Volume 3, Issue 4, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

COMPARISON OF LAPAROSCOPIC TRANSABDOMINAL PREPERITONEAL (TAPP) VERSUS LICHTENSTEIN REPAIR FOR BILATERAL INGUINAL HERNIAS

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DOI: https://doi.org/10.5281/zenodo.17118909

Keywords
Hernia, Inguinal; Liechtenstein; Laparoscopy; Treatment Outcome; Postoperative Complications

Article History
Received: 15 May 2025
Accepted: 21 June 2025
Published: 29 June 2025

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Abstract

Background: Inguinal hernias account for the majority of abdominal wall hernias, with up to 20% of patients presenting bilaterally. Surgical management includes open Lichtenstein mesh repair and laparoscopic transabdominal preperitoneal (TAPP) repair, each with distinct advantages. This study compares postoperative outcomes of these two approaches in bilateral inguinal hernia repair, focusing on complications such as seroma, wound infection, and scrotal hematoma. The findings aim to support evidence-based surgical decision-making and improve patient care. Materials and Methods: This randomized controlled trial enrolled 280 patients with primary bilateral inguinal hernias, randomized into Lichtenstein (n=140) and laparoscopic TAPP (n=140) groups. Standardized surgical techniques and perioperative protocols were applied. Outcomes assessed included operative time, hospital stay, and postoperative complications (wound infection, seroma, scrotal hematoma), with data analyzed using SPSS v23. Results: A total of 280 patients were equally randomized to Lichtenstein and TAPP groups with comparable baseline characteristics. Operative time was significantly longer in TAPP (128.6 ± 15.4 vs. 94.3 ± 10.2 min, $p < 0.001$), but hospital stay was shorter (1.7 ± 0.6 vs. 2.8 ± 0.9 days, $p < 0.001$). Postoperative complications were fewer in the TAPP group, with significantly lower rates of seroma ($p = 0.04$) and wound infection ($p = 0.02$), though scrotal hematoma showed no significant difference. Conclusion: Laparoscopic TAPP repair demonstrated clear benefits over open Lichtenstein repair in bilateral inguinal hernias, with shorter hospitalization and fewer wound-related complications, despite longer operative times. These results endorse TAPP as a safe and effective option, while emphasizing the need for tailored surgical decision-making.

INTRODUCTION

A hernia occurs when a viscus, or part of it, protrudes through an abnormal defect in the containing cavity wall. Approximately 75% of abdominal wall hernias arise in the groin region, making inguinal hernias the most common type.[1] The global prevalence of hernias is estimated to

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ISSN: (e) 3007-1607 (p) 3007-1593

range from 1% to 5%. Unilateral inguinal hernias are more frequent, although up to 20% of patients present with bilateral disease.[2]

Multiple factors predispose to inguinal hernia formation, including obesity, chronic cough, constipation with straining, and heavy lifting, all of which elevate intra-abdominal pressure.[3] The fundamental pathology involves weakening of the fibromuscular structures of the abdominal wall, with repair aiming to reinforce the posterior wall of the inguinal canal.[1]

Both open and laparoscopic approaches are available for hernia repair. The Lichtenstein tension-free mesh repair, introduced in 1984, remains the most widely performed open procedure.[4] This involves the placement of a mesh prosthesis anterior to the transversalis fascia.[5] In contrast, laparoscopic techniques, particularly the transabdominal preperitoneal (TAPP) approach, have gained increasing popularity. In TAPP, the prosthetic mesh is placed in the preperitoneal space, posterior to the transversalis fascia. [5,6]

Several studies suggest that laparoscopic repair offers advantages over open repair, including reduced postoperative pain, earlier return to routine activities, and faster overall recovery. [7,8] However, the optimal surgical strategy for bilateral inguinal hernia remains a subject of ongoing debate.[9] The present study was designed to compare outcomes of Lichtenstein mesh repair and laparoscopic TAPP repair in patients with bilateral inguinal hernias, focusing specifically on postoperative complications such as seroma formation, wound infection, and scrotal hematoma. Findings from this study aim to guide surgical decision-making and contribute to improving standards of care.

MATERIALS AND METHODS:

This randomized controlled trial was conducted in the Department of General Surgery, Federal Government Polyclinic Hospital, Islamabad, over an eight-month period (September 2024 to April 2025), following approval from the Institutional Ethical Review Committee.

A total of 280 patients were enrolled, with 140 patients allocated to each group. The sample size was calculated using the WHO sample size calculator, which determined a minimum of 140 participants per arm. Recruitment was performed through non-probability consecutive sampling.

Inclusion criteria comprised patients aged 18–70 years with primary bilateral inguinal hernias confirmed on ultrasonography, with no prior history of abdominal surgery. Exclusion criteria included contraindications to general anesthesia or laparoscopy, obstructed or strangulated hernias, recurrent hernias, diabetes mellitus, and patients on immunosuppressive therapy.

Written informed consent was obtained from all participants. Demographic and baseline data including name, age, sex, body mass index (BMI), and contact information were documented on a structured proforma. Randomization was performed using a computer-generated lottery method. Patients in Group A underwent open Lichtenstein mesh repair, while those in Group B received laparoscopic TAPP repair. All surgeries were performed by the same surgical team to minimize inter-operator variability.

The Lichtenstein repair was performed using the standard technique, in which a polypropylene mesh was placed ventral to the transversalis fascia and fixed with prolene sutures, without infiltration of local anesthetic. The TAPP repair was performed under general anesthesia, with pneumoperitoneum established and three trocars placed. The hernia sac was identified, isolated, and reduced, followed by placement of two polypropylene meshes (15 × 10 cm) in both preperitoneal spaces and fixation. Perioperative management protocols were standardized for both groups.

Outcome measures included operative time (minutes), length of hospital stay (days), and postoperative complications such as wound infection (within 48 hours to 10 days), seroma formation (within 48 hours to 14 days), and scrotal hematoma (within 48 hours).

Data were analyzed using SPSS version 23.0. Continuous variables (age, BMI, operative time, hospital stay) were expressed as mean ± standard deviation (SD). Categorical variables (sex, wound infection, seroma, hematoma) were presented as frequencies and percentages. Data distribution was assessed using the Shapiro–Wilk test. Independent sample *t*-tests were used for continuous variables, while chi-square tests were applied to categorical

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ISSN: (e) 3007-1607 (p) 3007-1593

variables. A *p*-value ≤ 0.05 was considered statistically significant, with a 95% confidence interval.

RESULTS:

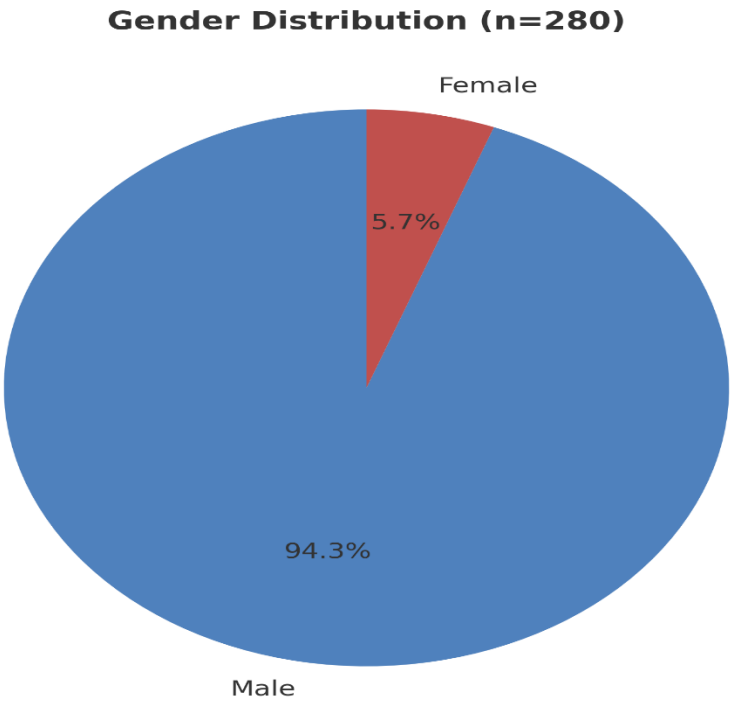
A total of 280 patients with bilateral inguinal hernias were included, with 140 patients undergoing Lichtenstein repair (Group A) and 140 undergoing laparoscopic TAPP repair (Group B). The two groups were comparable with respect to age, gender, and BMI as shown in Table 1. The mean age of patients was 49.3 ± 12.1 years in Group A and 48.7 ± 11.8 years in Group B (p = 0.71). The majority of patients were male (94.6% vs. 93.2%, p = 0.64) as shown in Figure 1.

Table 1: Baseline characteristics of patients

VARIABLE	LICHTENSTEIN (N=140)	TAPP (N=140)	p-VALUE*
Mean Age (years)	49.3 ± 12.1	48.7 ± 11.8	0.71
Male : Female ratio	133:7	131:9	0.64
Mean BMI (kg/m²)	24.8 ± 3.4	25.1 ± 3.1	0.49

* p ≤ 0.05 was considered statistically significant.

Figure 1: Male vs Female distribution



The mean operative time was significantly longer in the TAPP group (128.6 ± 15.4 min) compared to the Lichtenstein group (94.3 ± 10.2 min, p < 0.001). The mean hospital stay was significantly shorter in the TAPP group (1.7 ± 0.6 days) compared to the Lichtenstein group (2.8 ± 0.9 days, p < 0.001) as shown in Table 2. Comparison of the operative time and hospital stay is shown in Figure 2.

Table 2: Operative and postoperative outcomes

OUTCOME	LICHTENSTEIN (N=140)	TAPP (N=140)	p-VALUE*
Mean operative time (min)	94.3 ± 10.2	128.6 ± 15.4	<0.001
Mean hospital stay (days)	2.8 ± 0.9	1.7 ± 0.6	<0.001

* p ≤ 0.05 was considered statistically significant.

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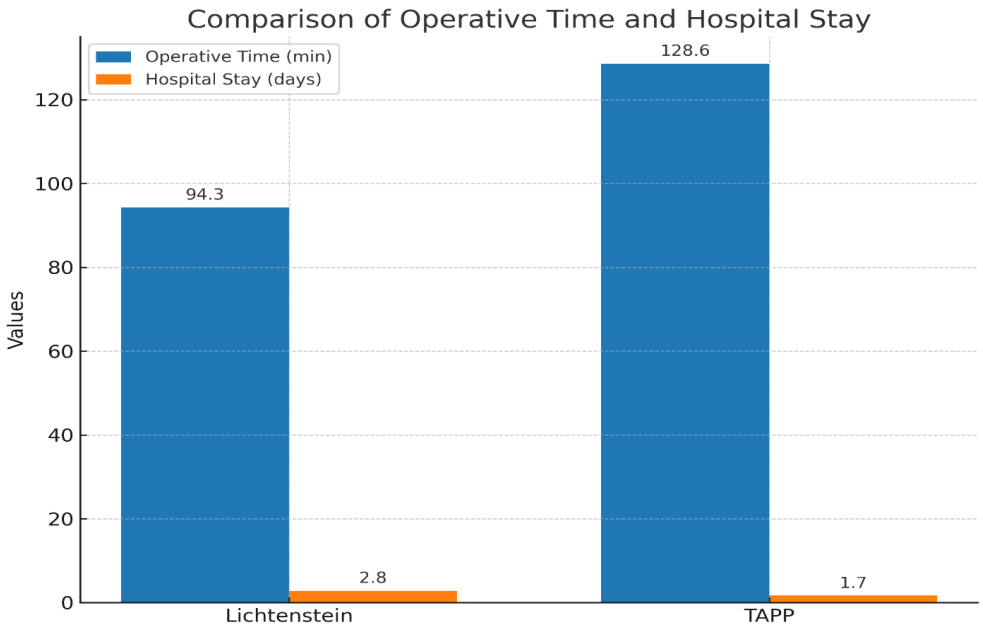

Figure 2: Mean operative time and hospital stay in both groups

The incidence of postoperative complications was lower in the TAPP group. Seroma formation was observed in 15 patients (10.7%) in Group A compared to 6 patients (4.3%) in Group B (p = 0.04). Wound infection occurred in 12 patients (8.6%) in Group A compared to 3 patients (2.1%) in Group B (p = 0.02). Scrotal hematoma developed in 10 patients (7.1%) in Group A versus 5 patients (3.6%) in Group B (p = 0.18) as shown in Table 3. Incidence of postoperative complications in both groups is shown in Figure 3.

Table 3: Postoperative complications

COMPLICATION	LICHTENSTEIN (N=140)	TAPP (N=140)	p-VALUE*
Seroma formation	15 (10.7%)	6 (4.3%)	0.04
Wound infection	12 (8.6%)	3 (2.1%)	0.02
Scrotal hematoma	10 (7.1%)	5 (3.6%)	0.18

* $p \leq 0.05$ was considered statistically significant.

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ISSN: (e) 3007-1607 (p) 3007-1593

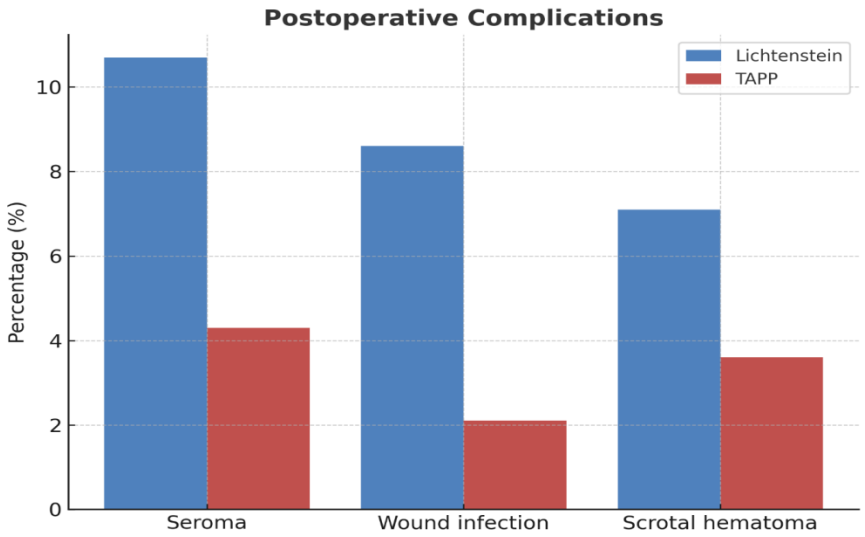

Figure 3: Incidence of postoperative complications in both groups

DISCUSSION:

Historically, simultaneous bilateral inguinal hernia repair was discouraged due to concerns regarding increased postoperative complications, including pain, wound-related issues, and recurrence.[10] While the relative merits of open versus laparoscopic approaches remain debated, advances in minimally invasive surgery have strengthened the role of laparoscopic repair for bilateral disease. [11,12] Despite its slower adoption, influenced by technical demands, learning curve, and occasional severe complications, laparoscopic repair is increasingly considered a safe and effective option. [12] The Hernia Surgery Group currently recommends single-stage repair using prosthetic mesh for bilateral inguinal hernias. [13]

In this trial comparing open Lichtenstein and laparoscopic TAPP repair, we observed a clear trade-off between operative time and postoperative outcomes. The TAPP group required a longer operative duration (128.6 ± 15.4 vs. 94.3 ± 10.2 minutes; $p < 0.001$), but benefited from significantly shorter hospitalization and lower complication rates.

Our findings regarding increased operative time with TAPP align with published evidence. Schmedt et al. reported mean durations of 65.7 versus 55.5 minutes for TAPP and open repair, respectively ($p = 0.01$). [14] Similarly, Scheuermann et al. noted a mean difference of 6.8 minutes in favor of Lichtenstein repair. [15] Although our operative times were longer, likely reflecting the bilateral nature of cases and institutional learning curve, the trend remains consistent with previous reports.

Hospital stay was significantly reduced in the TAPP group, consistent with other studies. Ielpo et al. demonstrated shorter hospitalization in TAPP patients ($p = 0.001$). [8] Kargar et al. also reported markedly reduced length of stay with TAPP compared to open repair (8.13 ± 2.19 vs. 13.15 ± 1.5 days, $p < 0.001$). [16] This reinforces the advantage of minimally invasive repair in facilitating early postoperative recovery.

Regarding complications, our study confirmed a lower incidence of wound infection and seroma following TAPP repair. Seroma formation was more common after Lichtenstein repair (10.7% vs. 4.3%, $p = 0.04$). Comparable results were observed by Ielpo et al., who reported seromas exclusively in the open group (13.7%), and Jan et al., who reported 4% seromas only in open repair. [8, 17] Kalaycı similarly noted 2.4% seroma formation following open repair, with none in the TAPP group. [18] Conversely, Gomes et al. found no statistically significant difference ($p = 0.67$). [19] These variations likely reflect differences in mesh handling, operative expertise, and perioperative care, but the weight of evidence supports reduced seroma rates with TAPP.

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ISSN: (e) 3007-1607 (p) 3007-1593

Wound infection was significantly higher in the Lichtenstein group (8.6% vs. 2.1%, p = 0.02). This is consistent with findings by Ielpo et al. and Sultan et al., who reported wound infections only in open repair groups. [8, 20] The minimally invasive approach likely reduces infection risk by minimizing groin dissection, reducing tissue trauma, and avoiding large incisions.

Although the difference in scrotal hematoma was not statistically significant in our study (7.1% vs. 3.6%), the trend favored TAPP repair. A systematic review by Schmedt et al. demonstrated significantly lower hematoma rates with laparoscopic approaches compared with open mesh repairs. [14] Our non-significant findings may reflect limited sample size rather than absence of benefit.

Limitations of our study include the relatively short follow-up period, which prevents assessment of long-term outcomes such as chronic pain and recurrence, and the single-center design, which may limit generalizability.

CONCLUSION:

In patients with bilateral inguinal hernias, laparoscopic TAPP repair offers significant advantages over open Lichtenstein repair, including shorter hospital stay and reduced rates of wound-related complications, though at the expense of longer operative time. These findings support the role of TAPP as a safe and effective option for bilateral hernia repair and highlight the importance of individualized surgical decision-making.

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