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# A PROSPECTIVE RANDOMISED STUDY BETWEEN E-TEP AND TAPP IN COMPLETE INGUINAL HERNIAS

General Surgery

**Dr. Anshika Rajen Varma** JR, PG 3rd Year, Department Of General Surgery, GSVM Medical College, Kanpur

**Dr. Ramendra Kumar Jauhari** MS, Professor, Department Of General Surgery, GSVM Medical College, Kanpur

**Dr. Anurag Singh** MS, Associate Professor Department Of General Surgery, GSVM Medical College, Kanpur,

**Dr. Abhimanyu Kapoor** MS, MCH (Surgical Gastroenterology), Regency Hospital, Kanpur.

## ABSTRACT

Inguinal hernias, characterized by the protrusion of abdominal contents through the inguinal canal, are prevalent and significant conditions in surgical practice. The advent of laparoscopic surgery has introduced techniques such as Transabdominal Preperitoneal (TAPP) and Extended Totally Extraperitoneal (e-TEP) for hernia repair, each with its advantages and challenges. This study's primary aim is to evaluate ease of operability of e-TEP and TAPP for Complete Inguinal Hernia repairs and to compare e-TEP and TAPP repair in terms of complications and recurrence. A prospective randomized study was conducted at GSVM Medical College, Kanpur, involving 52 patients with complete inguinal hernias, equally divided into TAPP and e-TEP groups. The patients were evaluated based on operative time, intraoperative and postoperative complications, postoperative pain, and recurrence rates. The study's results indicated that both TAPP and e-TEP techniques have specific advantages and limitations. Key findings include: TAPP had a higher incidence of intra-abdominal complications. e-TEP showed a technically demanding procedure with benefits in specific cases. Comparative analysis of operative time, complication rates, and recurrence provided insights into the efficacy of each technique. Both TAPP and e-TEP techniques are viable options for laparoscopic inguinal hernia repair, each with unique benefits. The study contributes valuable data to aid in clinical decision-making, highlighting the need for tailored approaches based on patient-specific factors and hernia characteristics, however the final decision is extensively based on the surgeon's expertise and the procedure he is comfortable with.

## KEYWORDS

e-TEP; TAPP; Ease of Operability; Complications; Recurrence;

## INTRODUCTION

Inguinal hernia repair is one of the most common surgical procedures performed worldwide. Historically, it has been a cornerstone of general surgery, with millions of patients undergoing hernia repair annually. The evolution of hernia repair techniques mirrors the broader advancements in surgical practice, from open surgical methods to the advent of minimally invasive techniques, which have revolutionized the management of this condition. Inguinal hernias occur when abdominal contents protrude through a weakened area in the inguinal canal, often leading to discomfort, pain, and potential complications such as bowel obstruction or strangulation. Traditional open hernia repair methods, such as the Lichtenstein technique, have been the gold standard for decades. However, these methods come with limitations, including significant postoperative pain, longer recovery times, and a higher risk of complications, particularly in cases of bilateral or recurrent hernias.

The introduction of laparoscopic techniques in the late 20$^{th}$ century marked a significant turning point in hernia surgery. Laparoscopic Transabdominal Preperitoneal (TAPP) repair and Totally Extraperitoneal (TEP) repair have since become popular alternatives to open surgery, offering benefits such as reduced postoperative pain, faster recovery, and lower recurrence rates. More recently, the Enhanced View-Total Extraperitoneal (e-TEP) technique has emerged as a novel approach to minimally invasive hernia repair. This technique builds on the principles of TEP but offers an enhanced view of the surgical field, which can potentially improve the safety and efficacy of the procedure. The comparative analysis of e-TEP and TAPP techniques is crucial for several reasons. First, as the prevalence of inguinal hernias continues to rise globally, there is a growing need to optimize surgical techniques to improve patient outcomes. Second, while both e-TEP and TAPP are minimally invasive approaches, they differ significantly in terms of the anatomical approach, the learning curve for surgeons, and the potential risks and benefits for patients.

### Study Objectives

The primary objective of this study is to compare the e-TEP and TAPP techniques in terms of clinical outcomes, operative time, intra-op and post-op complication rates, recurrence rates, and postoperative pain. Additionally, the study aims to assess the learning curve associated with each technique and to identify patient-specific factors that may influence the choice of surgical approach.

## MATERIAL AND METHODS

The present hospital-based prospective study was conducted on patients with inguinal hernia those were admitted in Department of General Surgery at GSVM Medical College, Kanpur of age more than 18 years both sex, after obtaining the consent form the patient or their relatives were studied during the period of study in 2022, 2023, 2024. The study adhered to ethical standards and guidelines. Informed consent was obtained from all participants before their inclusion in the study. Patient confidentiality was maintained throughout the research process.

### Study Design

Hospital-based prospective interventional study.

### Study Population

Patients who presented with complete inguinal hernia. During the period of study a total of 52 patients were found eligible as per the inclusion criteria those were admitted to the department.

### Inclusion Criteria

- Age more than 18 years
- Patient giving consent for laparoscopic hernia repair

### Exclusion Criteria

- Patients with lower abdominal scar
- Patients in which laparoscopic procedure is contraindicated.
- Patients with recurrence after laparoscopic techniques for hernia repairs e-TEP/ TEP/TAPP
- Cases of strangulated inguinal hernia.
- Patients with irreducible inguinal hernia.

## RESULTS

### Patient Demographics and Baseline Characteristics

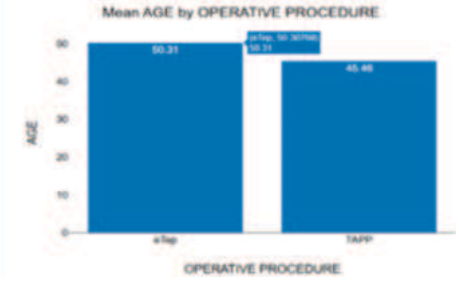
| VARIABLE | TAPP | E-TEP |
|---|---|---|
| AGE (MEAN ± SD) | 45.46 ± 15.90 | 50.3 ± 11.70 |
| DURATION OF SYMPTOMS | 9.21 ± 11.28 | 13.88 ± 11.19 |
| UNILATERAL | 21 | 21 |

| | | |
|---|---|---|
| RIGHT | 18 | 12 |
| LEFT | 8 | 14 |
| BILATERAL | 5 | 5 |
| DIRECT | 4 | 3 |
| INDIRECT | 22 | 23 |

A total of 52 patients were enrolled in the study, with 26 assigned to the e-TEP group and 26 to the TAPP group. The mean age of the patients was 50.3± 11.70 years in the e-TEP group and 45.46 ± 15.90 years in the TAPP group, with no statistically significant difference between the groups. The majority of patients were male. Baseline characteristics, including BMI, the presence of comorbidities, and the size and laterality of the hernias, were similar between the two groups, ensuring comparability.

AGE DISTRIBUTION AMONG PATIENTS

Patients more than 18 years of age were selected in our study.




| | | Frequency | % | Mean | Std. Deviation | Mini-mum | Maxi-mum |
|---|---|---|---|---|---|---|---|
| AGE | TAPP | 26 | 49.06% | 45.46 | 15.91 | 19 | 72 |
| | e-TEP | 26 | 49.06% | 50.31 | 11.7 | 25 | 68 |

Operative Time

The study conducted by us observed that the operative time of TAPP group was mostly less than 2 hours when compared to the e-TEP group which was mostly seen to be moer than 2 hours.

Dissection of sac in different operative procedures

There were 4 cases of incomplete sac dissection 1 in TAPP and 3 in e-TEP group. There was no statistically significant relationship between OPERATIVE PROCEDURE and DISSECTION OF SAC, $\chi^2(1) = 1.08, p = 0.298$

| | OPERATIVE PROCEDURE | | | | | |
|---|---|---|---|---|---|---|
| | TAPP | | e-TEP | | Total | |
| | n | % | n | % | n | % |
| COMPLETE | 25 | 48.08% | 23 | 44.23% | 48 | 92.31% |
| INCOMPLETE | 1 | 1.92% | 3 | 5.77% | 4 | 7.69% |
| Total | 26 | 50% | 26 | 50% | 52 | 100% |
| Chi2 | df | | p | | | |

Intraoperative Complications

Incidence of sac tear in different operative procedure

| | OPERATIVE PROCEDURE | | |
|---|---|---|---|
| | TAPP | e-TEP | Total |
| NO | 24 | 22 | 46 |
| YES | 2 | 4 | 6 |

Vascular injury in different operative procedures

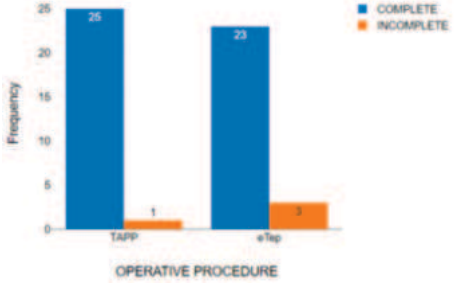
| | OPERATIVE PROCEDURE | | | | | |
|---|---|---|---|---|---|---|
| | TAPP | | e-TEP | | Total | |
| | n | % | n | % | n | % |
| NO | 26 | 50% | 25 | 48.08% | 51 | 98.08% |
| YES | 0 | 0% | 1 | 1.92% | 1 | 1.92% |
| Total | 26 | 50% | 26 | 50% | 52 | 100% |
| Chi2 | df | | p | | | |
| 1.02 | 1 | | .313 | | | |

Intraoperative complications were recorded such as sac tear, vascular injury, injury to vas deferens, injury to viscera. These complications were invariably distributed in both TAPP e-TEP groups and are their occurrence is statically insignificant.

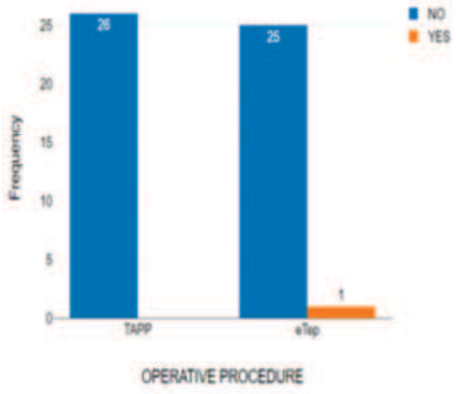
Postoperative Pain and Recovery:-Postoperative pain, as measured by the Visual Analog Scale (VAS) show that the TAPP group had equally high values for the dependent variable PAIN AT 24 HRS (Mdn = 3) than the e-TEP group (Mdn = 3). Thus indicating no significant difference in intensity of pain at 24 hours.The result was insignificant in follow-up period also.

**Postoperative Complications**

Post- Operative complications such as seroma formation, urinary retention, ischaemic orchitis, wound infections, were distributed invariably and are not particular to certain group.








## DISCUSSION

Patient Demographics and Baseline Characteristics

The study compared two laparoscopic hernia repair techniques: Transabdominal Preperitoneal (TAPP) and Enhanced View Totally Extraperitoneal (e-TEP). The mean age of patients was 45.46 years for the TAPP group and 50.31 years for the e-TEP group, with no significant difference (p = 0.217), aligning with previous research indicating age does not notably impact the choice of surgical technique (Sauerland et al., 2004; Liem et al., 2007). The average symptom duration was 9.21 months for TAPP and 13.88 months for e-TEP, also showing no significant difference (p = 0.343). This finding supports the view that symptom duration is not a major factor in technique selection (Sauerland et al., 2004).

Pain at 24 Hours Post-Operation:-Pain levels at 24 hours post-operation did not differ significantly between TAPP and e-TEP, reflecting findings from Helgstrand et al. (2012), which report similar early postoperative pain outcomes for laparoscopic hernia repairs. Both techniques lead to comparable early pain levels due to reduced tissue trauma compared to open surgery (Sauerland et al., 2004; Liem et al., 2007).

Chronic Pain at 1, 3, 6 Months, and 1 Year:-The e-TEP group reported higher chronic pain at 1, 3, and 6 months compared to TAPP, although long-term pain outcomes at 1 year were similar. This observation is in line with Helgstrand et al. (2012) and Bittner et al. (2011), who noted increased early discomfort with e-TEP, with pain levels converging over time. The complexity and greater tissue manipulation in retro rectus space in e-TEP may contribute to higher early pain levels, suggesting the need for more intensive pain management in the short term (Helgstrand et al., 2012; Bittner et al., 2011).

Seroma Incidence:-The incidence of seroma was low for both techniques, supporting previous findings that seroma formation is

more related to surgical trauma than to the specific technique used (Knaus et al., 2015; Fink et al., 2006). Both TAPP and e-TEP show similar rates of seroma formation, indicating that this risk should not influence technique selection.

Vascular Injury:-Vascular injuries were rare in both TAPP and e-TEP, consistent with findings by Arregui et al. (2003) and Cacca et al. (2007). The low incidence underscores the safety of both techniques regarding vascular complications.

Urinary Retention:-There were no cases of urinary retention in the study, aligning with Liem et al. (2007) and Bittner et al. (2011). This indicates that urinary retention is a rare complication not significantly influenced by the surgical technique.

Dissection of Sac:-The study found that complete dissection of the sac was achieved in most cases for both TAPP and e-TEP, indicating that both techniques are effective for thorough hernia management (Arregui et al., 2003; Bittner et al., 2011). This effectiveness suggests that both techniques are viable options for complete hernia repair.

Duration of Procedure:-e-TEP generally took longer to perform than TAPP, reflecting findings from Helgstrand et al. (2012) and Burcharth et al. (2013), who attributed this to e-TEP's complexity. The longer operative times associated with e-TEP may impact scheduling and resource use, an important consideration in surgical planning.

Sac Tear Incidence:-Both TAPP and e-TEP exhibited similar rates of sac tears, which is consistent with findings from Sauerland et al. (2004) and Liem et al. (2007). The low incidence of sac tears supports the efficacy of both techniques.

Injury to Vas Deferens, Ischemic Orchitis, and Injury to Viscera:-The study found no instances of injuries to the vas deferens, ischemic orchitis, or visceral injuries, consistent with Fink et al. (2006) and Knaus et al. (2015). This underscores the safety of both TAPP and e-TEP concerning these potential complications.

## CONCLUSION

In terms of pain management, initial postoperative pain levels were similar for both techniques at the 24-hour mark. However, e-TEP patients reported slightly higher pain levels at 1, 3, and 6 months post-surgery, suggesting that while early pain management is effective for both, e-TEP might involve longer-term discomfort. The average hospital stay was equivalent for both techniques, indicating that neither significantly affects postoperative hospitalization duration.

Both TAPP and e-TEP exhibited low seroma incidence and showed a comparable safety profile with minimal vascular injury and no cases of urinary retention. Both methods almost effectively achieved complete sac dissection with low rates of sac tears. Although e-TEP generally required longer operative times than TAPP, this did not influence the overall effectiveness of the repair.

In summary, TAPP and e-TEP are both effective and safe laparoscopic approaches for inguinal hernia repair. While TAPP and e-TEP provide similar outcomes in pain management, hospital stay, and complication rates, e-TEP may involve longer operative times and slightly higher long-term pain levels. The choice between TAPP and e-TEP should be based on patient-specific factors, surgeon expertise, and the particular characteristics of each case.

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