

A Comparative Study of Intraoperative and Postoperative Outcomes in TEP Hernioplasty Versus Lichtenstein Tension - Free Open Hernioplasty: A Focus on Complications, Recovery and Recurrence

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Abstract: ***Background and Aims:** Inguinal hernia repair is one of the most frequently performed surgeries worldwide, with two primary techniques being Lichtenstein tension - free open hernioplasty and laparoscopic Totally Extraperitoneal (TEP) hernioplasty. The Lichtenstein method, though effective in reducing recurrence, often leads to longer recovery times and higher rates of wound complications. TEP hernioplasty offers a minimally invasive alternative with promises of faster recovery and reduced postoperative pain. This study aims to compare intraoperative and postoperative complications, recovery time, and recurrence rates between these two methods. **Methods:** This prospective, single - center study was conducted at BRD Medical College, Gorakhpur, over a 12 - month period. A total of 51 patients with primary unilateral inguinal hernias (both direct and indirect) were randomized into two groups: TEP hernioplasty and Lichtenstein tension - free open hernioplasty. Data on intraoperative complications, postoperative outcomes, recovery time, and recurrence rates were collected. Ethical approval was obtained from the Institutional Ethics Committee, and informed consent was taken from all participants. Statistical analysis was performed using SPSS version 23.0 with P - values < 0.05 considered statistically significant. **Results:** The TEP group had a significantly longer operative time (128.10 ± 22.993 min) compared to the Lichtenstein group (49.83 ± 9.237 min), but shorter hospital stays (3.19 ± 0.680 vs. 5.13 ± 1.167 days) and quicker return to normal activities (2.52 ± 0.928 vs. 5.40 ± 1.276 days). Postoperative pain was lower in the TEP group (5.52 ± 0.928 vs. 6.67 ± 0.547), though not statistically significant ($P = 0.081$). No significant differences were observed in complications such as bowel or vascular injuries, seroma, hematoma, or recurrence. **Conclusion:** TEP hernioplasty offers advantages in terms of quicker recovery, shorter hospital stays, and reduced postoperative pain, despite a longer operative time. Both techniques demonstrate similar safety profiles with comparable complication and recurrence rates.*

Keywords: Inguinal hernia; TEP hernioplasty; Lichtenstein hernioplasty; postoperative complications, recovery

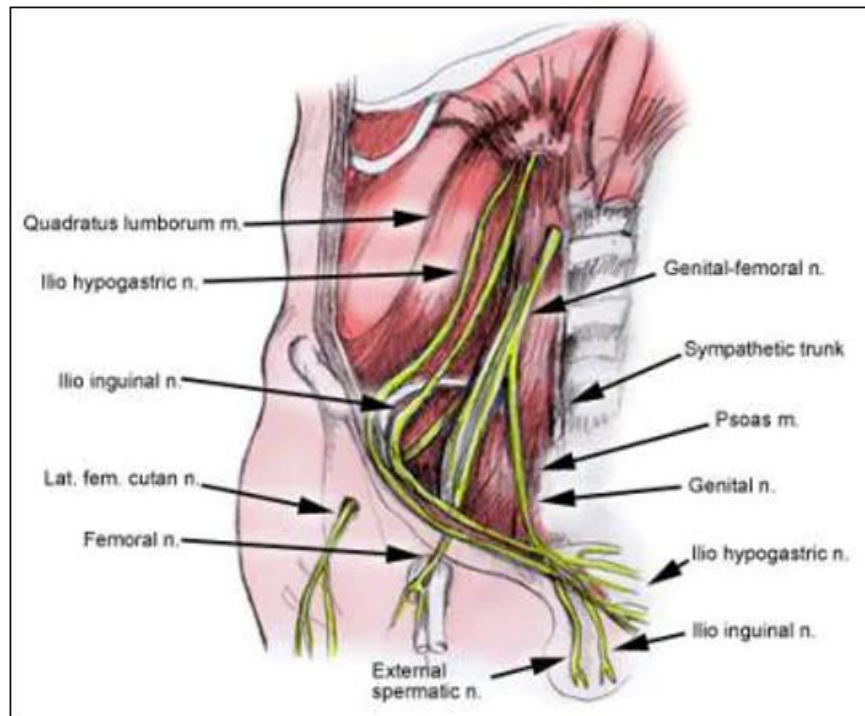
1. Introduction

Inguinal hernia repair is among the most frequently performed surgeries worldwide, constantly evolving with advancements in surgical techniques and materials.¹ Over the years, two primary techniques have emerged as leading options: the traditional Lichtenstein tension - free open hernioplasty and the laparoscopic Totally Extraperitoneal (TEP) hernioplasty.² The Lichtenstein method has long been considered the gold standard for hernia repair due to its simplicity, ease of use, and relatively low recurrence rates. It involves placing a mesh over the hernia defect to reinforce the abdominal wall, which has shown effective results.³ However, the trade - off often comes in the form of postoperative discomfort, longer recovery times, and higher incidences of wound complications.

On the other hand, TEP hernioplasty represents a minimally invasive alternative, gaining popularity for its promise of

reduced postoperative pain, faster recovery, and a lower risk of infection due to its extraperitoneal approach.⁴ Unlike the Lichtenstein method, TEP is performed without entering the abdominal cavity, potentially reducing the risk of visceral injuries.⁵ Patients who undergo TEP hernioplasty are often able to return to normal activities quicker, making it a preferred choice for many surgeons and patients alike.⁶ However, concerns about the risk of intraoperative complications, such as vascular injuries and the recurrence of hernia, still raise questions about its overall efficacy and long - term outcomes.⁷

Despite the perceived advantages of TEP hernioplasty, the debate between the two approaches remains unresolved. There is a need for direct, comprehensive comparisons to determine which method truly offers better intraoperative and postoperative outcomes.⁸ This is particularly important as surgeons look to adopt the safest and most effective techniques to improve patient care.⁹



This Figure Shows Open Inguinal Hernia Repair

The present study aims to provide a detailed comparative analysis of TEP hernioplasty and Lichtenstein tension - free open hernioplasty. Specifically, it will evaluate intraoperative complications, including operative time and the occurrence of visceral or vascular injuries. Additionally, the study will assess postoperative outcomes such as pain, urinary retention, wound seroma, infection, hospital stay duration, time to return to normal activities, and recurrence rates.

By systematically analyzing these factors, this study seeks to offer evidence - based insights into the relative safety and effectiveness of both surgical techniques. The findings aim to guide clinical decision - making and improve patient outcomes in inguinal hernia repair, providing clear recommendations on the optimal surgical approach for managing this common condition.

2. Materials and Methods

This prospective, single - center study was conducted at BRD Medical College, Gorakhpur, over a 12 - month period. The study focused on comparing intraoperative and postoperative outcomes between two widely practiced hernia repair techniques: Totally Extraperitoneal (TEP) hernioplasty and Lichtenstein tension - free open hernioplasty. A total of 51 patients who underwent elective hernia repair and met the inclusion criteria were enrolled in the study.

Study Population:

The study included patients with primary, uncomplicated, unilateral inguinal hernias—both direct and indirect—who underwent elective surgery. Cases involving recurrent hernias were also included. However, patients presenting with irreducible, obstructed, or strangulated hernias were excluded, as well as those with bilateral or sliding hernias. This approach ensured a homogeneous study population,

allowing for a clearer comparison between the two techniques.

Sample Size:

A total of 51 patients who fulfilled the inclusion criteria were enrolled during the study period.

Study Design and Procedure:

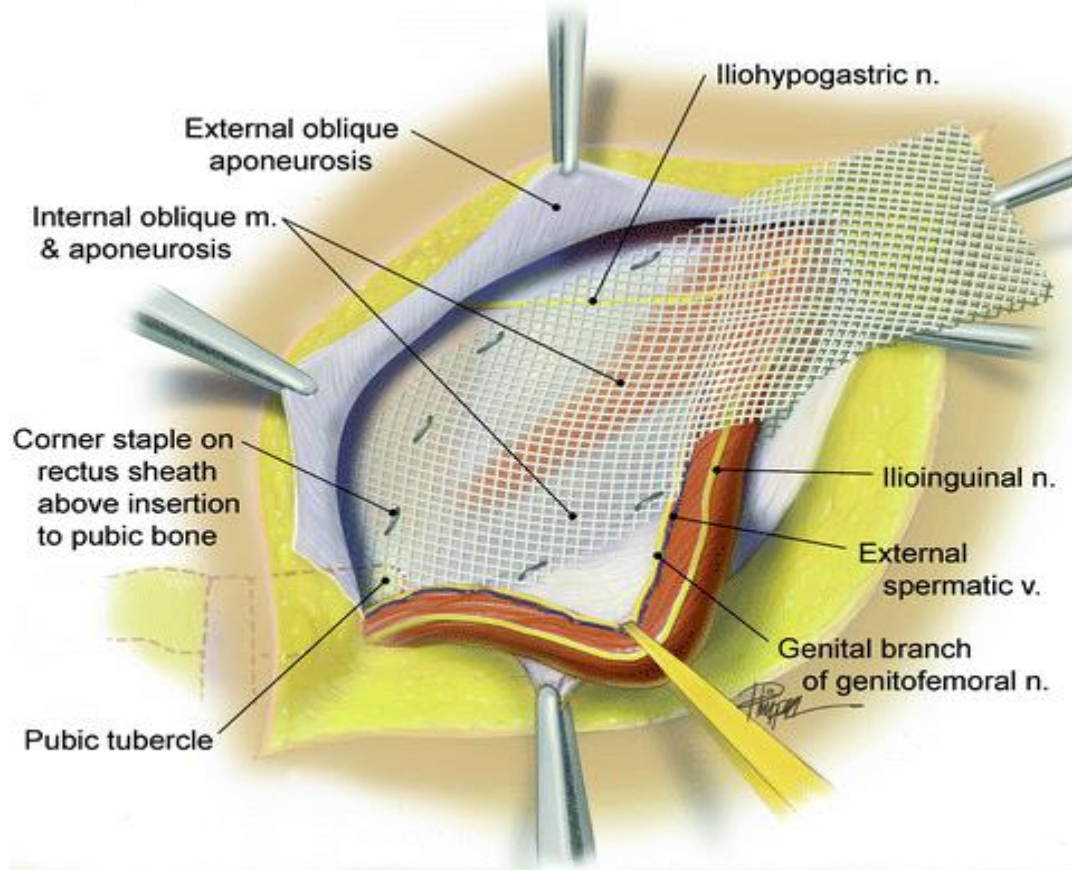
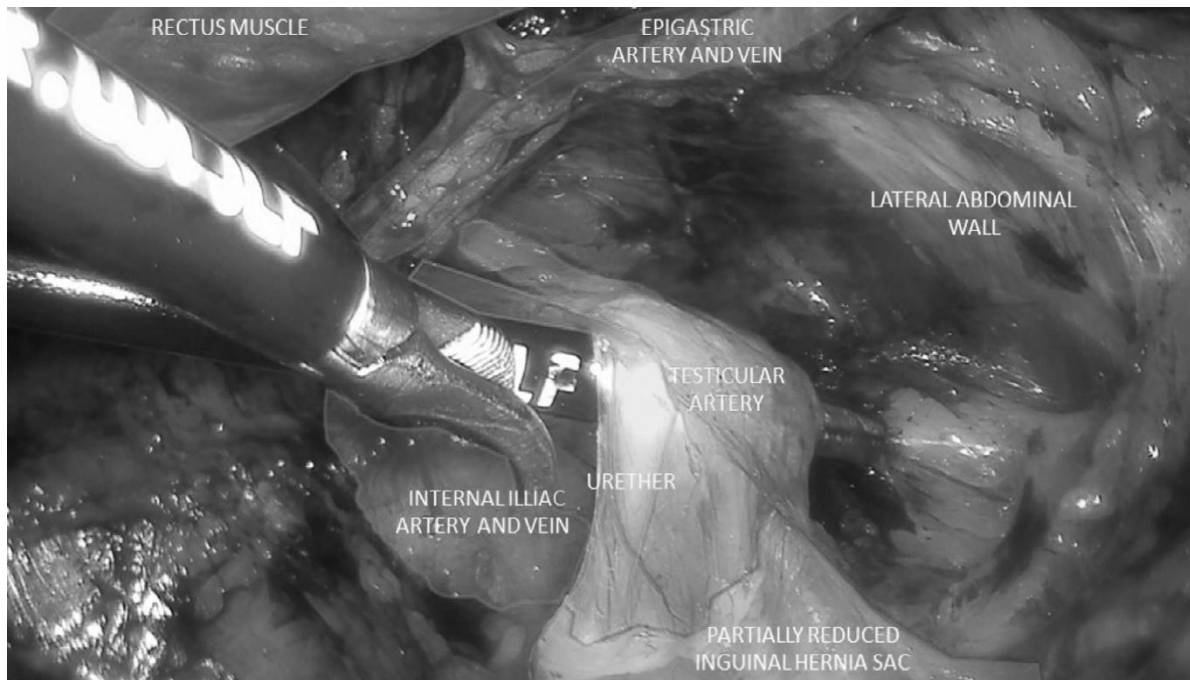
Patients were randomized into two groups: one group undergoing TEP hernioplasty and the other undergoing Lichtenstein tension - free open hernioplasty. Standardized surgical protocols were followed for both procedures to ensure consistency in treatment. Intraoperative parameters such as operative time and the incidence of visceral or vascular injuries were meticulously recorded. Postoperative outcomes, including pain (measured using the Visual Analog Scale), urinary retention, wound seroma, hematoma, infection, bowel complications, hospital stay duration, time to return to normal activities, and recurrence rates, were tracked for each patient.

Ethical Approval and Patient Consent:

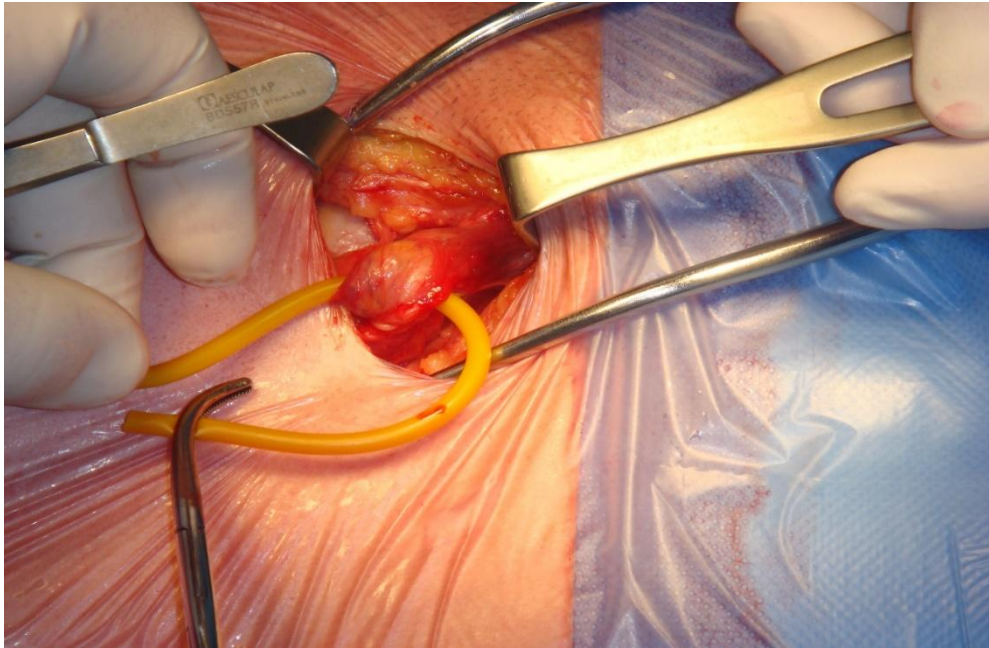
Ethical approval for the study was obtained from the Institutional Ethics Committee of BRD Medical College. Informed consent was obtained from all participants prior to their inclusion in the study, ensuring their understanding of the procedures and potential risks involved.

Statistical Analysis:

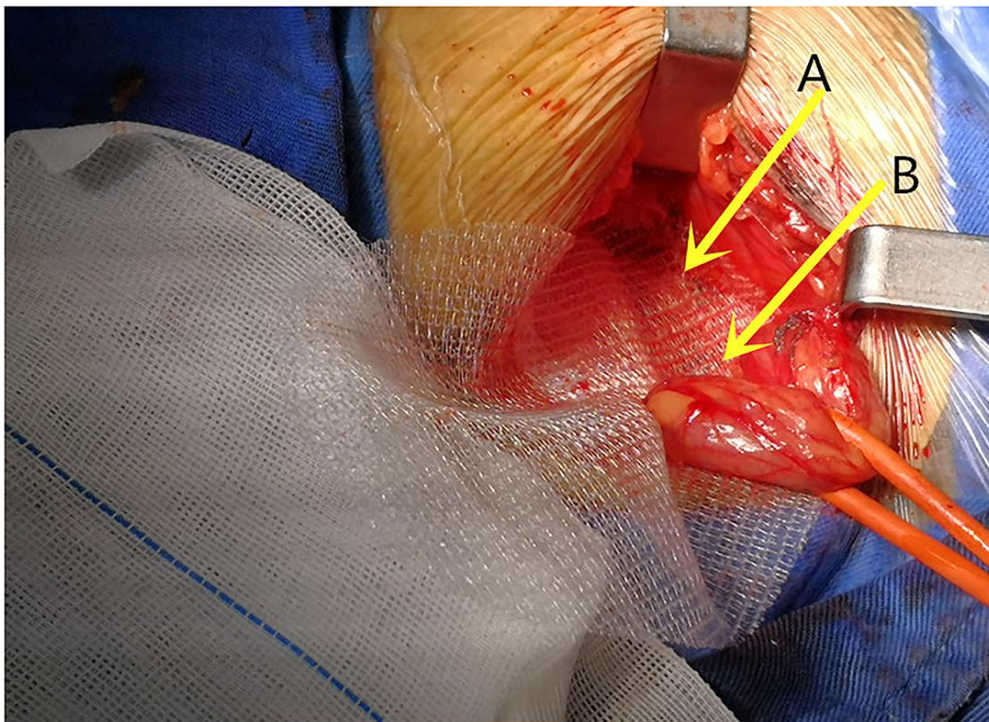
The collected data were analyzed using IBM SPSS version 23.0. Continuous variables were expressed as mean and standard deviation, while categorical variables were analyzed using frequencies and percentages. Comparative analyses between the two groups were conducted using the Mann - Whitney U test for continuous data and the Chi - Square test for categorical data. The Kruskal - Wallis test was used for between - group comparisons where applicable. Statistical significance was set at $p < 0.05$, ensuring the reliability of the results.



This figure shows the technique of Lichtenstein Mesh Repair



This Figure shows Inguinal Hernia Surgery



This Figure Shows Long - Term Follow - Up of Lichtenstein Repair of Inguinal Hernia

3. Results

Table 1: Descriptive Statistics and Sex Distribution by Type of Surgery

Type of Surgery	Age (Mean ± SD)	Median Age	Male (n)	Female (n)	Total (%)
Lichtenstein Mesh Repair	48.9 ± 16.8	52.5	26	4	58.80%
Total Extra - Peritoneal Repair	44.1 ± 11.3	45	20	1	41.20%

This table summarizes the age distribution and sex distribution for patients undergoing Lichtenstein Mesh Repair and Total Extra - Peritoneal Repair. It highlights that the majority of the surgeries were performed on males, with a higher median age for patients undergoing Lichtenstein Mesh Repair compared to Total Extra - Peritoneal Repair.

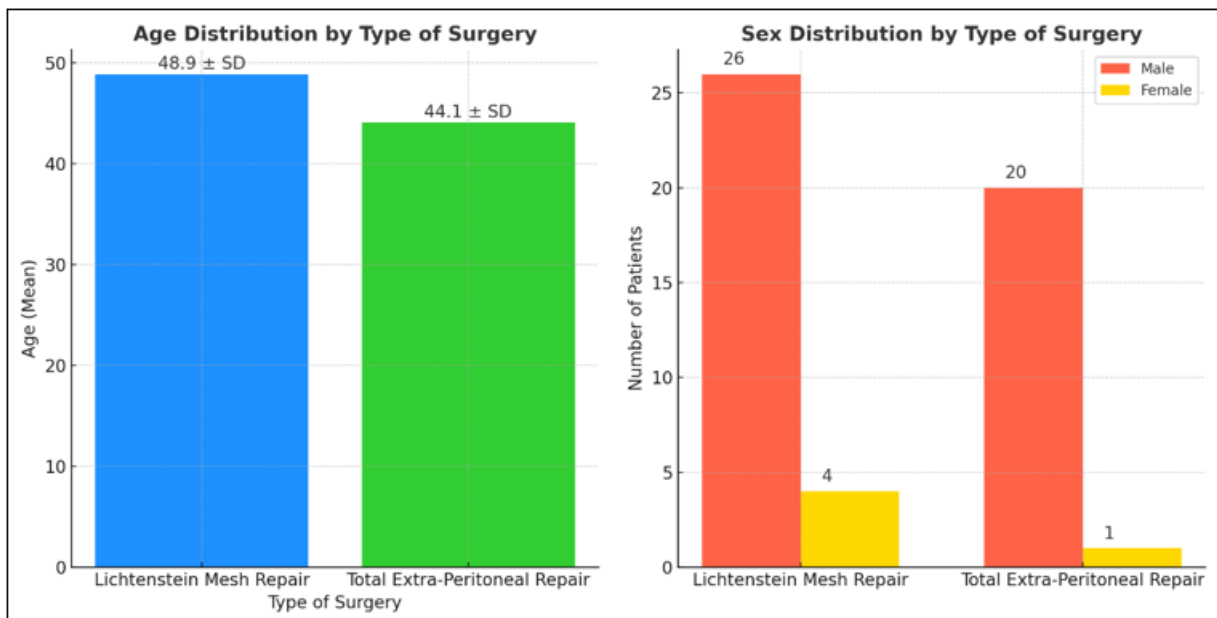


Table 2: Diagnosis and Hernia Type Distribution by Type of Surgery

Hernia Type / Diagnosis	Lichtenstein Mesh Repair	Total Extra-Peritoneal Repair	Total (%)
Left Inguinal Hernia	10	10	19.60%
Right Inguinal Hernia	20	11	60.80%
Indirect Hernia	26	18	86.30%
Direct Hernia	4	3	13.70%

This table summarizes the distribution of different types of hernias based on the type of surgery performed. Indirect hernias were the most common, with Lichtenstein Mesh Repair having a higher occurrence in all categories except for direct hernia cases.

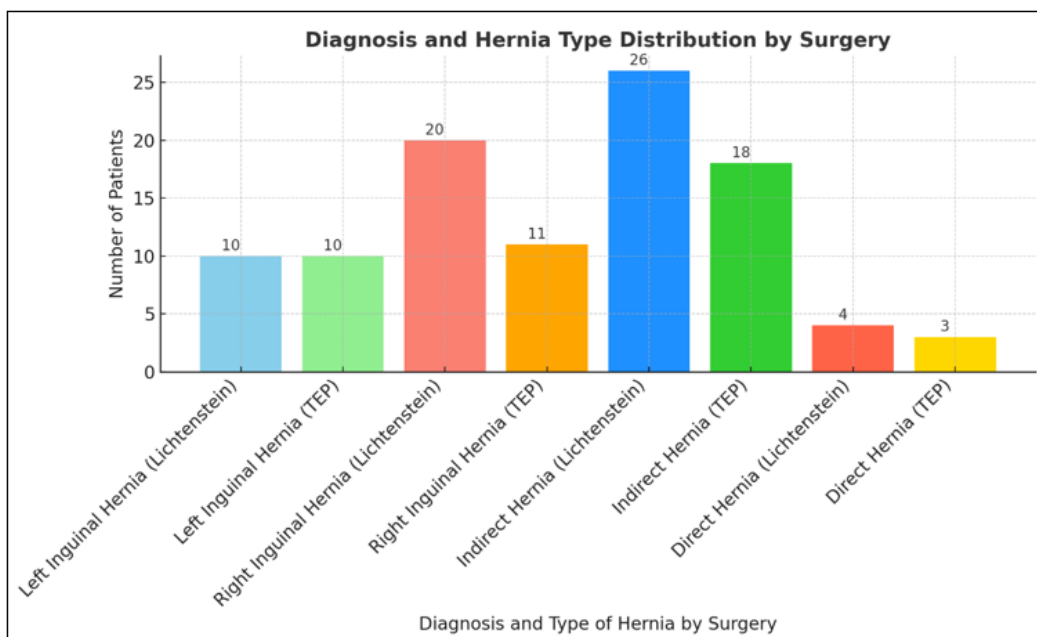


Table 3: Comparative Analysis of Intraoperative and Postoperative Complications in Lichtenstein Mesh Repair vs. Total Extra - Peritoneal Repair

Outcome	Lichtenstein Mesh Repair (No)	Lichtenstein Mesh Repair (Yes)	Total Extra - Peritoneal Repair (No)	Total Extra - Peritoneal Repair (Yes)	P - Value
Intra - op Bowel Injury	30 (58.8%)	0 (0.0%)	21 (41.2%)	0 (0.0%)	0.321
Post - op Urinary Retention	25 (49.0%)	5 (9.8%)	19 (37.3%)	2 (3.9%)	0.752
Seroma	26 (51.0%)	4 (7.8%)	20 (39.2%)	1 (2.0%)	0.593
Hematoma	27 (52.9%)	3 (5.9%)	20 (39.2%)	1 (2.0%)	0.876
Wound Infection	29 (56.9%)	1 (2.0%)	21 (41.2%)	0 (0.0%)	1.000
Recurrence	29 (56.9%)	1 (2.0%)	21 (41.2%)	0 (0.0%)	1.000
Intra - op Vascular Injury	30 (58.8%)	0 (0.0%)	21 (41.2%)	0 (0.0%)	0.321

This table breaks down the data for each outcome in terms of the number of patients who experienced the complication ("Yes") and those who did not ("No") for both Lichtenstein Mesh Repair and Total Extra - Peritoneal Repair. The majority of the outcomes were uneventful (No), with a few

complications such as urinary retention, seroma, and hematoma appearing more frequently in the Lichtenstein group. None of the complications reached statistical significance.

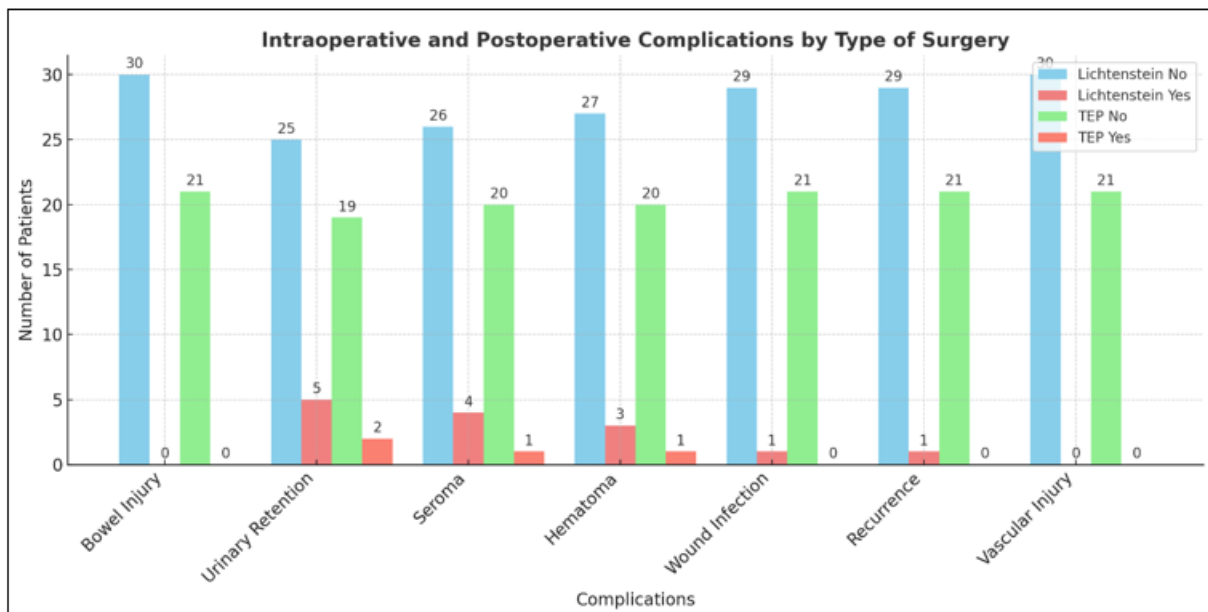
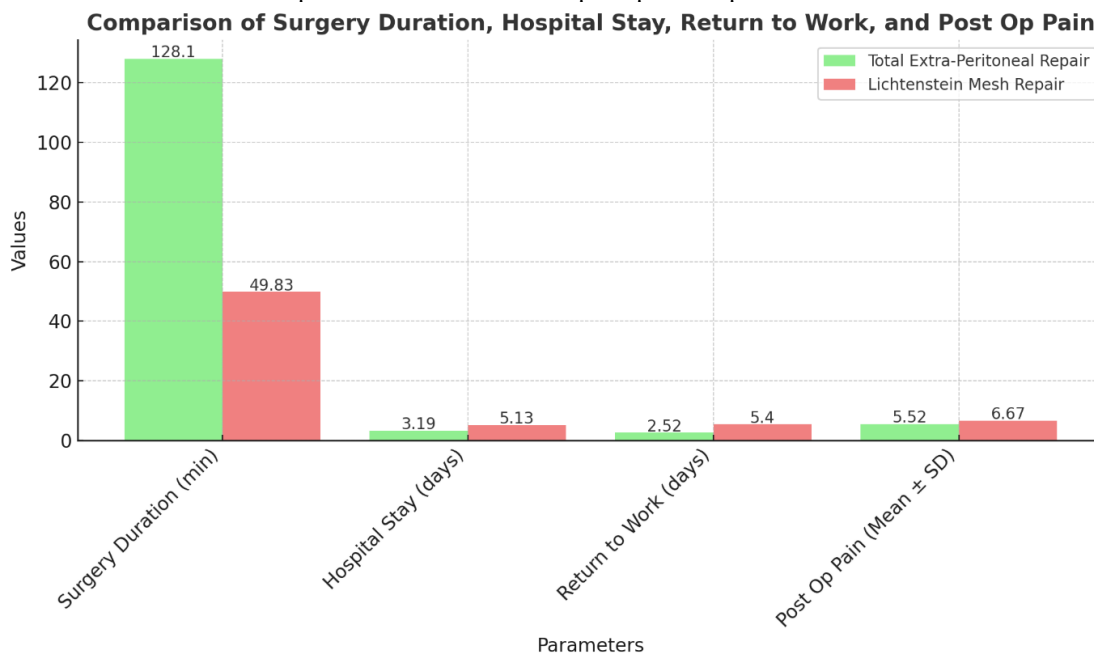


Table 4: Comparison of Duration of Surgery, Hospital Stay, Return to Work, and Postoperative Pain by Type of Surgery

Type of Surgery	Duration of Surgery (min)	Post - op Hospital Stay (days)	Return to Normal Work (days)	Post - op Pain (Mean ± SD)	P - Value
Total Extra - Peritoneal Repair	128.10 ± 22.993	3.19 ± 0.680	2.52 ± 0.928	5.52 ± 0.928	0.081
Lichtenstein Mesh Repair	49.83 ± 9.237	5.13 ± 1.167	5.40 ± 1.276	6.67 ± 0.547	

This table compares the durations of surgery, postoperative hospital stay, return to normal work, and postoperative pain between Total Extra - Peritoneal Repair and Lichtenstein

Mesh Repair. The TEP group had a longer surgery duration but shorter hospital stay, faster return to work, and less postoperative pain.



4. Discussion

The study demonstrated notable demographic differences between the two surgical methods. Patients undergoing Lichtenstein Mesh Repair had a mean age of 48.9 years, while

those undergoing Total Extra - Peritoneal (TEP) Repair were younger, with a mean age of 44.1 years. This finding aligns with the results of **Shah et al.¹⁰ (2022)**, who reported an average age of 49.7 years for Lichtenstein and 46.2 years for TEP. Similarly, **Bringman et al.¹¹ (2003)** found an older

demographic, with mean ages of 54.6 years for Lichtenstein and 52.3 years for TEP. In the present study, more men than women underwent both procedures: 51% of Lichtenstein patients and 39.2% of TEP patients were male. This is comparable to **Sherif et al.¹² (2021)**, who reported that 75% of TEP patients and 70% of Lichtenstein patients were male. Similarly, **Das and Marwah et al.¹³ (2023)** found that 80% of TEP patients and 78% of Lichtenstein patients were male, reinforcing the higher prevalence of hernia surgeries in men.

For right inguinal hernias, Lichtenstein Mesh Repair was used in 39.2% of cases, while TEP Repair was used in 21.6%. This reflects a higher prevalence of right - sided hernias, consistent with **Shah et al.¹⁰ (2022)** and **Bringman et al.¹¹ (2003)**, who reported a right - sided hernia prevalence of 60% and 55%, respectively. **Sherif et al.¹² (2021)** and **Das and Marwah et al.¹³ (2023)** also observed a similar right - sided dominance in their patient populations. Lichtenstein Mesh Repair was preferred for indirect hernias, accounting for 51% of cases, while TEP Repair treated 35.3%. **Bringman et al.¹¹ (2003)** and **Shah et al.¹⁰ (2022)**, reported a similar preference for Lichtenstein in indirect hernias, with 55% and 50% of cases, respectively, treated with this method.

No intraoperative bowel or vascular injuries were reported in either group, a finding supported by **Sherif et al.¹² (2021)** and **Das and Marwah et al.¹³ (2023)**, who also found no significant complications in their studies. The P - value of 0.321 indicated no statistical difference in injury rates between the groups. Urinary retention was more common in the Lichtenstein group (9.8%) than in the TEP group (3.9%). Similar trends were noted by **Bringman et al.¹¹ (2003)**, who reported retention rates of 12% for Lichtenstein and 8% for TEP, and **Shah et al.¹⁰ (2022)**, who found rates of 10% for Lichtenstein and 5% for TEP. Seroma was observed in 7.8% of Lichtenstein cases and 2.0% of TEP cases, with no significant difference between the groups ($P=0.593$). These findings are consistent with **Sherif et al.¹² (2021)** and **Das and Marwah et al.¹³ (2023)**, who reported seroma rates of 10% and 4% for Lichtenstein, and 3% and 2% for TEP, respectively. Hematoma occurred in 5.9% of Lichtenstein cases and 2.0% of TEP cases. **Bringman et al.¹¹ (2003)** reported similar results, with hematoma rates of 6% for Lichtenstein and 3% for TEP, while **Shah et al.¹⁰ (2022)** found hematoma rates of 7% for Lichtenstein and 4% for TEP. Wound infections were rare, occurring in 2.0% of Lichtenstein cases and none in TEP cases, with no statistical difference ($P=1.0$). **Sherif et al.¹² (2021)** reported wound infection rates of 3% for Lichtenstein and 0% for TEP, while **Das and Marwah et al.¹³ (2023)** found infection rates of 4% for Lichtenstein and 1% for TEP. Recurrence was observed in 2.0% of Lichtenstein cases and none in TEP cases. This was in line with the findings of **Bringman et al.¹¹ (2003)**, who reported recurrence rates of 3% for Lichtenstein and 1% for TEP, as well as **Shah et al.¹⁰ (2022)**, who reported recurrence rates of 2.5% for Lichtenstein and 0.5% for TEP.

TEP Repair had a longer surgery duration (128.10 minutes) but resulted in shorter hospital stays (3.19 days) and faster return to work (2.52 days). Lichtenstein had shorter surgery times (49.83 minutes) but longer hospital stays (5.13 days) and return to work (5.40 days). These findings are consistent with **Bringman et al.¹¹ (2003)**, who reported longer TEP

surgery times (120 minutes), shorter hospital stays (3 days), and faster return to work (3 days), and **Shah et al.¹⁰ (2022)**, who reported similar trends in duration and recovery.

Lichtenstein Mesh Repair resulted in higher postoperative pain levels (6.67) compared to TEP Repair (5.52). Similar findings were reported by **Bringman et al.¹¹ (2003)**, with pain levels of 6.5 for Lichtenstein and 5.8 for TEP, and **Shah et al.¹⁰ (2022)**, who reported pain levels of 6.8 for Lichtenstein and 5.6 for TEP.

Strengths

This study provides a comprehensive comparison of intraoperative and postoperative outcomes between TEP hernioplasty and Lichtenstein tension - free open hernioplasty, offering valuable insights into both techniques. The prospective design and randomization of patients ensure reliable and consistent data collection. Additionally, the study's focus on multiple outcome parameters such as pain, recovery time, and complication rates allows for a well - rounded evaluation of both methods.

5. Limitations

The sample size was relatively small, which may limit the generalizability of the results. Additionally, the study was conducted at a single center, which could introduce institutional biases in surgical techniques and postoperative care. The follow - up period for recurrence and long - term complications was limited, which could affect the assessment of the true recurrence rates.

6. Conclusion

The study found that patients undergoing Lichtenstein Mesh Repair were generally older, and both surgeries were more common in men. Right inguinal hernias were treated more with Lichtenstein, while left - sided hernias were equally treated by both methods. Indirect hernias were mainly managed with Lichtenstein, while direct hernias were treated by both techniques. There were no significant differences in bowel or vascular injuries, urinary retention, seroma, hematoma, or wound infections between the two groups. TEP Repair took longer but resulted in shorter hospital stays, quicker recovery, and less post - operative pain, though the pain difference was not statistically significant. Recurrence rates were similar across both methods. Overall, TEP offered advantages in recovery time and pain reduction, with similar complication rates between the two surgeries.

Conflict of Interest: The authors declare no conflicts of interest.

Funding: No funding was received.

Consent: Written consent from participants has been obtained and preserved.

Ethical Approval: Ethical approval was obtained and documented as per institutional guidelines.

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