Int. J Med. Pharm. Res.
E-ISSN: 2958-3683 | **P-ISSN**: 2958-3675
Available on: https://ijmpr.in/

International Journal of
Medical and Pharmaceutical Research

ORIGINAL ARTICLE OPEN ACCESS

Study Of Intra and Post-Operative Complications in Laparoscopic Inguinal Hernia Repair Using Total Extraperitoneal (TEP) Approach

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OPEN ACCESS

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Received: 15-07-2025
Accepted: 20-08-2025
Available Online: 31-08-2025

ABSTRACT

Background: Inguinal hernias are common surgical conditions caused by a defect in the abdominal wall at the myopectineal orifice, an inherently weak collagenous region. Laparoscopic Transabdominal Preperitoneal (TAPP) repair, introduced by Arregui and Dion in the early 1990s, revolutionized hernia surgery, while the extraperitoneal approach is based on the Rives-Stoppa technique. However, TEP may be associated with higher rates of postoperative complications, Therefore, this study evaluates short- and mid-term intraoperative and postoperative complications of laparoscopic inguinal hernia repair using the TEP approach. **Methods:** Present study was longitudinal in nature conducted among 38 patients undergoing TEP repair. All patients fulfilling inclusion criteria and exclusion criteria were taken up for the study. Study was carried out over a period of 1.5 years. **Results:** Intraoperative complications included conversion to open surgery (23.68%), major vessel clipping (15.79%), pneumoperitoneum (13.16%), and troublesome bleeding (10.53%). Postoperatively, chronic pain showed a significant reduction across follow-up visits, with the highest incidence at one month ($p < 0.05$), while wound infection was significant immediately postoperatively ($p < 0.05$). Other complications showed no significant variation across the follow-up period ($p > 0.05$). **Conclusion:** Laparoscopic TEP repair for inguinal hernia demonstrated favorable perioperative outcomes, with acceptable operative time, manageable complications, and no recurrences or mortality during follow-up.

Keywords: Inguinal hernias, Laparoscopic TEP, Intraoperative complications, postoperative complications.

INTRODUCTION

Inguinal hernias are common surgical conditions caused by a defect in the abdominal wall at the myopectineal orifice, an inherently weak collagenous region.[1] The lifetime risk is approximately 27% in men and 3% in women.[2] Surgical repair remains one of the most frequently performed procedures in general surgery.[3]

Laparoscopic Transabdominal Preperitoneal (TAPP) repair, introduced by Arregui and Dion in the early 1990s, revolutionized hernia surgery, while the extraperitoneal approach is based on the Rives-Stoppa technique.[4] Current laparoscopic techniques include Totally Extraperitoneal (TEP), extended-view TEP (eTEP), TAPP, Intraperitoneal Onlay Mesh (IPOM), and sac reduction with or without ring closure, with classical TEP considered closest to the ideal repair, despite its technical complexity.

Recurrence and chronic pain remain the most significant mid-term complications.[5] Systematic reviews show mixed outcomes when comparing laparoscopic and open anterior repair—some report similar complication rates,[6] while others highlight advantages of laparoscopy, including reduced chronic inguinal pain[7,8] and faster postoperative recovery.

However, TEP may be associated with higher rates of postoperative complications, including urinary retention, ileus, bowel obstruction, visceral and vascular injuries, or gas embolism, though reoperation rates are not proportionally increased.[9] With growing experience among hernia surgeons in high-volume centres, outcomes are expected to improve. Therefore,

this study evaluates short- and mid-term intraoperative and postoperative complications of laparoscopic inguinal hernia repair using the TEP approach.

OBJECTIVES

To study intra and post-operative complications in laparoscopic inguinal hernia repair using Total Extraperitoneal(TEP) approach.

MATERIALS AND METHODS

This prospective observational study was conducted at a tertiary care centre from January 2023 to June 2024. Adult patients (>18 years) presenting with uncomplicated inguinal hernia and undergoing laparoscopic repair using the Totally Extraperitoneal(TEP) approach were included. The study was approved by the Institutional Ethics Committee, and written informed consent was obtained from all participants.

Inclusion criteria comprised patients with good preoperative general condition, no significant comorbidities precluding general anaesthesia or pneumoperitoneum, and willingness to participate. Exclusion criteria included patients undergoing open hernia repair, pregnant women, those with absolute contraindications (e.g., intra-abdominal infection or abdominal wall fistula), obstructed or incarcerated hernias, age <18 years, and those unwilling to provide consent.

Preoperative assessment included demographic data, clinical history, and examination findings using a pre-structured proforma. Intraoperative variables recorded were side of hernia (unilateral/bilateral), blood loss, wound infection, organ injury, conversion to laparotomy, peritoneal closure technique, and complications. Postoperative evaluation included pain assessment using the Visual Analog Scale (VAS), incidence of complications, re-interventions, and duration of hospital stay. Relevant investigations such as haemoglobin, total and differential leukocyte counts, platelet count, haematocrit, abdominal ultrasonography, and urine examination were performed as needed. Perioperative antibiotic prophylaxis with intravenous Amoxiclav 1.2 g was administered at induction and continued up to three days postoperatively.

Sample size was calculated using Open EPI version 3.0, assuming a complication rate of 2.5% for chronic pain following laparoscopic TEP repair, with a 95% confidence level and 5% margin of error, resulting in a minimum sample size of 38. Convenience sampling was applied. Quantitative variables were presented as mean ± standard deviation (SD) and compared using the Z-test. Qualitative variables were analysed using Chi-square or Fisher's exact test, as appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

In this comparative longitudinal observational study of 38 patients with inguinal hernia undergoing laparoscopic repair via the total extraperitoneal (TEP) approach, intraoperative and postoperative outcomes were evaluated. The mean age of the study participants was 38.4 ± 8.9 years, with the majority (60.53%) aged 30–50 years, followed by 26.32% aged below 30 years and 13.15% aged above 50 years. All patients were male. Based on BMI classification, 39.47% were pre-obese (25–29.99 kg/m²), 34.21% had normal BMI (18–24.99 kg/m²), 21.06% were obese class I (30–34.99 kg/m²), and 5.26% were obese class II (35–39.99 kg/m²). Diabetes mellitus was the most frequent comorbidity (18.42%), followed by hypertension (2.63%), while 78.95% of patients had no comorbid conditions. All patients presented with inguinal swelling as the sole clinical complaint. Indirect hernia was predominant (76.32%), with bilateral involvement observed in 44.73% of patients, right-sided in 28.95%, and left-sided in 26.32%. The operative time ranged between 60 and 120 minutes, with a mean duration of 95.5 ± 17.7 minutes. Most procedures (68.42%) lasted 90–120 minutes, while 31.58% were completed within 60–90 minutes.

Intraoperative complications included conversion to open surgery (23.68%), major vessel clipping (15.79%), pneumoperitoneum (13.16%), and troublesome bleeding (10.53%). Postoperatively, chronic pain showed a significant reduction across follow-up visits, with the highest incidence at one month ($p < 0.05$), while wound infection was significant immediately postoperatively ($p < 0.05$). Other complications showed no significant variation across the follow-up period ($p > 0.05$).

VAS pain scores demonstrated a statistically significant decline over time (Repeated Measures ANOVA, $p < 0.0001$). The proportion of patients reporting no pain increased from 2.63% immediately after surgery to 92.11% at six months, while moderate-to-severe pain (VAS 4–9) decreased to zero by the third month (Cochran's Q test, $p < 0.0001$).

Table 1. Distribution of patients according to baseline characteristics.

Baseline characteristic		No.	%
Age groups	30	10	26.32

	30-50	23	60.53
	>50	05	13.15
	Mean ± SD	38.4 ± 8.9 years.	
Gender	Male	38	100
	Female	00	00
BMI	18-24.99	13	34.21
	25-29.99	15	39.47
	30-34.99	08	21.06
	35-39.99	02	5.26
Comorbidities	Diabetes mellitus	07	18.42
	Hypertension	01	2.63
	Nil	30	78.95
Type of inguinal hernia	Indirect	29	76.32
	Direct	09	23.68
Laterality	Bilateral	17	44.73
	Right	11	28.95
	Left	10	26.32

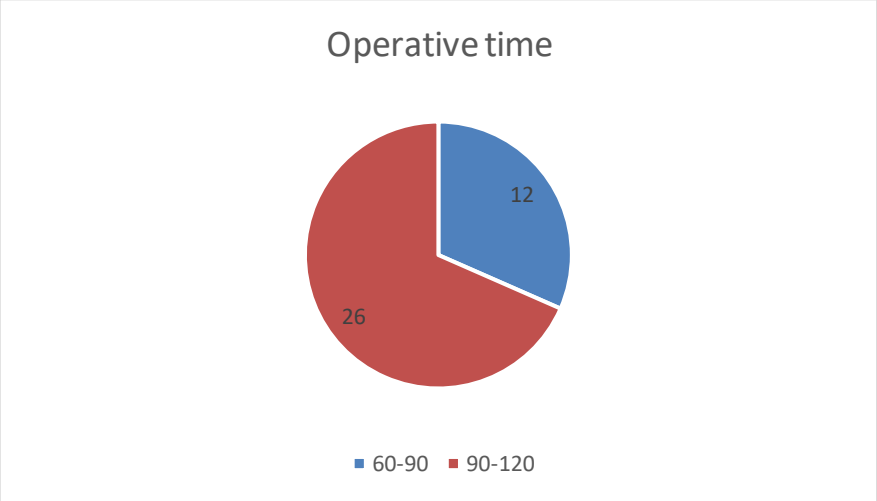

Chart 1. Operative time wise distribution of cases.

Table 2. Distribution of cases according to intraoperative complications. (n=38)

Intraoperative complications	**Cases**	
	No.	**(%)**
Conversion to open	09	23.68
Major vessel clipping	06	15.79
Pneumoperitoneum	05	13.16
Troublesome bleeding	04	10.53

Table 3. Comparison of cases according to postoperative complications at follow up of 1, 3 and 6 months. (n=38)

Postoperative complications	**Follow up of cases**				**P#**
	Immediate	**1 month**	**3 months**	**6 months**	
Chronic pain	20 (52.63)	25 (65.79)	10 (26.32)	03 (7.89)	**<0.001**
Mortality	00 (00)	00 (00)	00 (00)	00 (00)	--
Recurrence	00 (00)	00 (00)	00 (00)	00 (00)	--
Seroma	05 (13.16)	02 (5.26)	01 (2.63)	00 (00)	0.2
Wound infection	05 (13.16)	03 (7.89)	00 (00)	00 (00)	**0.04**
GI disturbance	29 (76.32)	00 (00)	00 (00)	00 (00)	--

#Cochran's Q test

Table 4. Comparison of cases according to postoperative VAS pain scores.

Postoperative VAS Pain scores	Follow up of cases				P
	Immediate	1 month	3 months	6 months	
0	01 (2.63)	13 (34.21)	28 (73.68)	35 (92.11)	<0.0001*
1-3	06 (15.79)	18 (47.37)	10 (26.32)	03 (7.89)	
4-6	23 (60.53)	07 (18.42)	00 (00)	00 (00)	
7-9	08 (21.05)	00 (00)	00 (00)	00 (00)	
Total	38 (100)	38 (100)	38 (100)	38 (100)	
Mean ± SD	4.9 ± 1.9	1.8 ± 1.7	0.4 ± 0.8	0.1 ± 0.3	<0.0001#

*** Cochran's Q test p-value < 0.0001; # Anova repeated measure**

DISCUSSION

This study assessed perioperative outcomes of laparoscopic TEP repair in 38 male patients (mean age 38.4 ± 8.9 years), consistent with Aggarwal et al.[10] and Vineeth S et al,[11] who also reported male predominance and peak incidence in the 31–40 years age group. Pre-obesity was the most frequent BMI category, comparable to Georgiou et al.[12] Diabetes mellitus (18.42%) was the leading comorbidity, similar to Aggarwal et al.[10]

Indirect hernia was predominant (76.32%) with bilateral involvement in 44.73% of cases, aligning with Aggarwal et al.[10] Mean operative time (95.5 ± 17.7 min) was comparable to Vineeth S et al.[11] Conversion to open repair (23.68%) was the most common intraoperative complication, while postoperative issues were minor and self-limiting. VAS pain scores declined significantly ($p < 0.0001$), and 92.11% reported no pain at six months.

No recurrences or mortalities occurred, corroborating findings by Reiner et al.[13] and Aggarwal et al.[10] that TEP repair ensures safe and favourable outcomes.

CONCLUSION

Laparoscopic TEP repair for inguinal hernia demonstrated favorable perioperative outcomes, with acceptable operative time, manageable complications, and no recurrences or mortality during follow-up. Pain scores and postoperative morbidity significantly improved over time, supporting TEP as a safe and effective approach in appropriately selected patients. Further large-scale studies with long-term follow-up are recommended to validate these findings.

Declaration:
There was no source of funding in our study and there was no any conflict of interest.

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