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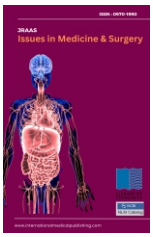

Research Article

Section: Surgery

Comparison between Laparoscopic Surgeries & Lichtenstein Repair for the Treatment of Inguinal Hernias

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HIGHLIGHTS

- Less postoperative pain observed
- Faster recovery and mobilization
- Shorter hospital stay achieved
- Higher patient satisfaction reported
- Longer operative time required

Key Words:
Inguinal hernia
Laparoscopic repair
Lichtenstein repair
TAPP
TEP
Mesh hernioplasty
Postoperative pain
Patient satisfaction

ABSTRACT

Introduction: Inguinal hernia repair is one of the most performed surgeries worldwide. While Lichtenstein tension-free mesh repair remains the standard open technique, laparoscopic approaches such as TAPP and TEP are increasingly favored due to improved postoperative recovery and patient comfort. **Aim & Objectives:** To compare laparoscopic repair and Lichtenstein repair for the treatment of inguinal hernias with respect to operative outcomes, postoperative pain, complications, recovery parameters, patient satisfaction, and cost. **Materials & Methods:** This prospective comparative study included 100 patients with inguinal hernia, equally divided into laparoscopic (n=50) and Lichtenstein repair (n=50) groups. Outcomes assessed included operative time, complications, postoperative pain, hospital stay, return to work, patient satisfaction, and treatment cost. Statistical significance was set at $p<0.05$. **Results:** Baseline demographic characteristics were comparable between the groups. Operative time was significantly longer in the laparoscopic group (72.58±8.18 vs. 56.12±6.11 minutes; $p<0.001$). However, laparoscopic repair was associated with significantly lower pain scores at 24 hours, 72 hours, and 3 months ($p<0.05$). Hospital stay (2.12±0.48 vs. 3.63±0.70 days; $p<0.001$) and time to return to work (9.16±2.53 vs. 14.88±3.06 days; $p<0.001$) were significantly shorter following laparoscopic repair. Wound infection rates were lower (6.0% vs. 24.0%; $p=0.011$), while hematoma formation was slightly higher (16.0% vs. 4.0%; $p=0.046$). Patient satisfaction was significantly greater in the laparoscopic group ($p<0.001$). The mean surgical cost was higher for laparoscopic repair (₹25,149.74±2,505.40 vs. ₹4,534.30±3,418.32; $p<0.001$). **Conclusion:** Laparoscopic inguinal hernia repair offers less postoperative pain, faster recovery, a shorter hospital stay, lower wound infection rates, and greater patient satisfaction than Lichtenstein repair, though it involves a longer operative time and a higher cost.

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INTRODUCTION

Inguinal hernia is one of the most common surgical conditions encountered worldwide and remains a significant contributor to the global burden of elective general surgery. It is characterized by the protrusion of intra-abdominal contents through a weakness in the inguinal region, presenting clinically as a groin swelling that may be associated with discomfort, pain, or functional limitation. If left untreated, inguinal hernias may progress to serious complications such as incarceration, obstruction, and strangulation, necessitating emergency surgical intervention. Consequently, surgical repair remains the definitive treatment for most patients with symptomatic inguinal hernias [1].

Over the past several decades, the surgical management of inguinal hernias has evolved considerably. Traditional tissue-based repairs have largely been replaced by tension-free mesh techniques, which have significantly reduced recurrence rates and improved long-term outcomes. Among these, the Lichtenstein tension-free mesh repair has gained widespread acceptance and is regarded as the benchmark open surgical technique because of its simplicity, reproducibility, and excellent clinical outcomes [2]. Despite these advantages, concerns regarding chronic postoperative groin pain, foreign-body sensation, and wound-related complications have prompted the search for alternative approaches that can further improve patient recovery and quality of life [3]. The introduction of minimally invasive surgery has led to the development of laparoscopic techniques for inguinal hernia repair, primarily the Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) approaches.

These techniques permit mesh placement within the preperitoneal space through small incisions and have been associated with reduced postoperative pain, earlier mobilization, shorter hospital stay, faster return to normal activities, and improved cosmetic outcomes compared with conventional open repair [4]. However, laparoscopic repair is technically more demanding, requires specialized training and equipment, and is often associated with longer operative duration and higher procedural costs [5].

Several studies have compared laparoscopic and open mesh repairs with varying conclusions regarding operative efficiency, postoperative recovery, complications, recurrence rates, and patient satisfaction. While both approaches have demonstrated excellent long-term effectiveness, differences in perioperative outcomes continue to influence clinical decision-making [6]. Randomized trials by Hamza et al., Kargar et al., and Yigit et al. reported superior postoperative recovery and lower pain scores following laparoscopic repair, although operative times were generally longer [7–9]. Similarly, Eklund et al. demonstrated favorable long-term outcomes following laparoscopic repair, while Westin et al. reported lower rates of chronic pain and improved patient comfort after minimally invasive surgery [10,11]. Comparison of laparoscopic (TAPP/TEP) and Lichtenstein inguinal hernia repair techniques **(Figure 1)**.

Given the continuing debate regarding the optimal surgical approach for inguinal hernia repair, a direct comparison of laparoscopic and Lichtenstein techniques remains clinically relevant. The present study was therefore undertaken to evaluate and compare operative outcomes, postoperative pain, recovery parameters, complications, patient satisfaction, and economic

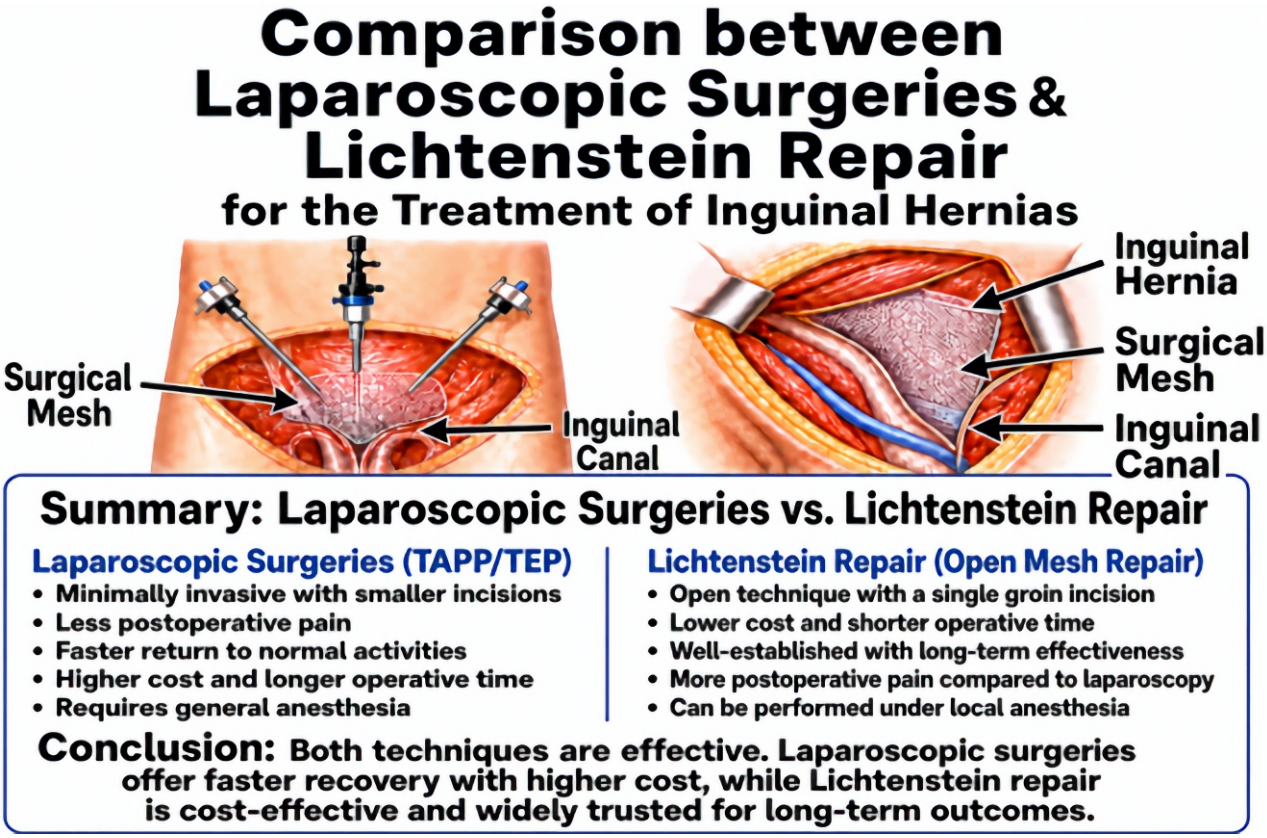

Figure 1. Comparative schematic illustration of laparoscopic (TAPP/TEP) and Lichtenstein mesh repair techniques for inguinal hernia, highlighting key procedural features, advantages, limitations, and clinical outcomes.

considerations associated with these two commonly performed procedures.

MATERIALS & METHODS

This prospective comparative study was conducted in the Department of General Surgery at a tertiary care teaching hospital and included patients diagnosed with inguinal hernia who were scheduled for elective surgical repair. A total of 100 patients fulfilling the eligibility criteria were enrolled and allocated into two equal groups: Group A underwent laparoscopic inguinal hernia repair (Transabdominal Preperitoneal [TAPP] or Totally Extraperitoneal [TEP] approach), while Group B underwent open Lichtenstein tension-free mesh repair. Patients with complicated, recurrent, bilateral, or multiple hernias, those unfit for surgery, and those unwilling to participate were excluded from the study. Written informed consent was obtained from all participants, and the study was conducted following approval from the Institutional Ethics Committee.

Baseline demographic and clinical data, including age, sex, and body mass index (BMI) were recorded preoperatively. Intraoperative variables assessed included operative time and intraoperative complications. Postoperative outcomes evaluated were pain intensity using the Visual Analog Scale (VAS) at 24 and 72 hours, chronic pain at 3 months, duration of hospital stay, time to return to normal work, postoperative complications (wound infection, seroma, and hematoma), patient satisfaction, and overall treatment cost. Standard perioperative care and postoperative analgesic protocols were followed for all patients.

Patients were followed up at regular intervals of 1 week, 1 month, 3 months, 6 months, and 1 year after surgery. Data were entered into a computerized database and analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation (SD) and compared using the independent Student's t-test, while categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square test or Fisher's exact test where appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 100 patients were included in the study, with 50 patients each in the laparoscopic and Lichtenstein repair groups. The mean age of patients in the laparoscopic group was 43.82 ± 15.05 years compared to 42.88 ± 14.89 years in the Lichtenstein group, with no statistically significant difference (t=0.314, p=0.754). Male patients predominated in both groups, accounting for 92.0% of participants, while females constituted 8.0% in each group (p=0.643). Similarly, the mean BMI was comparable between the laparoscopic and Lichtenstein groups (24.40 ± 2.88 kg/m² vs. 23.35 ± 3.14 kg/m², p=0.076) **(Table 1)**. These findings indicate that both groups were well matched at baseline with no significant demographic differences. The mean operative duration was significantly longer in the laparoscopic group compared to the Lichtenstein group (72.58 ± 8.18 minutes vs. 56.12 ± 6.11 minutes; t=11.391, p<0.001). Intraoperative complications were uncommon in both groups, occurring in 4.0% of laparoscopic procedures and 2.0% of Lichtenstein repairs, with no statistically significant difference (p=0.500) **(Table 2)**. These findings suggest that while laparoscopic repair requires a longer operative time, both procedures demonstrate comparable intraoperative safety profiles. Postoperative pain scores were significantly lower among patients undergoing laparoscopic repair. At 24 hours postoperatively, the mean VAS score was 3.77 ± 0.82 in the laparoscopic group compared with 5.59 ± 1.18 in the Lichtenstein group (t=-8.889, p<0.001). Similarly, at 72 hours, the mean pain score remained significantly lower in the laparoscopic group (2.42 ± 0.66 vs. 4.27 ± 0.89; t=-11.779, p<0.001). Chronic pain assessed at 3 months was also significantly lower following laparoscopic repair (0.06 ± 0.24 vs. 0.22 ± 0.42; t=-2.346, p=0.021) **(Table 2)**. These findings demonstrate superior short-term and long-term pain control with the laparoscopic approach. Postoperative pain scores at 24 h, 72 h, and 3 months **(Figure 2)**. Recovery parameters favored laparoscopic repair. The mean duration of hospital stay was significantly shorter in the laparoscopic group (2.12 ± 0.48 days) compared to the Lichtenstein group (3.63 ± 0.70 days) (t=-12.423, p<0.001). Likewise, patients undergoing laparoscopic repair returned to work significantly earlier (9.16 ± 2.53 days) than those who underwent Lichtenstein repair (14.88 ± 3.06 days) (t=-10.177, p<0.001) **(Table 4)**.

Patient satisfaction scores were also significantly higher among laparoscopic patients (p<0.001). In the laparoscopic group, 60.0% of patients reported a satisfaction score of 4 and 40.0% reported the highest score of 5. In contrast, no patient in the Lichtenstein group reported a score of 5, while 30.0% and 40.0% reported satisfaction scores of 2 and 3, respectively. These results indicate superior postoperative recovery and patient-perceived outcomes following laparoscopic repair. Comparison of recovery outcomes between laparoscopic and Lichtenstein repair **(Figure 3)**.

Postoperative wound infection occurred significantly less frequently in the laparoscopic group than in the Lichtenstein group (6.0% vs. 24.0%; p=0.011). Seroma formation was observed in 10.0% of laparoscopic cases and 8.0% of Lichtenstein repairs, with no statistically significant difference (p=0.500). Hematoma formation was significantly more common following laparoscopic repair (16.0% vs. 4.0%; p=0.046), although most cases were minor and managed conservatively **(Table 5)**. Overall, laparoscopic repair was associated with a lower risk of wound infection but a slightly higher incidence of postoperative hematoma. Postoperative complications in both surgical groups **(Figure 4)**. The mean surgical cost was significantly higher in the laparoscopic group (₹25,149.74 ± 2,505.40) compared with the Lichtenstein group (₹4,534.30 ± 3,418.32) (t=33.693, p<0.001). Although laparoscopic repair incurred greater procedural expenditure, it was associated with better postoperative recovery, lower pain scores, and earlier return to work **(Table 6)**.

Table 1. Baseline Characteristics of Study Participants

Variable	Laparoscopic (n=50)	Lichtenstein (n=50)	Test Statistic	p-value
Age (years), Mean ± SD	43.82 ± 15.05	42.88 ± 14.89	t=0.314	0.754
Male, n (%)	46 (92.0)	46 (92.0)	χ^2	0.643
Female, n (%)	4 (8.0)	4 (8.0)		
BMI (kg/m²), Mean ± SD	24.40 ± 2.88	23.35 ± 3.14	t=1.795	0.076

Table 2. Intraoperative Outcomes

Variable	Laparoscopic	Lichtenstein	Test Statistic	p-value
Operative Time (min), Mean ± SD	72.58 ± 8.18	56.12 ± 6.11	t=11.391	<0.001
Intraoperative Complications, n (%)	2 (4.0)	1 (2.0)	χ^2	0.500

Table 3. Postoperative Pain Outcomes

Variable	Laparoscopic	Lichtenstein	Test Statistic	p-value
VAS Pain at 24 h	3.77 ± 0.82	5.59 ± 1.18	t=-8.889	<0.001
VAS Pain at 72 h	2.42 ± 0.66	4.27 ± 0.89	t=-11.779	<0.001
Chronic Pain at 3 Months	0.06 ± 0.24	0.22 ± 0.42	t=-2.346	0.021

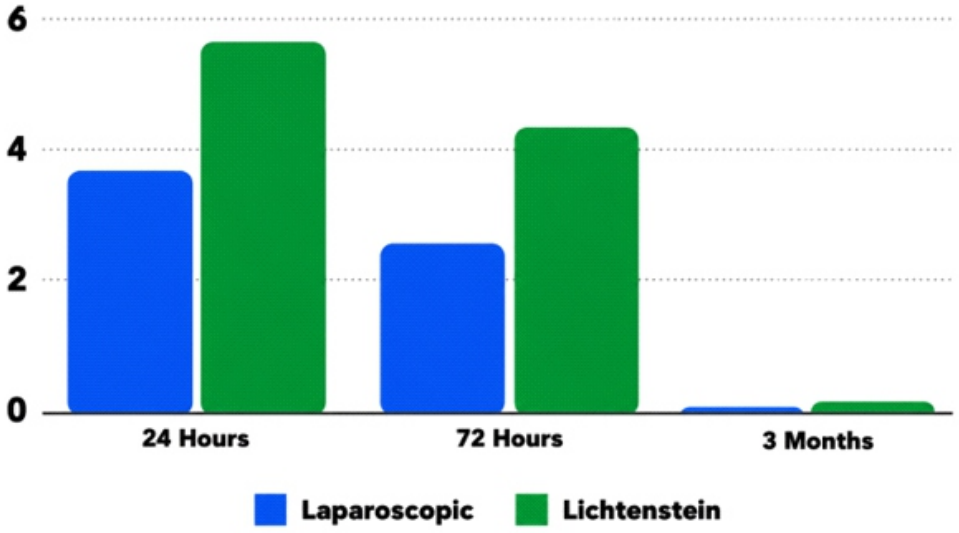

Figure 2: Comparison of postoperative pain scores at 24 hours, 72 hours, and 3 months following

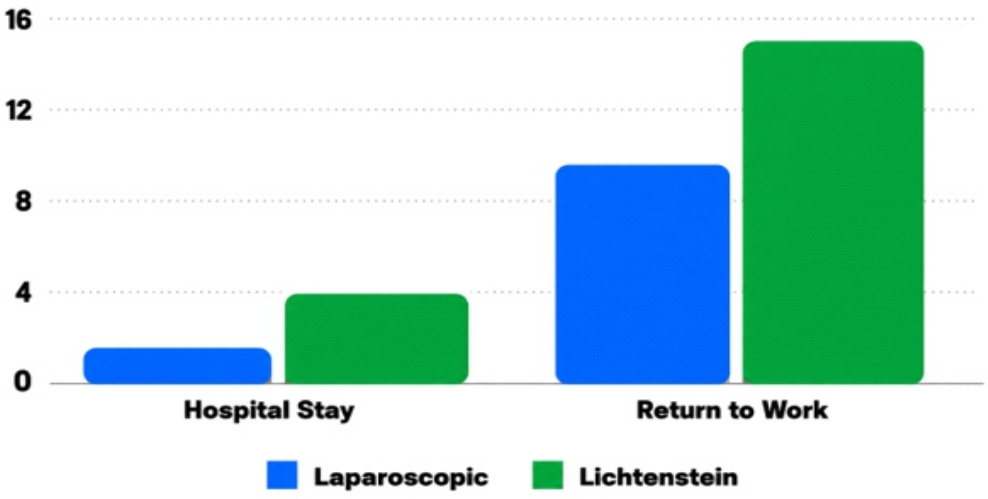

Figure 3: Comparison of recovery parameters between laparoscopic and Lichtenstein repair.surgery.

Table 4. Recovery Outcomes

Variable	Laparoscopic (n=50)	Lichtenstein (n=50)	Test Statistic	p-value
Hospital Stay (days), Mean ± SD	2.12 ± 0.48	3.63 ± 0.70	t = -12.423	<0.001
Return to Work (days), Mean ± SD	9.16 ± 2.53	14.88 ± 3.06	t = -10.177	<0.001
Patient Satisfaction Score , n (%)			χ^2	<0.001
Score 2	0 (0.0)	15 (30.0)		
Score 3	0 (0.0)	20 (40.0)		
Score 4	30 (60.0)	15 (30.0)		
Score 5	20 (40.0)	0 (0.0)		

Table 5. Postoperative Complications

Complication	Laparoscopic n (%)	Lichtenstein n (%)	p-value
Wound Infection	3 (6.0)	12 (24.0)	0.011
Seroma Formation	5 (10.0)	4 (8.0)	0.500
Hematoma Formation	8 (16.0)	2 (4.0)	0.046

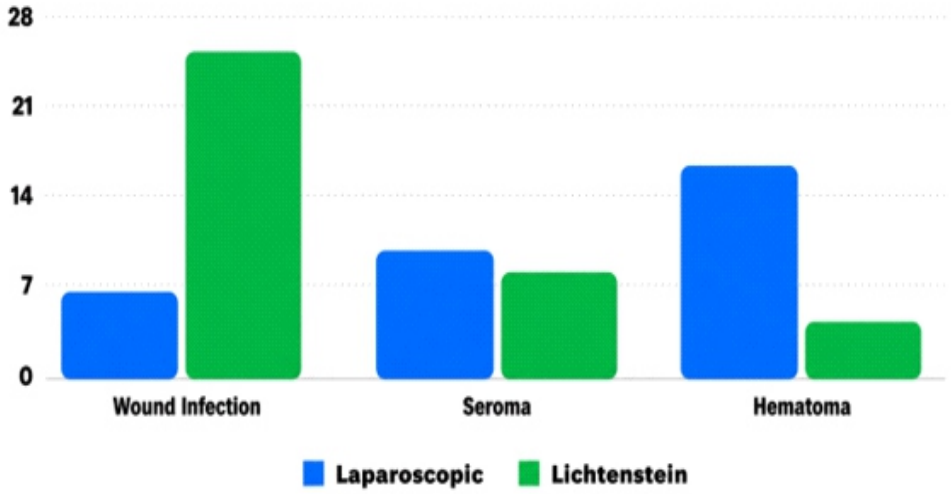

Figure 4: Distribution of postoperative complications in both surgical groups.

Table 6. Economic Outcome Comparison Between Laparoscopic and Lichtenstein Repair

Variable	Laparoscopic (n=50)	Lichtenstein (n=50)	Test Statistic	p-value
Surgery Cost (₹), Mean ± SD	25149.74 ± 2505.40	4534.30 ± 3418.32	t = 33.693	<0.001

DISCUSSION

In the present study, both study groups were comparable at baseline, as no statistically significant differences were observed in age, gender distribution, or body mass index. This suggests that the observed outcomes were unlikely to be influenced by demographic variables [6]. The operative duration was significantly longer in the laparoscopic group, which can be attributed to the technical complexity and learning curve associated with minimally invasive procedures. Similar observations have been reported in studies conducted by Hamza et al., Kargar et al., and Yigit et al. [7–9]. Despite the increased operative time, intraoperative complication rates were low and comparable between the two groups, indicating that both techniques are equally safe when performed by trained surgeons [7]. Postoperative pain was significantly lower in patients undergoing laparoscopic repair at both 24 and 72 hours, with a further reduction in chronic pain at 3 months. These findings agree with previous studies by Eklund et al. and Westin et al., which have demonstrated improved long-term comfort following laparoscopic repair [10,11].

Patients in the laparoscopic group also had a shorter hospital stay and returned to work earlier than those who underwent open repair. These findings are consistent with existing literature and highlight the clinical as well as economic advantages of laparoscopic techniques [8,10]. The incidence of wound infection was significantly lower in the laparoscopic group, likely due to smaller incisions and minimal tissue handling. Rates of seroma formation were similar between the two groups, while a slightly higher incidence of hematoma was observed in the laparoscopic group; however, these were minor and did not affect overall outcomes [9]. Although laparoscopic repair is associated with higher initial costs, it offers clear advantages in terms of recovery and patient experience. This is further supported by the significantly higher satisfaction levels reported among patients undergoing laparo-scopic repair, reflecting better pain control, faster recovery, and improved quality of life [11]. Overall, the findings of this study support the growing body of evidence that favors laparoscopic repair as a more patient-centered approach, despite its longer operative time [4,10].

CONCLUSION

Both laparoscopic and Lichtenstein techniques are safe and effective for the management of inguinal hernia. However, laparoscopic repair offers clear advantages in terms of reduced postoperative pain, shorter hospital stays, earlier return to work, lower incidence of wound infection, decreased chronic pain, and improved patient satisfaction. Although it is associated with longer operative time and higher cost, these limitations are offset by its superior recovery profile and enhanced quality of life.

Therefore, laparoscopic repair may be considered the preferred option in suitable patients, particularly when early recovery and better functional outcomes are desired. Nonetheless, the choice of procedure should be individualized, considering patient characteristics, surgeon expertise, and available resources.

LIMITATIONS & FUTURE PERSPECTIVES

The study's limitations include a single-centre setting, a relatively small sample size, and a short study duration, which may limit the broader applicability of the results. Future studies should incorporate multicentre designs with larger populations to enhance validity, assess long-term outcomes, and investigate advanced diagnostic & management approaches. Such efforts will improve overall patient care & help minimize complications.

CLINICAL SIGNIFICANCE

The clinical significance of this study lies in its potential to bridge the gap between research findings and practical healthcare applications. It emphasizes the importance of translating scientific observations into meaningful improvements in patient care, diagnosis, and treatment outcomes. By highlighting real-world relevance, the study contributes to evidence based medical practice and supports informed clinical decision making. Ultimately, the findings aim to enhance patient quality of life, optimize therapeutic strategies, and promote better disease management in clinical settings.

ABBREVIATIONS

TAPP: Transabdominal Preperitoneal Repair
TEP: Totally Extraperitoneal Repair
n: Number of Patients
p: Probability Value

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AUTHOR CONTRIBUTIONS

All authors significantly contributed to the study conception and design, data acquisition, or data analysis and interpretation. They participated in drafting the manuscript or critically revising it for important intellectual content, consented to its submission to the current journal, provided final approval for the version to be published, and accepted responsibility for all aspects of the work.

Additionally, all authors meet the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE) guidelines.

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CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

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None

ETHICAL APPROVAL & CONSENT TO PARTICIPATE

All necessary consent & approval was obtained by authors.

CONSENT FOR PUBLICATION

All necessary consent for publication was obtained by authors.

DATA AVAILABILITY

All data generated and analyzed are included within this research article. The datasets utilized and/or analyzed in this study can be obtained from the corresponding author upon a re-asonable request.

USE OF ARTIFICIAL INTELLIGENCE (AI) & LARGE LANGUAGE MODEL (LLM)

The authors confirm that no AI & LLM tools were used in the writing or editing of the manuscript, and no images were altered or manipulated using AI & LLM.

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