative analgesia (NSAIDs ± opioids) and antibiotics.
- Patients were encouraged for early ambulation.
- Postoperative pain was assessed using the **Visual Analogue Scale (VAS)** at 24 hours, 48 hours, and on the 7th postoperative day.
- Patients were discharged once ambulating comfortably, tolerating diet, and pain was controlled.

Follow-up Schedule:

- 1 week, 1 month, 6 months, and 12 months postoperatively.
- At each follow-up, patients were assessed for wound healing, complications, recurrence, and return to normal activity.

Outcome Measures

The following variables were recorded and compared between groups:

1. **Operative time (minutes)** – measured from incision to closure.
2. **Postoperative pain** – assessed using VAS at 24 hrs, 48 hrs, and day 7.
3. **Postoperative complications** – seroma, hematoma, wound infection, urinary retention, chronic groin pain.
4. **Duration of hospital stay (days).**
5. **Time to return to normal activity (days).**
6. **Recurrence rate** – assessed clinically at 1-year follow-up.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using **SPSS software version 20** (IBM Corp, USA).

- Continuous variables were expressed as **mean ± standard deviation (SD)** and compared using **Student's *t*-test**.
- Categorical variables were expressed as **percentages** and compared using the **Chi-square test**
- A *p*-value of **<0.05** was considered statistically significant.

RESULTS:

A total of **100 patients** were enrolled, with 50 patients in each group (Lichtenstein = 50, Laparoscopic = 50). Both groups were comparable in terms of **age, gender distribution, and side of hernia**, and there was no statistically significant difference in baseline characteristics (Table 1).

Table 1. Baseline characteristics of patients

Variable	Lichtenstein (n=50)	Laparoscopic (n=50)	*p* value
Mean age (years)	45.6 ± 12.1	46.8 ± 11.4	0.62 (NS)
Male : Female ratio	48:2	47:3	0.64 (NS)
Right : Left hernia	32:18	30:20	0.71 (NS)
ASA I / II	36 / 14	34 / 16	0.68 (NS)

The **mean operative time** was significantly shorter in the Lichtenstein group compared to the laparoscopic group (Table 2)

Table 2. Comparison of operative time

Parameter	Lichtenstein (n=50)	Laparoscopic (n=50)	*p* value
Mean operative time (min)	55 ± 8	75 ± 10	<0.001

Pain assessment using the **VAS score** demonstrated significantly higher pain levels in the Lichtenstein group at 24 and 48 hours. By the 7th postoperative day, pain scores reduced in both groups, but remained slightly lower in the laparoscopic group (Table 3).

Table 3. Postoperative pain scores (VAS)

Time Interval	Lichtenstein (n=50)	Laparoscopic (n=50)	*p* value
24 hours	6.2 ± 1.1	3.8 ± 0.9	<0.001
48 hours	4.3 ± 0.8	2.7 ± 0.6	<0.001
Day 7	2.1 ± 0.5	1.5 ± 0.4	0.02

The **duration of hospital stay** was significantly shorter for laparoscopic repair. Similarly, the **mean time to return to normal activity** was earlier in the laparoscopic group (Table 4).

Table 4. Hospital stay and return to activity

Parameter	Lichtenstein (n=50)	Laparoscopic (n=50)	*p* value
Hospital stay (days)	3.5 ± 0.8	2.1 ± 0.5	<0.001
Return to activity (days)	13.5 ± 2.3	8.2 ± 1.4	<0.001

Complications were generally **mild and self-limiting**. The most common complication in the Lichtenstein group was **wound infection**, whereas in the laparoscopic group, **seroma formation** was more frequent. The overall complication rates did not differ significantly between groups (Table 5).

Table 5. Postoperative complications

Complication	Lichtenstein (n=50)	Laparoscopic (n=50)	*p* value
Seroma	2 (4%)	3 (6%)	0.64 (NS)
Hematoma	1 (2%)	1 (2%)	1.00 (NS)
Wound infection	2 (4%)	1 (2%)	0.55 (NS)
Urinary retention	0	1 (2%)	0.31 (NS)
Chronic groin pain	0	0	–
Total	5 (10%)	6 (12%)	0.72 (NS)

During **12-month follow-up**, there was **1 recurrence** (2%) in the Lichtenstein group and none in the laparoscopic group, which was not statistically significant (Table 6).

Table 6. Recurrence at 1 year

Group	Recurrence (%)	*p* value
Lichtenstein (n=50)	1 (2%)	0.31 (NS)
Laparoscopic (n=50)	0 (0%)	-

Discussion

Inguinal hernia repair remains one of the most frequently performed general surgical procedures worldwide, and the choice of surgical technique continues to evolve with advances in minimally invasive surgery. In this study, we compared **Lichtenstein tension-free mesh repair** with **laparoscopic hernia repair (TAPP/TEP)** in terms of operative time, postoperative pain, hospital stay, complications, and recurrence.

Operative Time

Our study demonstrated a significantly **shorter operative time in the Lichtenstein group (55 ± 8 min) compared to laparoscopic repair (75 ± 10 min, $p<0.001$)**. This is consistent with findings from the landmark randomized trial by Neumayer et al. [13], which reported that open mesh repair required less operative time, particularly in unilateral hernias. The longer duration for laparoscopic repair can be attributed to port placement, creation of preperitoneal space, and mesh fixation. However, as surgical expertise improves, operative time for laparoscopy decreases, making it comparable to open repair in high-volume centers [14].

Postoperative Pain

Postoperative pain was significantly lower in the laparoscopic group at 24 and 48 hours, as well as at one week. Similar results were observed in the Cochrane meta-analysis by McCormack et al. [15], which concluded that laparoscopic repair is associated with less early postoperative pain compared to open repair. Reduced tissue dissection and absence of large incisions in laparoscopy explain these findings. Chronic groin pain, although rare in our study, has been reported to be lower in laparoscopic approaches due to reduced risk of nerve injury [16,17].

Hospital Stay and Return to Activity

The mean hospital stay was significantly shorter for laparoscopic repair (2.1 days vs 3.5 days, $p<0.001$), and return to normal activity was also faster (8.2 days vs 13.5 days, $p<0.001$). These results align with previous RCTs and systematic reviews [18,19], which consistently report earlier recovery and return to work in patients undergoing laparoscopic repair. The socioeconomic advantage of early resumption of work is particularly relevant for younger patients and working populations.

Complications

The overall complication rates were low and comparable between groups (10% in Lichtenstein vs 12% in laparoscopic). Seroma formation was slightly higher in the laparoscopic group, while wound infection was more common in open repair. These findings are in line with Bittner et al. [20], who reported that while laparoscopy is associated with more seromas, open repair carries higher risk of wound-related complications. Importantly, there were no cases of chronic groin pain in our study, though literature suggests that laparoscopic repair may reduce long-term neuralgia compared to open repair [21].

Recurrence

At 12 months, recurrence was observed in **one patient (2%) in the Lichtenstein group and none in the laparoscopic group**, though this difference was not statistically significant. This is consistent with long-term follow-up studies such as the MRC trial [13] and the European Hernia Trialists Collaboration meta-analysis [22], which concluded that recurrence rates are generally low and comparable between the two techniques when performed by experienced surgeons. However, the shorter follow-up duration in our study limits conclusions about long-term recurrence.

CONCLUSION:

Both Lichtenstein mesh repair and laparoscopic hernia repair are safe and effective, with low recurrence and complication rates. Laparoscopic repair offers less postoperative pain, shorter hospital stay, and faster recovery, making it advantageous for bilateral and recurrent hernias. However, it requires longer operative time, general anesthesia, and higher costs. Lichtenstein repair remains a simple, cost-effective, and widely applicable option, particularly for unilateral hernias in resource-limited settings. The choice of technique should be individualized based on patient factors, surgeon expertise, and healthcare resources.

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