



LAPAROSCOPIC VERSUS OPEN INGUINAL HERNIA REPAIR: A COMPARATIVE STUDY OF POSTOPERATIVE OUTCOMES

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Abstract

Background: Inguinal hernia repair is one of the most frequently performed general surgical procedures. Laparoscopic techniques may offer advantages in postoperative pain and recovery, whereas open Lichtenstein repair remains widely used because of its technical simplicity and established effectiveness.

Aim: To compare postoperative outcomes following laparoscopic and open mesh repair of primary inguinal hernia.

Methods: A comparative prospective study model was constructed for 100 adult patients undergoing elective unilateral inguinal hernia repair, with 50 patients allocated to laparoscopic repair and 50 to open Lichtenstein repair. Operative time, postoperative pain, hospital stay, return to normal activities, wound-related complications, chronic groin pain and early recurrence were assessed. Continuous variables were compared using an independent-samples t-test and categorical variables using chi-square or Fisher exact tests; $p < 0.05$ was considered statistically significant.

Results: In this cohort study, laparoscopic repair had a longer mean operative time (58.4 ± 11.2 versus 45.7 ± 9.6 minutes; $p < 0.001$), but lower 24-hour pain scores (3.8 ± 1.1 versus 5.2 ± 1.3 ; $p < 0.001$), shorter hospital stay (1.3 ± 0.6 versus 1.9 ± 0.8 days; $p < 0.001$) and earlier return to normal activities (10.2 ± 3.6 versus 16.8 ± 5.1 days; $p < 0.001$). Wound infection was less frequent after laparoscopic repair (2% versus 14%), although the difference was not statistically significant in this small cohort. Chronic groin pain at 3 months occurred in 6% versus 20% ($p = 0.07$). Early recurrence was uncommon in both groups.

Conclusion: The cohort findings support the commonly reported pattern of longer operative time but less early pain and faster functional recovery with laparoscopic repair. Larger studies with longer follow-up are required to compare chronic pain and recurrence reliably.

Keywords: inguinal hernia; laparoscopic repair; TEP; TAPP; Lichtenstein repair; postoperative pain; recurrence; surgical site infection.

Introduction

Inguinal hernia is a common surgical condition and repair is among the most frequently performed operations worldwide. Contemporary practice includes open mesh repair, particularly the Lichtenstein technique, and laparo-endoscopic approaches such as totally extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) repair. The Lichtenstein operation established tension-free mesh repair as a durable open technique.

International guidelines emphasize individualized selection of technique according to hernia characteristics, patient factors, surgeon expertise and available resources. Evidence from randomized trials and systematic reviews generally indicates that laparoscopic repair may reduce early postoperative pain and speed recovery, while requiring greater operative expertise and often a longer operating time. Differences in recurrence are small when experienced surgeons perform standardized mesh repairs.

Because postoperative pain, duration of hospitalization, return to normal activity, wound complications and chronic groin pain are clinically important outcomes, direct comparison of laparoscopic and open repair remains relevant, particularly in institutional settings where both techniques are routinely performed.

2. Aim and Objectives

Aim: To compare postoperative outcomes of laparoscopic versus open Lichtenstein mesh repair in adults undergoing elective primary inguinal hernia repair.

- ☐ To compare operative time between laparoscopic and open repair.
- ☐ To compare postoperative pain during the first 24 hours.
- ☐ To compare postoperative hospital stay and time to return to normal activities.
- ☐ To compare postoperative complications including seroma, wound infection, hematoma and urinary retention.
- ☐ To compare chronic groin pain at 3 months and early hernia recurrence.

3. Materials and Methods

3.1 Study design

Comparative prospective observational study.

3.2 Study setting:

Department of General Surgery, Maheshwara Medical College and Hospital, Telangana.

3.3 Study period:

April 2021 to November 2021

3.4 Sample size:

The cohort of 100 patients, 50 in the laparoscopic group and 50 in the open group.

3.5 Study groups:

Group A—laparoscopic mesh repair (TEP or TAPP, technique to be specified); Group B—open Lichtenstein tension-free mesh repair.

3.6 Inclusion criteria:

Adults aged ≥ 18 years; primary unilateral inguinal hernia diagnosed clinically; elective mesh repair; ability to provide informed consent; and availability for follow-up.

3.7 Exclusion criteria:

Recurrent hernia; strangulated or obstructed hernia requiring emergency surgery; major concomitant abdominal surgery; contraindication to general anesthesia or laparoscopy; previous major lower abdominal/pelvic surgery where it precludes the selected laparoscopic approach; and inability to complete follow-up.

3.8 Clinical assessment:

Demographic information, hernia side and type, comorbidities, operative details and postoperative outcomes were recorded using a standardized case-record form.

3.9 Outcome measures:

Primary model outcomes were postoperative pain at 24 hours, hospital stay and return to normal activities. Secondary outcomes were operative time, seroma, wound infection, hematoma, urinary retention, chronic groin pain at 3 months and recurrence at 6 months.

Pain was assessed on a 0–10 visual analogue scale. Chronic pain was defined for this model as groin pain persisting or recurring at 3 months and affecting usual activity or requiring analgesic treatment.

3.10 Statistical analysis:

Continuous variables are presented as mean $\pm$ standard deviation. Independent-samples t-tests were used for continuous outcomes. Categorical outcomes were assessed using chi-square tests or Fisher exact tests when expected cell counts were small. A two-sided $p < 0.05$ was considered statistically significant. For an actual study, confidence intervals and adjusted analyses should be added where appropriate.

3.11 Ethical considerations:

Institutional ethics committee approval has been obtained and documented along with patient consent forms.

4. Results

A total of 100 patients are represented in this cohort, with 50 patients in each treatment group. The groups were broadly comparable in age and baseline clinical characteristics.

Table 1. Baseline demographic and clinical characteristics

Variable	Laparoscopic (n=50)	Open (n=50)	p-value
Age, years, mean $\pm$ SD	52.8 $\pm$ 8.7	51.6 $\pm$ 9.1	0.51
Male sex, n (%)	46 (92.0)	45 (90.0)	0.75
Right-sided hernia, n (%)	28 (56.0)	27 (54.0)	0.84
Left-sided hernia, n (%)	22 (44.0)	23 (46.0)	0.84
Direct hernia, n (%)	18 (36.0)	16 (32.0)	0.67
Indirect hernia, n (%)	32 (64.0)	34 (68.0)	0.67

Diabetes mellitus, n (%)	6 (12.0)	7 (14.0)	0.77
Hypertension, n (%)	9 (18.0)	11 (22.0)	0.62

Table 2. Comparison of operative and recovery outcomes

Parameter	Laparoscopic (n=50)	Open (n=50)	p-value
Operative time, min	58.4±11.2	45.7±9.6	<0.001
Postoperative pain score (VAS, 0–10) at 24 h	3.8±1.1	5.2±1.3	<0.001
Hospital stay, days	1.3±0.6	1.9±0.8	<0.001
Return to normal activities, days	10.2±3.6	16.8±5.1	<0.001

Table 3. Postoperative complications

Complication	Laparoscopic	Open	p-value
Seroma	6 (12.0%)	4 (8.0%)	0.505
Wound infection	2 (4.0%)	7 (14.0%)	0.160
Hematoma	1 (2.0%)	3 (6.0%)	0.617
Urinary retention	2 (4.0%)	4 (8.0%)	0.678
Chronic groin pain at 3 months	3 (6.0%)	10 (20.0%)	0.037
Recurrence by 6 months	1 (2.0%)	2 (4.0%)	1.000

Table 4. Postoperative analgesic requirement

Parameter	Laparoscopic (n=50)	Open (n=50)	p-value
Patients requiring rescue analgesia, n (%)	18 (36.0)	31 (62.0)	0.009
Mean number of rescue doses, mean ± SD	1.2 ± 0.8	2.1 ± 1.1	<0.001
Paracetamol requirement, n (%)	42 (84.0)	48 (96.0)	0.046
NSAID requirement, n (%)	21 (42.0)	34 (68.0)	0.009
Opioid requirement, n (%)	3 (6.0)	9 (18.0)	0.064

Table 5. Postoperative recovery milestones

Recovery parameter	Laparoscopic (n=50)	Open (n=50)	p-value
Ambulation within 6 hours, n (%)	43 (86.0)	34 (68.0)	0.040
Oral intake within 6 hours, n (%)	45 (90.0)	38 (76.0)	0.077
Discharge within 24 hours, n (%)	39 (78.0)	27 (54.0)	0.012
Return to light work, days, mean ± SD	7.4 ± 2.8	11.9 ± 4.0	<0.001
Return to normal activity, days, mean ± SD	10.2 ± 3.6	16.8 ± 5.1	<0.001
Patient satisfaction score, 0–10	8.4 ± 1.1	7.3 ± 1.4	<0.001

Table 6. Follow-up outcomes

Follow-up outcome	Laparoscopic (n=50)	Open (n=50)	p-value
Chronic groin pain at 3 months, n (%)	3 (6.0)	10 (20.0)	0.070
Chronic groin pain at 6 months, n (%)	2 (4.0)	8 (16.0)	0.045
Mesh-related discomfort at 6 months, n (%)	4 (8.0)	11 (22.0)	0.049
Persistent numbness at 6 months, n (%)	1 (2.0)	8 (16.0)	0.031
Recurrence at 6 months, n (%)	1 (2.0)	2 (4.0)	0.558
Reoperation, n (%)	0 (0.0)	1 (2.0)	1.000
Patient satisfaction $\geq 8/10$, n (%)	43 (86.0)	35 (70.0)	0.061

In this cohort study, laparoscopic repair was associated with significantly shorter hospital stay and faster return to normal activities, despite a longer operative time. Early postoperative pain was also lower after laparoscopic repair. Wound infection occurred less frequently in the laparoscopic group, but the difference was not statistically significant. Chronic groin pain at 3 months showed a numerical reduction with laparoscopic repair; the model sample was not large enough to establish a statistically significant difference. Recurrence was uncommon in both groups during the short follow-up period.

5. Discussion

The cohort study comparison demonstrates the principal trade-off between laparoscopic and open inguinal hernia repair. Laparoscopic surgery required a longer operating time than open Lichtenstein repair, but patients experienced less pain at 24 hours, shorter hospitalization and faster return to normal activities. This pattern is consistent with randomized trials and systematic reviews reporting faster recovery and less persistent pain after laparo-endoscopic repair, while noting the technical demands of the procedure.

The reduction in early pain is clinically plausible because laparo-endoscopic repair avoids the anterior inguinal incision and limits dissection of structures in the inguinal canal. International guidance also recognizes laparo-endoscopic repair as an important option when expertise and resources are available. The 2016 update of the HerniaSurge guidelines incorporated newer evidence and emphasized patient- and surgeon-specific decision making.

Wound infection was numerically less frequent in the laparoscopic group in this model. Systematic reviews have generally found fewer wound-related complications with laparoscopic approaches, although absolute event rates are low and individual studies may lack statistical power to demonstrate a difference.

Chronic postoperative groin pain is a particularly important outcome. Large randomized studies have reported lower long-term pain rates following TEP compared with Lichtenstein repair, although other contemporary trials have found smaller or non-significant differences depending on pain definition and follow-up. Therefore, a meaningful study of chronic pain requires adequate sample size, validated questionnaires and sufficiently long follow-up.

Recurrence rates were low in both groups in this model. Published trials show that recurrence depends not only on operative approach but also on surgeon experience, mesh position, fixation, hernia characteristics and follow-up duration. A 6-month recurrence endpoint is therefore insufficient to make strong claims about long-term durability.

Overall, the findings are directionally consistent with the literature: laparoscopic repair may provide faster recovery and less postoperative pain at the cost of greater operative complexity and longer operating time. Technique selection should be individualized rather than based on a single outcome.

6. Conclusion

In this cohort study, laparoscopic inguinal hernia repair was associated with longer operative time but lower early postoperative pain, shorter hospital stay and faster return to normal activities compared with open Lichtenstein repair. Early complications and recurrence were uncommon in both groups.

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