International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

A Prospective Comparative Study of Fixation Versus Non-Fixation of Mesh in Laparoscopic Enhanced View Totally Extra Peritoneal (Etep) Inguinal Hernia Repair

Dr. Merul Godika[1], Dr. Naresh Meena[2], Dr. Shiv Kumar Bunkar[3], Dr. Hitesh Sharma[4], Dr. Paras Ram Chaudhary[5], Dr. Ashutosh Dadhich[6]

[1,4,5,6]Resident, Department of General Surgery, JLN Medical College & Associated Group of Hospitals, Ajmer (Raj.)
[2]Associate Professor, Department of General Surgery, JLN Medical College & Associated Group of Hospitals, Ajmer (Raj.)
[3]Senior Professor, Department of General Surgery, JLN Medical College & Associated Group of Hospitals, Ajmer (Raj.)

OPEN ACCESS

Corresponding Author:

Dr. Hitesh Sharma
Resident, Department of General Surgery, JLN Medical College & Associated Group of Hospitals, Ajmer (Raj.)

Received: 20-05-2026
Accepted: 03-06-2026
Available online: 25-06-2026

ABSTRACT

Background: Laparoscopic enhanced-view totally extraperitoneal (eTEP) repair has emerged as an effective minimally invasive technique for inguinal hernia repair. However, the necessity of mesh fixation during eTEP repair remains controversial due to concerns regarding postoperative pain, complications, and additional cost.
Objective: To compare postoperative pain, recovery, operative outcomes, complications, recurrence, and cost-effectiveness between mesh fixation and non-fixation in laparoscopic eTEP inguinal hernia repair.
Materials and Methods: This prospective comparative interventional study was conducted in the Department of General Surgery, JLN Medical College and Associated Hospitals, Ajmer, from June 2024 to December 2025. Sixty patients with uncomplicated unilateral inguinal hernia were randomized into two groups: Group A (n=30) underwent eTEP repair with mesh fixation, while Group B (n=30) underwent eTEP repair without mesh fixation. Postoperative pain was assessed using the Visual Analog Scale (VAS), and perioperative outcomes and complications were compared during a 3-month follow-up period.
Results: The mean age of patients was 50.1±15.64 years in Group A and 48.37±17.99 years in Group B. Postoperative VAS pain scores were significantly lower in the non-fixation group at all time intervals, including 0–6 hours (4.80±1.77 vs. 6.47±1.70; p<0.001), 6–12 hours (3.37±1.30 vs. 4.40±1.25; p=0.003), 12–24 hours (1.97±0.93 vs. 2.87±1.25; p=0.002), and 24–72 hours (0.70±0.60 vs. 1.47±0.86; p<0.001). Pain scores during follow-up were also lower in the non-fixation group. Postoperative swelling occurred more frequently in the fixation group (26.67% at 1 week) compared to the non-fixation group (0%). No recurrence, mesh migration, or significant differences in wound infection rates were observed between the groups during follow-up.
Conclusion: Mesh non-fixation in laparoscopic eTEP inguinal hernia repair is a safe and effective alternative to mesh fixation. It is associated with significantly lower postoperative pain, reduced incidence of postoperative swelling, and lower procedural cost without increasing recurrence or mesh-related complications.

Keywords: Inguinal hernia, enhanced-view totally extraperitoneal (eTEP), Mesh fixation.

INTRODUCTION

Hernia is a protrusion of whole or part of a viscus through the wall that contains it.[1] A primary hernia is defined as spontaneous herniation of intra-abdominal contents through a defect in the abdominal wall that is not related to a scar from surgery or trauma.[2] Trocars insertion for laparoscopic surgery may also cause defects in the abdominal wall fascia which is called port sites hernia. Pre-peritoneal fat, omentum, or the intestines fill these hernia sacs. If the neck of the sac is

narrow, complications including obstruction, strangulation or gangrene may happen. Surgical repair is the cornerstone of hernia treatment.[3] Surgery is typically advised for people with an acceptable operative risk, hernias that are symptomatic or who are at an elevated risk of hernia-related complications. They may have an impact on a person's quality of life, cause hospitalizations and in some cases, even result in death.[4]

Pain, swelling or fullness at the site of incidence are common symptoms of abdominal wall hernia, which can vary with position or Valsalva. In most cases, a history and physical examination are sufficient to diagnose an abdominal hernia, although extreme obesity, a key risk factor, can limit the examination. Because hernias can vary with exercise or even standing, it is critical that the patient should be evaluated in a variety of situations. A variety of adjunct assessments, such as ultrasound or CT scan, can be done to aid in diagnosis.[5] Repair of inguinal hernia is one of the most frequently performed operations in general surgery.[6] In India, inguinal hernia repair stands as the most prevalent elective surgery, affecting 15%-20% of the population, with an estimated 1.5 to 2 million cases. Predominantly afflicting men, 90% of inguinal hernia repairs target them, while 70% of femoral hernia repairs focus on women. Inguinal hernias can be unilateral or bilateral. The hernia defect degree determines how the bilateral inguinal hernia is repaired. For the simultaneous repair of bilateral inguinal hernias, giant prosthetic reinforcement of the visceral sac (Stoppa repair) or laparoscopic repair are preferred methods.[7]

The surgical approach to this common ailment has undergone a significant evolution over the past few decades. The paradigm shifted from traditional open tension repairs to tension-free techniques with the introduction of prosthetic mesh, which dramatically reduced recurrence rates. A further revolution occurred with the advent of minimally invasive surgery, leading to the development of laparoscopic techniques such as the Transabdominal Preperitoneal (TAPP) and the Totally Extraperitoneal (TEP) repair. These methods offered patients benefits including reduced postoperative pain, faster recovery and improved cosmesis. The eTEP technique differs from conventional TEP by performing a more extensive preperitoneal dissection, creating an "enhanced" retromuscular and preperitoneal working space that extends superiorly to the umbilicus and laterally to the anterior axillary line. This wider dissection theoretically places a larger mesh and provides better coverage of the myopectineal orifice, but it also raises concerns about potential mesh displacement due to the larger extraperitoneal dead space.[8]

The e-TEP approach can quickly and easily create an extra peritoneal space, enlarge the surgical field, provide a flexible port setup adaptable to many situations, allow unencumbered parietalization of the cord structures (proximal dissection of the sac and peritoneum), ease the management of the distal sac, and improve tolerance of pneumoperitoneum, which is a common complication.[9]

There are various surgical methods to prepare ventral hernia. In today's scenario laparoscopic repair has taken front seat in comparison to open hernia repair. There are various laparoscopic methods such as eTEP, TARM, TAPP to do this. Of these eTEP and TARM are most frequently done in our institute. The purpose of this study is to compare fixation of mess versus non fixation during laparoscopic eTEP inguinal hernia repair.

OBJECTIVES

The study aimed to compare the outcomes of mesh fixation versus non-fixation in laparoscopic enhanced-view totally extraperitoneal (eTEP) inguinal hernia repair. The primary objectives were to evaluate postoperative pain, recovery, and cost-effectiveness between the two techniques. Secondary objectives included comparison of operative time, assessment of postoperative complications such as pain and seroma during follow-up visits, and evaluation of hernia recurrence rates in patients undergoing eTEP repair with or without mesh fixation.

MATERIALS AND METHODS

This prospective comparative interventional study was conducted in the Department of General Surgery, JLN Medical College and Associated Hospitals, Ajmer, from June 2024 to December 2025. A total of 60 adult patients diagnosed with uncomplicated unilateral inguinal hernia were enrolled and randomly allocated into two groups: Group A (n=30), who underwent laparoscopic enhanced-view totally extraperitoneal (eTEP) inguinal hernia repair with mesh fixation, and Group B (n=30), who underwent eTEP repair without mesh fixation.

After obtaining written informed consent, all patients underwent detailed clinical evaluation, including history, physical examination, and relevant preoperative investigations. Adults aged >18 years of either sex with uncomplicated unilateral inguinal hernia and American Society of Anesthesiologists (ASA) grade I or II were included. Patients with previous major abdominal surgery, bilateral inguinal hernia, femoral hernia, strangulated or incarcerated hernia, recurrent hernia, or high anesthetic risk were excluded from the study.

Perioperative and postoperative outcomes were recorded and compared between the two groups using appropriate statistical methods. A p-value <0.05 was considered statistically significant.

OBSERVATIONS

Table 1 : Age Distribution of Patients Undergoing Laparoscopic eTEP Inguinal Hernia Repair

Age Range (years)	Group A (eTEP with Mesh Fixation)		Group B (eTEP with non Fixation)	
	No. of patients	Percent	No. of patients	Percent
> 20	0	0.00	1	3.33
21-40	10	33.33	11	36.67
41-60	13	43.33	10	33.33
61-80	6	20.00	8	26.67
> 80	1	3.33	0	0.00
Total	**30**	**100.00**	**30**	**100.00**
Mean ± SD	**50.1±15.64**		**48.37±17.99**	

Table 2 : Comparison of Duration Of Surgery

Duration of Surgery (min)	Group A (eTEP with Mesh Fixation)		Group B (eTEP with non Fixation)		P Value
	No. of patients	Percent	No. of patients	Percent	
< 60 min.	26	86.67	27	90.00	0.687
> 60 min.	4	13.33	3	10.00	
Total	**30**	**100.00**	**30**	**100.00**	

Table 3 : Comparison of Post-Operative Pain Scores (Mean VAS Score)

Mean Pain VAS Score	Group A (eTEP with Mesh Fixation)		Group B (eTEP with non Fixation)		P Value
	Mean	SD	Mean	SD	
0-6 hour	6.47	1.70	4.80	1.77	P < 0.001 (S)
6-12 hour	4.40	1.25	3.37	1.30	P = 0.003 (S)
12-24 hour	2.87	1.25	1.97	0.93	P = 0.002 (S)
24-72 hour	1.47	0.86	0.70	0.60	P < 0.001 (S)

Table 4 : Postoperative Complications In Group A And Group B Patients

Postoperative Complications		Group A (eTEP with Mesh Fixation)		Group B (eTEP with non Fixation)	
Complications	Time duration	No. of patients	Percent	No. of patients	Percent
Fever	0-6 hour	2	6.67	0	0.00
	6-12 hour	2	6.67	4	13.33
	12-24 hour	3	10.00	1	3.33
	24-72 hour	2	6.67	1	3.33
Urinary Retention	0-6 hour	4	13.33	4	13.33
	6-12 hour	0	0.00	0	0.00
	12-24 hour	1	3.33	1	3.33
	24-72 hour	1	3.33	0	0.00
Wound Seroma	0-6 hour	3	10.00	0	0.00
	6-12 hour	1	3.33	1	3.33
	12-24 hour	4	13.33	1	3.33
	24-72 hour	7	23.33	3	10.00
Wound Infection	0-6 hour	0	0.00	0	0.00
	6-12 hour	0	0.00	0	0.00
	12-24 hour	0	0.00	0	0.00
	24-72 hour	5	16.67	2	6.67

Table 5 : Follow-Up Assessment Of Pain/Discomfort (VAS Scores)

Follow Up		Group A (eTEP with Mesh Fixation)		Group B (eTEP with non Fixation)		P Value
		Mean	SD	Mean	SD	
	1 Week	1.17	0.79	0.53	0.51	P<0.0001 (S)

Pain/Discomfort (VAS)	1 Month	0.23	0.50	0.07	0.25	
	3 Month	0	0	0	0	

Table 6 : Follow-Up Outcomes in Group A and Group B patients undergoing Laparoscopic eTEP Inguinal Hernia Repair

Follow Up		Group A (eTEP with Mesh Fixation)		Group B (eTEP with non Fixation)	
		No. of patients	Percent	No. of patients	Percent
Wound infection	I Week	3	10	3	10
	I Month	0	0	0	0
	3 Month	0	0	0	0
Ambulation	I Week	0	0	0	0
	I Month	0	0	0	0
	3 Month	0	0	0	0
Swelling	I Week	8	26.67	0	0
	I Month	1	3.33	0	0
	3 Month	1	3.33	0	0
Recurrence	I Week	0	0	0	0
	I Month	0	0	0	0
	3 Month	0	0	0	0
Mesh Mirgration)	I Week	0	0	0	0
	I Month	0	0	0	0
	3 Month	0	0	0	0

DISCUSSION

In the present study, the mean age was 50.1 ± 15.64 years in the mesh fixation group and 48.37±17.99 years in the non-fixation group, indicating that inguinal hernia was more common among middle-aged and older adults. The age distribution was comparable between the two groups. Similar findings were reported by Yilmaz AH et al. (2026)[10], who observed mean ages of 42.7±10.5 years and 43.9±14.6 years, in the fixation and non-fixation groups, respectively. Although patients in the present study were slightly older, the findings are broadly consistent with previous studies, supporting that inguinal hernia predominantly affects adults in the middle and older age groups. **(Table 1)**

In the present study, postoperative fever and urinary retention were observed in both groups, with comparable incidence rates. Similar findings were reported by Kala et al. (2021)[11]**,** Gangopadhyay and Ghosh (2018)[12] and Singh et al. (2022)[13], who found no significant difference in these complications between mesh fixation and non-fixation groups. Seroma and wound infection were more common in the mesh fixation group (50.0% and 16.67%, respectively) compared to the non-fixation group (16.67% and 6.67%). These findings are consistent with Yilmaz and Ulutas (2026)[10], Daes (2014)[14] and Shenoy et al. (2023)[15] who reported lower postoperative morbidity with atraumatic mesh placement. Thus, the present study suggests that non-fixation of mesh in eTEP repair is associated with fewer postoperative complications while maintaining safety and effectiveness. **(Table 4)**

Postoperative pain is an important parameter for evaluating patient recovery after eTEP inguinal hernia repair. In the present study, the mean VAS pain score at 1 week was significantly higher in the mesh fixation group (1.17 ± 0.79) compared to the non-fixation group (0.53 ± 0.51) (P<0.0001). However, pain scores decreased substantially in both groups at 1 month and were absent at 3 months. These findings are consistent with Gangopadhyay and Ghosh (2018)[12] and Kala et al. (2021)[11], who reported significantly lower early postoperative pain in patients undergoing non-fixation of mesh compared to fixation. Similarly, Yilmaz and Ulutas (2026)[10] observed reduced postoperative discomfort with non-fixation due to avoidance of tissue trauma caused by fixation devices. Thus, the present study supports the evidence that non-fixation of mesh in eTEP repair results in less early post-operative pain without affecting long-term outcomes. **(Table 5)**

During follow-up, wound infection was observed in 10% of patients in both groups at 1 week and resolved completely by 1 month. Similar low infection rates were reported by Kala et al. (2021)[11], Gangopadhyay and Ghosh (2018)[12] and Bhushan et al. (2025)[16]**,** indicating that mesh fixation does not significantly influence wound infection rates. Postoperative swelling was more common in the mesh fixation group (26.67% at 1 week) compared to the non-fixation group (0%). This finding is comparable to the observations of Shenoy et al. (2023)[15] and Yilmaz and Ulutas (2026)[10], who reported increased postoperative seroma or swelling with fixation-related tissue trauma. No recurrence, mesh migration, or ambulation-related complications were observed in either group during the 3-month follow-up. Similar findings were reported by Kala et al. (2021)[11] and Yilmaz and Ulutas (2026)[10], demonstrating that non-fixation of mesh is safe and does not increase the risk of recurrence or mesh displacement in eTEP inguinal hernia repair.

CONCLUSION:

This prospective comparative study demonstrated that both mesh fixation and non-fixation techniques in laparoscopic eTEP inguinal hernia repair are safe and effective, with no recurrence or mesh migration observed during the follow-up period. However, the non-fixation group showed significantly lower postoperative pain scores, reduced incidence of post-operative swelling / seroma, and comparable complication rates when compared to the fixation group. Additionally, mesh non-fixation offers the advantage of reduced operative cost by eliminating the need for fixation devices. Therefore, mesh non-fixation appears to be a feasible, safe, and cost-effective alternative to mesh fixation in laparoscopic eTEP inguinal hernia repair**,** without compromising short-term surgical outcomes.

BIBLIOGRAPHY

1. Aslani N, Brown CJ. Does mesh offer an advantage over tissue in the open repair of umbilical hernias? A systematic review and meta-analysis. Hernia. 2010;14(5):455-462.
2. Muysoms F, Jacob B. International hernia collaboration consensus on nomenclature of abdominal wall hernia repair. World J Surg 2018;42:302–304.
3. Muysoms FE, Miserez M, Berrevoet F, et al. Classification of primary and incisional abdominal wall hernias. Hernia 2009;13(4):407–414.
4. Cho JE, Helm MC, Helm JH, Mier N, Kastenmeier AS, Gould JC, Goldblatt MI. Retro-rectus placement of bio-absorbable mesh improves patient outcomes. Surg Endosc. 2019 Aug;33(8):2629-2634.
5. Smolevitz J, Jacobson R, Thaqi M, Millikan S, Millikan KW. Outcomes in complex ventral hernia repair with anterior component separation in class III obesity patients. Am J Surg 2018; 215:458–461.
6. Zib M, Gani J (2002) Inguinal hernia repair: where to next? ANZ J Surg 72:573–579.
7. Belyansky I, Reza Zahiri H, Sanford Z, Weltz AS, Park A. Early operative outcomes of endoscopic (eTEP access) robotic-assisted retromuscular abdominal wall hernia repair. Hernia. 2020;24(3):525-533.
8. Radu VG, Cucu DT. The eTEP/eTEP-TAR Repair of Ventral Hernias a Study From One Center/ One Surgeon-The First Five Years of Experience. J Abdom Wall Surg. 2024;3:12796.
9. Belyansky I, Reza Zahiri H, Sanford Z, Weltz AS, Park A. Early operative outcomes of endoscopic (eTEP access) robotic-assisted retromuscular abdominal wall hernia repair. Hernia. 2020;24(3):525-533.
10. Yilmaz AH, Ulutas ME. Assessment of mesh displacement following laparoscopic enhanced view totally extraperitoneal technique: comparing mesh fixation and non-fixation in difficult inguinal hernias. Updates in Surgery. 2026;78:935-944.
11. Kala S, Jauhari RK, Singh A, et al. A prospective comparative study in laparoscopic inguinal hernia repair with regard to fixation and non-fixation of mesh in a tertiary care centre in northern India. J Evid Based Med Healthc 2021;8(27):2417-2422.
12. Gangopadhyay A, Ghosh BC. To compare advantage of non-fixation versus fixation of mesh in Laparoscopic totally Extra Peritoneal (TEP) repair of inguinal hernias. Asian Journal of Medical Sciences, 2018; 9 (4) : 35-40.
13. Singh S, Kala S, Jauhari RK et al. A prospective randomized study of eTEP and TEP repair for inguinal hernia in terms of ease of operability, complication and recurrences. Asian Journal of Medical Sciences, 2022; 13 (3) : 87-94.
14. Daes J. Endoscopic repair of large inguinoscrotal hernias: management of the distal sac to avoid seroma formation. Hernia. 2014;18:119–22.
15. Shenoy G, Shamburao RB, Thomas M. Enhanced view totally extraperitoneal approach to irreducible inguinoscrotal and giant inguinal hernias: Technical remarks and 5-year experience. Int J Abdom Wall Hernia Surg 2023;6:242-50.
16. Bhushan A, Kumar M, Manhas AS, Singh G. To evaluate the safety and efficacy of the eTEP technique in treating inguinal hernias. Annals of Medicine and Medical Sciences. 2025;4:1266-1270.