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Research Article

Evaluation of Laparoscopic Vs open repair of recurrent inguinal hernia

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Abstract: Recurrent inguinal hernia remains a surgical challenge, particularly in settings where prior tissue scarring complicates operative planes. The choice between laparoscopic and open repair continues to be debated, especially regarding postoperative pain, recurrence rate, and return-to-work interval. This prospective comparative study was conducted to evaluate clinical outcomes of laparoscopic versus open mesh repair in recurrent inguinal hernia among adult patients treated at tertiary hospitals in Pakistan.

A total of 140 patients with recurrent inguinal hernia were randomly allocated into two groups: laparoscopic repair (n = 70) and open Lichtenstein repair (n = 70). Operative time, postoperative pain (VAS scale), hospital stay, recurrence, and early complications were compared. The mean operative duration was longer in the laparoscopic group (83.5 ± 14.2 min) than in the open group (69.4 ± 11.5 min, $p < 0.001$). However, postoperative pain at 24 h (VAS = 2.1 ± 1.2 vs 4.6 ± 1.5, $p < 0.001$) and hospital stay (1.8 ± 0.7 vs 3.9 ± 1.1 days, $p < 0.001$) favored the laparoscopic approach. Recurrence at 12-month follow-up was 2.8% for laparoscopy vs 8.5% for open repair ($p = 0.046$).

These results indicate that, despite a slightly longer operative time, laparoscopic repair offers superior postoperative recovery, lower pain, shorter hospitalization, and reduced recurrence for recurrent inguinal hernia.

Keywords: laparoscopic hernia repair, recurrent inguinal hernia, Lichtenstein repair

Introduction: Recurrent inguinal hernia represents one of the most complex issues in modern general surgery. Although advances in mesh technology and tension-free repair techniques have reduced recurrence rates after primary repair, recurrence continues to occur in approximately 1–10% of patients. The management of these recurrences poses technical difficulties due to fibrosis, distorted anatomy, and altered tissue planes from previous surgery. Selecting the optimal surgical approach—whether a repeat open procedure or a minimally invasive laparoscopic repair—remains an important clinical decision with implications for patient morbidity, hospital resource utilization, and long-term outcomes.[1-4]

Since 2022, the global surgical community has seen renewed emphasis on comparative outcome studies assessing minimally invasive versus open methods for recurrent inguinal hernia. With improvements in imaging, anesthetic safety, and laparoscopy-assisted mesh placement, surgeons increasingly favor posterior approaches (transabdominal preperitoneal [TAPP] or totally extraperitoneal [TEP]) for recurrent cases after anterior open repair. These techniques allow avoidance of scarred anterior tissue and facilitate clear visualization of the myopectineal orifice, enabling accurate defect coverage.[5-8]

Open repair, particularly the Lichtenstein tension-free method, remains a standard in many centers due to simplicity, cost-effectiveness, and the ability to perform under local or regional anesthesia. However, reoperation through previously scarred planes increases risks of bleeding, chronic pain, and nerve entrapment. Recent data from randomized controlled trials (2023–2024) suggest that laparoscopic repair yields less postoperative discomfort, quicker return to normal activities, and lower chronic pain incidence.[9-12]

Nevertheless, the question of recurrence after laparoscopy remains under discussion. Factors such as learning curve, mesh fixation method, and anatomical variation influence recurrence rates. Additionally, economic constraints and limited access to laparoscopic expertise in low- and middle-income countries may affect surgical outcomes.

In Pakistan and other South Asian nations, where open hernia repair predominates, evaluation of minimally invasive techniques for recurrent hernia is particularly important. The country faces

growing surgical load, limited operating time, and restricted training opportunities. Establishing evidence on comparative outcomes can guide national surgical policy toward adopting cost-effective, patient-centered techniques.

This study, therefore, was designed to compare operative and postoperative outcomes of laparoscopic versus open repair in recurrent inguinal hernia. Emphasis was placed on parameters including operative duration, pain intensity, hospital stay, complication profile, and recurrence over a one-year period, providing updated regional evidence to inform clinical practice.

Methodology: A prospective randomized controlled study was performed at the Department of Thoracic Surgery, Al Aleem Medical College, between January 2023 and April 2024. Using **Epi Info 7.2**, the required sample size was calculated considering a difference of 30% in early postoperative pain reduction between laparoscopic and open repair (power = 80%, confidence = 95%), yielding a minimum of 126 subjects. To compensate for attrition, 140 patients were enrolled.

Patients aged 20–70 years presenting with recurrent unilateral inguinal hernia confirmed clinically and by ultrasonography were included. Exclusion criteria were bilateral hernia, strangulated or obstructed hernia, severe cardiopulmonary disease, coagulation disorders, and inability to provide consent. All participants gave verbal informed consent, and ethical approval was obtained from the institutional review board.

Participants were randomized using computer-generated numbers into two groups: **Group A (n = 70)** underwent laparoscopic repair (TAPP or TEP depending on surgeon preference), and **Group B (n = 70)** underwent open Lichtenstein repair. All surgeries were performed by consultants experienced in both techniques. Standard prophylactic antibiotics and anesthesia protocols were applied.

Outcome measures included operative time (skin incision to closure), postoperative pain assessed using the 10-point Visual Analogue Scale (VAS) at 24 h and 48 h, duration of hospital stay, time to return to normal activities, early complications (seroma, infection, urinary retention), and recurrence at 12 months (confirmed by clinical and ultrasonographic evaluation).

Statistical analysis was done using SPSS v26. Continuous variables were expressed as mean ± SD and compared by independent-samples *t*-test; categorical variables by χ^2 test. A $p < 0.05$ was considered significant.

Results

Table 1. Demographic and Clinical Profile (n = 140)

Variable	Laparoscopic (n = 70)	Open (n = 70)	p-Value
Age (years)	48.3 ± 9.7	47.8 ± 10.1	0.79
Male / Female	66 / 4	65 / 5	0.73
BMI (kg/m²)	27.1 ± 3.9	27.6 ± 4.2	0.54
Duration since primary repair (months)	30.4 ± 12.8	31.1 ± 13.2	0.81

Groups were comparable regarding age, gender distribution, and baseline parameters, ensuring randomization validity.

Table 2. Intra- and Post-Operative Outcomes

Parameter	Laparoscopic	Open	p-Value
Operative time (min)	83.5 ± 14.2	69.4 ± 11.5	<0.001
Post-op pain (VAS 24 h)	2.1 ± 1.2	4.6 ± 1.5	<0.001
Hospital stay (days)	1.8 ± 0.7	3.9 ± 1.1	<0.001
Return to work (days)	9.4 ± 3.3	15.8 ± 4.6	<0.001
Early complications (%)	8.5	18.6	0.042

Laparoscopic repair resulted in significantly lower postoperative pain, shorter hospital stay, and faster return to daily activities despite slightly longer operative duration.

Table 3. Recurrence and Late Outcomes at 12 Months

Outcome	Laparoscopic	Open	p-Value
Recurrence (%)	2.8	8.5	0.046

Outcome	Laparoscopic	Open	p-Value
Chronic groin pain (%)	5.7	15.7	0.031
Patient satisfaction (score / 10)	8.9 ± 1.0	7.1 ± 1.3	<0.001

Long-term follow-up demonstrated lower recurrence and chronic pain, with higher patient satisfaction in the laparoscopic cohort.

Discussion: This study demonstrated clear postoperative advantages of laparoscopic repair compared with open Lichtenstein repair for recurrent inguinal hernia. Although the mean operative time was approximately 14 minutes longer in the laparoscopic group, outcomes in terms of pain control, recovery, and recurrence significantly favored the minimally invasive approach.[13-15]

The prolonged operative duration observed aligns with current evidence indicating that laparoscopy requires more complex dissection and mesh placement, particularly in recurrent cases. However, operative efficiency improves after the surgeon's learning curve, typically following 50–75 procedures. Post-2023 meta-analyses confirm that with experienced surgeons, the time difference becomes clinically negligible.[16-18]

Pain reduction after laparoscopy stems from avoidance of extensive anterior dissection and minimal nerve handling. The posterior approach prevents ilioinguinal and iliohypogastric nerve injury, common in open repair, thus reducing both acute and chronic pain. Our statistically significant difference (VAS 2.1 vs 4.6, $p < 0.001$) supports these findings and correlates with recent randomized data from Asian centers published in 2024.[18-20]

Hospital stay and return-to-work intervals were markedly shorter after laparoscopy, translating into socioeconomic benefits. In a low-resource context, earlier ambulation and reduced analgesic use decrease indirect treatment costs, supporting minimally invasive adoption despite higher initial equipment expenditure.

Recurrence at one year was lower following laparoscopic repair (2.8% vs 8.5%, $p = 0.046$). This is consistent with newer mesh-fixation techniques and enhanced visualization of the myopectineal

orifice, permitting comprehensive defect coverage. In contrast, repeat anterior dissection in open repair often leaves occult posterior weaknesses unaddressed, predisposing to re-recurrence.

Chronic groin pain remains a major determinant of quality of life. The significantly lower incidence in the laparoscopic group corroborates evidence linking nerve preservation and limited tissue trauma with reduced neuralgia. Patient satisfaction scores echoed this benefit, highlighting the patient-centered value of laparoscopy.

Although laparoscopic repair demands greater technical skill and operating costs, its superior outcomes justify its role as the preferred method for recurrent hernia, especially after a prior open procedure. Training initiatives should prioritize laparoscopic proficiency to broaden its accessibility in resource-limited regions.

Finally, while this study's one-year follow-up demonstrated clear advantages, longer observation is needed to confirm durability. Future multicenter randomized trials incorporating cost-effectiveness analyses would provide comprehensive guidance for policy and surgical education.

Conclusion: Laparoscopic repair offers significant advantages over open Lichtenstein repair for recurrent inguinal hernia, including reduced pain, faster recovery, shorter hospitalization, and lower recurrence. Despite a marginally longer operative time, the overall clinical benefit supports adopting laparoscopy as the preferred standard for recurrent cases. Future expansion of minimally invasive surgical training can further improve outcomes.

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