

# A Comparative Prospective Study between Enhanced Total Extraperitoneal (eTEP) Repair V/S Transabdominal Preperitoneal (TAPP) Repair in Groin Hernias

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## Abstract:

**Introduction:** A hernia is an abnormal protrusion of tissue through a defect in the surrounding walls, and includes direct inguinal, indirect inguinal, and femoral hernias. Repair techniques have evolved from Bassini's method to tension-free approaches using polypropylene mesh. Current minimal access techniques include TAPP and TEP, with eTEP offering advantages in complex hernias. eTEP provides a larger surgical field, easier management of large hernias, improved tolerance of pneumoperitoneum, and reduced risk of complications than TAPP.

**Aim:** This study aimed compare postoperative pain and complications between the eTEP and TAPP techniques in groin hernia repair.

**Methodology:** This study analyzed groin hernia cases treated electively at the JLN Medical College, Ajmer, from January 2023 to July 2024. Fifty patients were randomly assigned to two groups: 25 for eTEP (Group A) and 25 for TAPP (Group B). Inclusion criteria were patients over 12 years who consented to laparoscopic repair, with specific exclusion criteria related to prior conditions and complications. Data collected encompassed demographics, medical history, surgical specifics, and postoperative complications such as pain etc.

**Results:** The results showed that the eTEP group had shorter surgery times for unilateral hernias, lower postoperative pain, fewer complications, and shorter hospital stays than to the TAPP group. Both techniques were effective in preventing hernia recurrence, with only one recurrence in the TAPP group and no recurrence in the eTEP group. The eTEP group also showed a faster return to duty, further highlighting the advantages of this approach in terms of patient recovery.

**Conclusion:** Our study highlights the advantages of eTEP over TAPP for inguinal hernia repair, including reduced postoperative pain, shorter hospital stay, and quicker recovery. Both techniques effectively prevent recurrence, however eTEP resulted in fewer complications. Further long-term studies with larger sample sizes are required to validate these findings across diverse patient populations.

**Keywords:** hernia, extraperitoneal, transabdominal Preperitoneal.

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## Introduction

The term groin hernia comprises three types of hernias depending on the location relative to the inguinal (Hesselbach) triangle and includes direct inguinal, indirect inguinal, and femoral hernias. A direct inguinal hernia is a protrusion of tissue through the posterior wall of the inguinal canal, medial to the inferior epigastric vessels. An indirect inguinal hernia protrudes through the internal inguinal ring, lateral to the inferior epigastric

vessels. A femoral hernia is the protrusion of tissue below the inguinal ligament, medial to the femoral vessels. Inguinal hernias are a common problem worldwide a prevalence of 1.7% in the adult population[1,2] The minimal access techniques that are practiced widely at present are mainly: Trans abdominal pre-peritoneal (TAPP) repair, Total extra peritoneal (TEP) repair, Intraperitoneal onlay meshplasty (IPOM) and Enhanced view TEP repair

(eTEP). eTEP is a novel technique first introduced by Daes in 2012 to address difficult groin hernias. The principle is to create a larger space than that used in TEP to treat large groin hernias. The advantage of TEP repair is the non-violation of the peritoneal cavity with the procedure performed totally in the preperitoneal space[3]

**The most salient features of the eTEP technique are:** Fast and easy creation of the extraperitoneal space, a large surgical field, a flexible port setup adaptable to many clinical situations, easy parietalization of the cord structures (proximal dissection of the sac and peritoneum), easier management of the distal sac in cases of large inguinoscrotal hernias, improved tolerance of pneumoperitoneum, which is a common complication, reduced risk of intestinal injury, less need for visceral retraction, less frequent postoperative ileus, fewer intraperitoneal adhesions and associated complications, fewer adverse hemodynamic effects than with the intraperitoneal approach

**Salient features of TAPP repair [4,5]:** Opportunity to provide a panoramic view of the myopectineal orifice with detection of unsuspected contralateral hernia and opportunity to evaluate the peritoneal cavity.

Hence, this study aimed to determine the advantages of eTEP over TAPP in groin hernia. In this context, the present study was conducted to compare post-operative pain and post-operative complications between the two procedures.

#### Aims and objectives:

**(1) Primary Objectives:** To compare eTEP and TAPP repair in terms of complications and recurrence. Comparison of post-operative pain between eTEP and TAPP.

**(2) Secondary Objectives:** To compare the duration of surgery between eTEP and TAPP for groin hernia repair. Comparison of length of hospital stay.

#### Material and Methods

The study includes 50 patients admitted with a diagnosis of inguinal hernia and electively treated in the Department of Surgery, JLN Medical College & Associated Group of Hospitals, Ajmer from January 2023 to July 2024. After obtaining clearance from the ethical committee a study was conducted. Consent was obtained from all the patients. Simple random sampling was performed to select the patients. Simple Random Sampling by Lottery. This study was divided into two groups: Group A (n=25): eTEP and Group B (n=25): TAPP

**Inclusion criteria:** Patients with groin hernia of age more than 12 years of either sex and patients who gave consent for laparoscopic hernia repair.

**Exclusion criteria:** Patients with lower abdominal scars, contraindicated laparoscopic procedure, general anaesthesia and cases of complicated groin hernia were excluded.

Patients related factor such as age, sex, obesity, constipation, prostatism, diabetes mellitus, hypertension, consumption of tobacco and alcohol and surgical history were recorded. Routine investigations including Hematology, Urine examination, chest x-ray, ECG, Ultrasound abdomen and pelvis for all patients and other special investigations were performed for associated diseases wherever required.

#### Statistical Analysis

Data Entry was performed using Microsoft Excel 2013 and analysis was performed using SPSS V 16.

Qualitative data are expressed as frequencies and percentages and quantitative data are expressed as mean and standard deviation.

Non parametric test including the chi-square test were used for qualitative data. An unpaired t test was used for parametric data.

Bar diagrams were used to represent the data with a p value of <0.05 which was considered statistically significant.

#### Results:

**Table 1: Age and Sex Distribution**

Age Group (years)	eTEP		TAPP		Total	
	N	%	N	%	N	%
21 – 30	2	8%	0	0%	2	4%
31 – 40	3	12%	5	20%	8	16%
41 – 50	9	36%	7	28%	16	32%
51 – 60	7	28%	10	40%	17	34%
61 – 70	4	16%	3	12%	7	14%
Total	25	100%	25	100%	50	100%
Mean Age	48.24 ± 10.81		48.88 ± 9.88		48.56 ± 10.26	
Chi square test= 3.42, p=0.48, Not statistically significant						

Gender	eTEP		TAPP		Total	
	N	%	N	%	N	%
Male	25	100%	25	100%	50	100%
Female	0	0%	0	0%	0	0%
<b>Total</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>	<b>50</b>	<b>100%</b>

Table 2:

	Tackers Used				Conversion to Open			
	eTEP		TAPP		eTEP		TAPP	
	N	%	N	%	N	%	N	%
Yes	4	4%	25	0%	1	4%	0	0%
No	21	96%	0	100%	24	96%	25	100%
<b>Total</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>
	Chi square test= 35.48, p=0.0001*, statistically significant				Chi square test= 1.00, p=0.31, Not statistically significant			

Table 3: Postoperative Pain

	Day 1				Day 3			
	eTEP		TAPP		eTEP		TAPP	
	N	%	N	%	N	%	N	%
No pain (0)	4	16%	0	0%	6	24%	3	12%
Mild pain (1-3)	16	64%	10	40%	15	60%	13	52%
Moderate pain (4-7)	5	20%	13	52%	4	16%	9	36%
Severe pain (8-10)	0	0%	2	8%	0	0%	0	0%
<b>Total</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>
	Chi square test= 9.31, p=0.02*, statistically significant				Chi square test= 9.26, p=0.02*, statistically significant			

Table 4: Post-operative complications

Complications	eTEP		TAPP	
	N	%	N	%
Vascular injury	0	0%	0	0%
Visceral injury	0	0%	0	0%
Urinary retention	0	0%	2	8%
Seroma	0	0%	2	8%
Wound Hematoma	0	0%	0	0%
Wound infection	0	0%	1	4%
Hydrocoele	0	0%	0	0%
Neuronal injury	0	0%	0	0%
Surgical Emphysema	3	12%	0	0%

Table 5: Length of hospital stay in days

	eTEP	TAPP	P value
Length of hospital stay in days (Mean)	2.64 ± 0.57	2.88 ± 0.44	0.001*

Table 6: Recurrence after 6 months

Recurrence	eTEP		TAPP		Total	
	N	%	N	%	N	%
Yes	0	0%	1	4%	1	2%
No	25	100%	24	96%	49	98%
<b>Total</b>	<b>25</b>	<b>100%</b>	<b>25</b>	<b>100%</b>	<b>50</b>	<b>100%</b>
Chi square test= 1.00, p=0.31, Not statistically significant						

Table 7: Return back to duty

	eTEP	TAPP	P value
Return back to work in days (Mean)	2.8 ± 0.71	3.5 ± 0.58	0.001*

## Discussion

The mean age of the eTEP and TAPP groups were approximately 48.24 years and 48.88 years respectively. Similarly, Singh S et al (2022)[6] reported mean age of 45.7 and 44.2 years for TEP and eTEP, respectively. In a meta-analysis Aiolfi A (2021)[3] age of patients undergoing TEP and TAPP varied from 18 to 92 years, with an average age similar across both techniques. In the study by Srivastava NK et al. (2023)[11] mean age for eTEP and TAPP groups is 49.28 years and 44.36 years respectively. In the present study, all participants were male. This aligns with Aiolfi A (2021)[3] the majority of the patients were male, with no significant gender disparity reported between TEP and TAPP repair. Ferzli G et al (2019)[7] also note that TEP is commonly used to diagnose femoral hernias in both male and female patients with groin hernias, particularly in female patients. (Table 1).

In the present study, all TAPP patients required tackers, while only 4% of eTEP patients needed them. Ferzli G et al (2019)[7] suggest that mesh fixation with tackers is not always necessary in TEP, as leaving the mesh untacked can reduce postoperative pain without increasing the risk of recurrence. Dong Hui et al. (2023)[8] which showed that in TEP group the operation time ( $P=0.001$ ) of the unfixed mesh group was shorter than that of the fixed mesh group; additionally, the postoperative 24-h pain score ( $P=0.04$ ) and incidence of urinary retention ( $P=0.001$ ) were lower in the unfixed mesh group. (Table 2)

In the present study, 4% of eTEP patients required conversion to open surgery, while no TAPP patients were converted. Similarly, Singh S et al (2022)[6] reported a higher conversion rate, with 16% of eTEP patients requiring conversion to TAPP. Andresen K et al (2024)[9] reported TEP technique may carry a higher risk of conversion to another hernia repair method (either TAPP technique or open surgery) when compared to TAPP (2.5% versus 0.7%; OR 0.28, 95% CI 0.09 to 0.84,  $P=0.02$ ,  $I^2=0\%$ ; 13 studies, 1178 participants; low certainty of evidence). Aiolfi A (2021)[3] reported that Conversion from laparoscopic to open surgery occurred slightly more frequently in TEP procedures due to technical difficulties such as preperitoneal adhesions or inadvertent peritoneal tear. TAPP, with its panoramic view of the surgical field, had fewer conversions. (Table 2)

The present study shows significantly less pain in the eTEP group on postoperative day 1 compared to the TAPP group. Singh S et al (2022)[6] also found lower VAS scores in the eTEP group compared to TEP, particularly in the first 12 hours postoperatively. Ferzli G et al (2019)[7] argue that

avoiding entry into the peritoneal cavity in TEP reduces postoperative pain and speeds recovery compared to open approaches. Krishna A et al (2012)[10] the pain scores at 1 hour and 24 hour after surgery and at 3-month follow-up were significantly higher in the TAPP group ( $p<0.05$ ) as compared to TEP group. In this study, TEP had a significant advantage over TAPP for significantly reduced postoperative pain up to 3 months, which resulted in a better patient satisfaction score. (Table 3) In the present study, postoperative pain on day 3 was significantly lower in the eTEP group (mean VAS score of 1.1) compared to the TAPP group (mean VAS score of 0.3). Singh S et al (2022)[6] also reported that postoperative pain scores were lower in the eTEP group compared to the TEP group. They observed that the mean VAS score at postoperative day 3 was 0.3 for eTEP and 1.1 for TEP, showing a significant difference in favor of eTEP for minimizing pain. Similarly, Ferzli G et al (2019)[7] indicated that the TEP technique can result in reduced postoperative pain, especially since the approach avoids entry into the abdominal cavity and reduces the need for electrocautery, which can cause more tissue trauma.

These findings align with the present study, indicating that the TEP approach tends to result in less postoperative pain due to its minimally invasive nature. Krishna A et al (2012)[10] in this study, TEP had a significant advantage over TAPP for significantly reduced postoperative pain up to 3 months, which resulted in a better patient satisfaction score. (Table 3)

The present study reported minimal postoperative complications in both groups, with the most notable being urinary retention, surgical emphysema and seroma. Singh S et al (2022)[6] similarly found that complications such as seroma occurred in a small percentage of patients (8% in the eTEP group). Additionally, Ferzli G et al (2019)[7] highlighted that the TEP technique is associated with fewer complications, such as bowel injury and adhesion formation, due to the avoidance of entering the abdominal cavity. In contrast Krishna A et al (2012)[10] study showed that in the TEP group, 37.8% of patients had seroma compared to 18.3% in the TAPP group ( $p=0.021$ ). However, there was a higher incidence of scrotal edema in the TAPP group (16 vs. 9,  $p=0.009$ ). The wound infection rates were equal (2% vs. 3%). (Table 4)

The present study observed that patients in the eTEP group had a shorter hospital stay (2.6 days) compared to the TAPP group (2.8 days). This aligns with Singh S et al (2022)[6] who found that eTEP patients had shorter hospital stays than TEP patients, with the eTEP group averaging 1.1 days compared to 1.7 days for the TEP group. Ferzli G et al (2019)[7] highlighted that the faster recovery

associated with TEP leads to shorter hospital stays compared to traditional open surgeries. Aiolfi A (2021)[3] hospital stay length was also comparable between the two methods (TEP and TAPP), with no significant differences. In the study of Nethaji K et al. (2023)[12] the mean postoperative hospital stay was  $2.07 \pm 0.59$  and  $2.80 \pm 1.32$  days in E-TEP and TAPP groups, respectively ( $P=0.044$ ) (Table 5)

The present study recorded only one recurrence (4%) in the TAPP group and no recurrences in the eTEP group. Singh S et al (2022)[6] reported no recurrences in either the eTEP or TEP groups during their follow-up period, suggesting that both techniques are effective in preventing recurrence. Ferzli G et al (2019)[7] similarly emphasized that TEP, when performed correctly, has a low recurrence rate due to the secure placement of mesh in the preperitoneal space, which covers all potential hernia sites.

Krishna A et al (2012)[10] there has been no recurrence in either group during the follow-up period of 44 months. Overall, the patients were more satisfied with TEP rather than TAPP ( $p < 0.05$ ). (Table 6)

In the present study, patients in the eTEP group returned to duty significantly faster (2.8 days) than those in the TAPP group (3.5 days). Singh S et al (2022)[6] found that patients in the eTEP group returned to work sooner (9.9 days) than those in the eTEP group (11.6 days), reflecting a similar trend of faster recovery with the extraperitoneal approach. Ferzli G et al (2019)[7] also noted that patients undergoing eTEP tend to have a quicker return to normal activities due to reduced trauma to the abdominal wall and faster recovery times than those undergoing TAPP.

This is consistent with the findings of the present study, which shows the benefits of the TEP approach in facilitating a quicker return to normal life. Aiolfi A (2021)[3] measured return to work or daily activities in eight studies, and no significant advantage was found for either technique, suggesting that patients recover at similar rates regardless of whether they underwent TAPP or TEP. (Table 7)

## Conclusion

Owing to the significant studies differentiating between TAPP and eTEP hernia repair techniques, our study offers a crucial foundation for research, providing valuable data that can support further investigation and contribute to advancing surgical knowledge in this field.

The study concluded that the eTEP technique offers several significant advantages over the TAPP approach for inguinal hernia repair, particularly in terms of reduced postoperative pain, shorter hospital stays, and faster return to normal activities.

While both techniques were effective in preventing hernia recurrence, eTEP showed a slight advantage in terms of fewer complications and better overall recovery outcomes.

These findings are consistent with those of previous studies comparing TEP with TAPP repair, suggesting that eTEP is a safe, efficient, and minimally invasive option for inguinal hernia repair, making it particularly suitable for patients requiring faster recovery with minimal intra-operative complication and postoperative discomfort.

Further long-term studies with larger sample sizes are recommended to validate these results and explore the broader applicability of eTEP in different patient populations.

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