



Original Article

A Comparative Study of Open Lichtenstein Repair and Laparoscopic Mesh Repair in Inguinal Hernia

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ABSTRACT

Background: Inguinal hernia repair is one of the most commonly performed surgical procedures worldwide. Open Lichtenstein mesh repair remains the conventional standard technique, whereas laparoscopic mesh repair has gained popularity because of its minimally invasive approach and improved postoperative recovery. This study compared the clinical outcomes of these two techniques in patients with primary uncomplicated inguinal hernia.

Methods: This prospective comparative observational study was conducted in the Department of General Surgery at a tertiary care teaching hospital over a period of one year. A total of 120 patients with primary uncomplicated inguinal hernia were included and divided into two groups: Group A underwent Open Lichtenstein mesh repair (n=60), and Group B underwent laparoscopic mesh repair (n=60). The groups were compared with respect to operative time, intraoperative blood loss, postoperative pain, analgesic requirement, hospital stay, return to normal activities, postoperative complications, chronic groin pain, patient satisfaction, and recurrence. Statistical analysis was performed using the independent Student's *t*-test and Chi-square test, with a p-value <0.05 considered statistically significant.

Results: The demographic and clinical characteristics were comparable between the two groups. Open Lichtenstein repair had a significantly shorter operative time (p<0.001), whereas laparoscopic repair was associated with significantly lower blood loss, reduced postoperative pain, decreased analgesic requirement, shorter hospital stay, earlier return to normal activities, higher patient satisfaction, and a lower incidence of chronic groin pain (p<0.05). Seroma formation and surgical site infection were significantly less frequent in the laparoscopic group. The recurrence rate was low and comparable in both groups during follow-up.

Conclusion: Both techniques were safe and effective for the treatment of primary uncomplicated inguinal hernia. Open Lichtenstein repair offered the advantages of shorter operative time and lower cost, while laparoscopic mesh repair provided superior postoperative recovery and patient satisfaction. The choice of procedure should be individualized according to patient characteristics, surgeon expertise, and available resources.

Keywords: Inguinal hernia; Lichtenstein repair; laparoscopic mesh repair; postoperative pain; recurrence; hernioplasty.

INTRODUCTION

Inguinal hernia is one of the most common surgical disorders encountered in clinical practice and accounts for nearly 75% of all abdominal wall hernias. It results from the protrusion of abdominal contents through a weakened area of the inguinal canal. The lifetime risk of developing an inguinal hernia is approximately 27% in men and 3% in women, making hernia repair one of the most frequently performed general surgical procedures worldwide. [1]

Globally, more than 20 million inguinal hernia repairs are performed annually, reflecting the significant healthcare burden of this condition. Although many inguinal hernias remain asymptomatic initially, untreated hernias may progressively

enlarge and lead to complications such as incarceration, intestinal obstruction, and strangulation, necessitating emergency surgery with increased morbidity and mortality. [2,3]

The primary goals of inguinal hernia repair are to relieve symptoms, prevent complications, minimize postoperative pain, reduce recurrence, and enable an early return to normal activities. The introduction of prosthetic mesh has transformed hernia surgery by significantly lowering recurrence rates compared with traditional tissue-based repairs. [4]

Among open techniques, the Lichtenstein tension-free mesh repair is widely regarded as the standard procedure because of its simplicity, reproducibility, low recurrence rate, and ability to be performed under regional or local anesthesia. It remains the most commonly practiced technique, particularly in centers where laparoscopic facilities are limited. [5]

The advent of minimally invasive surgery has led to the increasing use of laparoscopic techniques, primarily Totally Extraperitoneal (TEP) and Transabdominal Preperitoneal (TAPP) repair. These approaches place the mesh in the preperitoneal space, reinforcing the myopectineal orifice without creating tension on surrounding tissues. Laparoscopic repair has gained popularity because of its association with reduced postoperative pain, shorter hospital stay, faster recovery, superior cosmetic outcomes, and earlier return to routine activities. It is particularly advantageous in bilateral and recurrent inguinal hernias. [6,7]

Despite these advantages, laparoscopic repair has certain limitations. It requires specialized equipment, greater technical expertise, and is associated with a longer learning curve and higher procedural cost. In contrast, Open Lichtenstein repair is technically less demanding, cost-effective, and remains an excellent option in many healthcare settings, especially in developing countries. [8]

Several randomized trials and systematic reviews have compared Open Lichtenstein and laparoscopic mesh repair with respect to operative time, postoperative pain, complications, hospital stay, recurrence, and quality of life. Most studies have shown that laparoscopic repair offers better short-term postoperative outcomes, whereas Open Lichtenstein repair generally requires a shorter operative time and provides comparable long-term recurrence rates when performed by experienced surgeons. [9,10]

The choice of surgical technique depends on multiple factors, including patient characteristics, hernia type, surgeon expertise, available resources, and patient preference. Current international guidelines recommend an individualized approach, recognizing that both open and laparoscopic mesh repairs are safe and effective for the management of primary inguinal hernia. [11]

The present study was undertaken to compare Open Lichtenstein repair and laparoscopic mesh repair in terms of operative time, postoperative pain, duration of hospital stay, postoperative complications, time to return to normal activities, and early recurrence in patients undergoing elective inguinal hernia repair.

MATERIALS AND METHODS:

Study Design and Setting

This prospective comparative observational study was conducted in the Department of General Surgery at a tertiary care teaching hospital over a period of **one year**, Institutional Ethics Committee approval was obtained before commencement of the study, and written informed consent was obtained from all participants.

Study Population

The study included adult patients diagnosed with primary uncomplicated inguinal hernia who underwent elective mesh repair during the study period. A total of **120 patients** satisfying the inclusion criteria were enrolled and divided into two groups based on the surgical technique performed.

- **Group A:** Open Lichtenstein Mesh Repair (n = 60)
- **Group B:** Laparoscopic Mesh Repair (TEP/TAPP) (n = 60)

The choice of surgical procedure was based on surgeon expertise, patient preference, clinical suitability, and availability of laparoscopic facilities.

Sample Size

The sample size was calculated using previous comparative studies evaluating postoperative outcomes following Open Lichtenstein and laparoscopic inguinal hernia repair. Considering a confidence level of 95%, study power of 80%, and an anticipated difference in postoperative pain scores between the two groups, the minimum required sample size was estimated to be 54 patients per group. To improve study power and compensate for possible loss to follow-up, **60 patients were included in each group**, giving a total sample size of **120 patients**.

Inclusion Criteria

- Patients aged 18 years and above.
- Primary unilateral uncomplicated inguinal hernia.
- Patients planned for elective mesh hernioplasty.
- American Society of Anesthesiologists (ASA) Grade I–III.
- Patients willing to provide written informed consent.

Exclusion Criteria

- Recurrent inguinal hernia.
- Bilateral inguinal hernia.
- Obstructed, incarcerated, or strangulated hernia.
- Femoral or other ventral hernias.
- Previous lower abdominal surgery contraindicating laparoscopic repair.
- Patients with severe systemic illness precluding surgery.
- Patients unwilling to participate.

Preoperative Evaluation

A detailed clinical history and thorough physical examination were performed in all patients. Routine investigations included complete blood count, blood sugar, renal and liver function tests, coagulation profile, urine analysis, electrocardiography, chest radiography (where indicated), and ultrasonography in selected cases with diagnostic uncertainty. Pre-anesthetic evaluation was performed before surgery.

Surgical Procedure

Group A: Open Lichtenstein Mesh Repair

The procedure was performed under spinal or general anesthesia using a standard inguinal incision. Following identification and management of the hernia sac, a polypropylene mesh was placed over the posterior wall of the inguinal canal using the standard Lichtenstein tension-free technique and fixed with non-absorbable sutures. The wound was closed in layers after achieving hemostasis.

Group B: Laparoscopic Mesh Repair

Laparoscopic repair was performed under general anesthesia using either the Totally Extraperitoneal (TEP) or Transabdominal Preperitoneal (TAPP) technique. After complete reduction of the hernia sac, a polypropylene mesh was placed in the preperitoneal space to cover the myopectineal orifice. Mesh fixation was performed according to the surgeon's preference using absorbable tacks or without fixation where appropriate.

Postoperative Management

Standard postoperative analgesics and antibiotics were administered according to institutional protocol. Early ambulation was encouraged in all patients. Patients were discharged once they achieved adequate pain control, tolerated oral diet, and were ambulatory. Follow-up evaluations were carried out at **1 week, 1 month, 3 months, and 6 months** after surgery to assess recovery and detect postoperative complications or recurrence.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using **IBM SPSS Statistics version 26.0**. Continuous variables were expressed as mean $\pm$ standard deviation and compared using the independent Student's *t*-test. Categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square test. A **p-value <0.05** was considered statistically significant.

RESULTS:

A total of **120 patients** with primary uncomplicated inguinal hernia were included in the study during the one-year study period. Patients were equally allocated into **Group A (Open Lichtenstein Mesh Repair, n = 60)** and **Group B (Laparoscopic Mesh Repair, n = 60)**.

There was no statistically significant difference in demographic characteristics between the two groups. (Table 1)

Table 1. Demographic Characteristics of the Study Population

Variable	Open Repair (n=60)	Laparoscopic Repair (n=60)	p-value
Age (years), Mean $\pm$ SD	47.2 $\pm$ 11.5	46.5 $\pm$ 10.8	0.73
Male, n (%)	58 (96.7)	57 (95.0)	0.65
BMI (kg/m ²), Mean $\pm$ SD	24.6 $\pm$ 2.9	24.2 $\pm$ 2.7	0.44

Right-sided and indirect inguinal hernias were more frequently observed in both groups. The distribution of hernia side and type did not differ significantly between the Open Lichtenstein and laparoscopic repair groups ($p>0.05$), demonstrating comparable clinical characteristics. (Table 2)

Table 2. Clinical Profile of Patients

Variable	Open Repair	Laparoscopic Repair	p-value
Side of Hernia			
Right	37 (61.7%)	35 (58.3%)	0.71
Left	23 (38.3%)	25 (41.7%)	
Type of Hernia			
Direct	22 (36.7%)	21 (35.0%)	0.85
Indirect	38 (63.3%)	39 (65.0%)	

The mean operative time was significantly shorter in the Open Lichtenstein group compared to the laparoscopic group (53.8 ± 8.9 vs. 72.6 ± 10.5 minutes, $p<0.001$). However, laparoscopic repair was associated with significantly lower intraoperative blood loss than open repair (23.9 ± 8.2 vs. 41.5 ± 12.3 mL, $p<0.001$) (Table 3)

Table 3. Intraoperative Parameters

Parameter	Open Repair	Laparoscopic Repair	p-value
Operative time (minutes)	53.8 ± 8.9	72.6 ± 10.5	<0.001
Blood loss (mL)	41.5 ± 12.3	23.9 ± 8.2	<0.001

Patients who underwent laparoscopic mesh repair experienced significantly lower postoperative pain scores and required fewer analgesic doses than those undergoing Open Lichtenstein repair ($p<0.001$). In addition, the duration of hospital stay was significantly shorter in the laparoscopic group, indicating faster postoperative recovery. (Table 4)

Table 4. Postoperative Recovery

Parameter	Open Repair	Laparoscopic Repair	p-value
VAS Pain Score (24 hours)	5.9 ± 1.0	3.2 ± 0.8	<0.001
Analgesic doses required	5.1 ± 1.2	3.0 ± 0.9	<0.001
Hospital stay (days)	2.8 ± 0.7	1.5 ± 0.5	<0.001

The mean time to resume normal daily activities and return to work was significantly shorter in patients treated with laparoscopic repair compared to those undergoing open repair ($p<0.001$). Patient satisfaction scores were also significantly higher in the laparoscopic group, reflecting better overall postoperative outcomes. (Table 5)

Table 5. Functional Recovery

Parameter	Open Repair	Laparoscopic Repair	p-value
Return to normal activities (days)	18.4 ± 4.5	11.7 ± 3.4	<0.001
Return to work (days)	21.6 ± 5.2	14.2 ± 4.1	<0.001
Patient satisfaction score (0–10)	7.9 ± 1.0	9.1 ± 0.7	<0.001

Seroma formation and surgical site infection were significantly more common in the Open Lichtenstein group than in the laparoscopic group ($p<0.05$). Although hematoma and urinary retention occurred more frequently following open repair, the differences were not statistically significant. (Table 6)

Table 6. Early Postoperative Complications

Complication	Open Repair n (%)	Laparoscopic Repair n (%)	p-value
Seroma	8 (13.3)	2 (3.3)	0.046
Surgical site infection	6 (10.0)	1 (1.7)	0.049
Hematoma	5 (8.3)	1 (1.7)	0.091
Urinary retention	3 (5.0)	2 (3.3)	0.648

The incidence of chronic groin pain and persistent numbness was significantly lower in the laparoscopic repair group compared with the Open Lichtenstein group ($p<0.05$). These findings suggest improved long-term patient comfort following laparoscopic mesh repair. (Table 7)

Table 7. Late Postoperative Outcomes

Outcome	Open Repair	Laparoscopic Repair	p-value
Chronic groin pain	8 (13.3%)	2 (3.3%)	0.046

Persistent numbness	7 (11.7%)	2 (3.3%)	0.043
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The recurrence rate was low in both groups, with one patient (1.7%) in each group developing recurrence during follow-up. There was no statistically significant difference in recurrence rates between the two surgical techniques ($p=1.000$), indicating comparable short-term effectiveness. (Table 8)

Table 8. Hernia Recurrence During Follow-up

Outcome	Open Repair	Laparoscopic Repair	p-value
Recurrence	1 (1.7%)	1 (1.7%)	1.000
No recurrence	59 (98.3%)	59 (98.3%)	

DISCUSSION:

Inguinal hernia repair is one of the most commonly performed surgical procedures worldwide. The introduction of mesh-based tension-free techniques has markedly reduced recurrence rates, while minimally invasive approaches have further improved postoperative recovery. The present study compared the clinical outcomes of Open Lichtenstein mesh repair and laparoscopic mesh repair in patients with uncomplicated inguinal hernia.

The mean age of patients in the present study was comparable between the two groups, with the majority belonging to the fourth and fifth decades of life. Male predominance was observed in both groups, accounting for more than 95% of the study population. These findings are consistent with the known epidemiology of inguinal hernia, which occurs predominantly in middle-aged men because of anatomical and occupational factors. Similar demographic distributions have been reported by Mitra et al. and Choudhary et al. [12,13].

In the present study, right-sided inguinal hernia was more common than left-sided hernia, and indirect inguinal hernia was the predominant type in both groups. These observations are comparable with previous studies, which have consistently reported a higher incidence of right-sided and indirect inguinal hernias owing to delayed descent of the right testis and persistence of the processus vaginalis. [12]

The mean operative time was significantly shorter in the Open Lichtenstein group than in the laparoscopic group (53.8 ± 8.9 vs. 72.6 ± 10.5 minutes; $p<0.001$). The longer operative duration observed with laparoscopic repair may be attributed to the creation of the preperitoneal space, meticulous dissection, and mesh placement, in addition to the learning curve associated with minimally invasive surgery. Comparable findings have been reported by Choudhary et al. and Ugraiah et al., who observed significantly longer operative times for laparoscopic repair than for open repair. [13,14]

Although laparoscopic repair required more operative time, it resulted in significantly lower intraoperative blood loss. Better visualization of the operative field, precise dissection under magnification, and minimal soft tissue handling contribute to improved hemostasis during laparoscopic surgery. Similar observations have been reported in recent comparative studies evaluating minimally invasive inguinal hernia repair. [12]

Postoperative pain was significantly lower in the laparoscopic group, with a corresponding reduction in analgesic requirement. The minimally invasive approach causes less tissue trauma and limited dissection of the inguinal canal, thereby reducing postoperative discomfort. Similar reductions in postoperative pain following laparoscopic repair have been consistently reported in prospective comparative studies and systematic reviews. [12,13]

Patients who underwent laparoscopic repair had a significantly shorter hospital stay and resumed normal daily activities earlier than those undergoing Open Lichtenstein repair. Reduced postoperative pain, early ambulation, and smaller surgical wounds contribute to accelerated recovery after laparoscopic surgery. These findings are in agreement with those reported by Ugraiah et al. and other prospective studies comparing open and laparoscopic hernia repair. [14,15]

The incidence of postoperative complications such as seroma formation and surgical site infection was significantly lower in the laparoscopic group. The smaller skin incisions and reduced tissue handling associated with minimally invasive surgery may account for these findings. Although hematoma and urinary retention occurred more frequently in the Open Lichtenstein group, the differences were not statistically significant. Similar trends have been documented in previous comparative studies. [15]

Chronic groin pain remains an important determinant of long-term patient satisfaction following inguinal hernia repair. In the present study, chronic groin pain and persistent numbness were significantly less frequent after laparoscopic repair. Reduced manipulation of the ilioinguinal, iliohypogastric, and genital branch of the genitofemoral nerves during laparoscopic surgery may explain these findings. Similar observations have been reported in systematic reviews and guideline updates, which suggest that minimally invasive repair is associated with a lower incidence of chronic postoperative pain. [16]

The recurrence rate during the six-month follow-up period was low and identical in both groups, with one recurrence observed in each group. Although recurrence remains the most important long-term outcome after hernia repair, short-term follow-up is often insufficient to detect meaningful differences. Several studies have demonstrated that both Open Lichtenstein and laparoscopic mesh repair achieve excellent long-term recurrence rates when performed by experienced surgeons. [17]

CONCLUSION:

Both Open Lichtenstein mesh repair and laparoscopic mesh repair are safe and effective techniques for the management of primary uncomplicated inguinal hernia. Open Lichtenstein repair offers the advantages of shorter operative time and cost-effectiveness, while laparoscopic mesh repair provides better postoperative recovery with less pain, shorter hospital stay, earlier return to normal activities, and higher patient satisfaction.

The recurrence rate was low and comparable in both groups. The choice of surgical technique should be individualized based on patient characteristics, surgeon expertise, and available resources.

REFERENCES

1. Jenkins JT, O'Dwyer PJ. Inguinal hernias. *BMJ*. 2008;336(7638):269-272.
2. HerniaSurge Group. International guidelines for groin hernia management. *Hernia*. 2018;22(1):1-165.
3. Fitzgibbons RJ Jr, Forse RA. Groin hernias in adults. *N Engl J Med*. 2015;372(8):756-763.
4. Kingsnorth A, LeBlanc K. Hernias: inguinal and incisional. *Lancet*. 2003;362(9395):1561-1571.
5. Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. *Am J Surg*. 1989;157(2):188-193.
6. Bittner R, Schwarz J. Inguinal hernia repair: current surgical techniques. *Langenbecks Arch Surg*. 2012;397(2):271-282.
7. Aiolfi A, Cavalli M, Ferraro SD, Manfredini L, Bonitta G, Bruni PG, et al. Treatment of inguinal hernia: systematic review and updated network meta-analysis of randomized controlled trials. *Ann Surg*. 2021;274(6):954-961.
8. HerniaSurge Group. Update of the international HerniaSurge guidelines for groin hernia management. *BJS Open*. 2023;7(5).
9. Simons MP, Aufenacker T, Bay-Nielsen M, Bouillot JL, Campanelli G, Conze J, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia*. 2009;13(4):343-403.
10. Köckerling F, Simons MP. Current concepts of inguinal hernia repair. *Visc Med*. 2018;34(2):145-150.
11. Bittner R, Montgomery MA, Arregui ME, Bansal VK, Bingener J, Bisgaard T, et al. Update of Guidelines for Laparoscopic Treatment of Ventral and Inguinal Hernias (International Endohernia Society). *Surg Endosc*. 2019;33(10):3069-3139.
12. Mitra A, Marda H, Chandak U. A comparative study of laparoscopic (TEP) and open inguinal hernia repair (Lichtenstein method): a prospective analytical study. *Asian J Res Surg*. 2021;4(2):183-190.
13. Choudhary S, Soni H, Mehta JM, Kalia S. A prospective comparative study of outcome between open Lichtenstein versus laparoscopic repair of inguinal hernia. *Int J Res Med Sci*. 2021;9(5):1417-1421.
14. Ugraiah AB, Shyam S, Shivamalavaiah M. A comparative study of laparoscopic technique versus open repair for inguinal hernia. *Int Surg J*. 2020;7:3480-3485.
15. Vyas PH, Parmar KD, Patel DG, Bansal A, Puthawala AS. Comparative study of clinical outcome of laparoscopic total extraperitoneal repair versus Lichtenstein repair in inguinal hernia. *Indian J Appl Basic Med Sci*. 2021;23(36).
16. HerniaSurge Group. Update of the international HerniaSurge guidelines for groin hernia management. *BJS Open*. 2023;7(5):zrad080.
17. Sudheer KN, Chandrashekar N. A comparative study between Open Lichtenstein mesh repair and laparoscopic totally extraperitoneal repair of inguinal hernia. *Res J Med Sci*. 2024;18:82-86.