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Comparative Study Between Laparoscopic Transabdominal Preperitoneal (TAPP) Repair and Totally Extraperitoneal Repair (TEP) for Primary Inguinal Hernia: A Prospective Comparative Study

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Abstract: ***Laparoscopic inguinal hernia repair has become the preferred minimally invasive approach for adult inguinal hernias because of reduced postoperative pain, shorter hospital stay, earlier return to work, and improved cosmetic outcomes. The two most widely practiced laparoscopic techniques are Transabdominal Preperitoneal (TAPP) repair and Totally Extraperitoneal (TEP) repair. Although both techniques involve mesh placement in the preperitoneal space, they differ in operative approach, technical complexity, and perioperative outcomes.***

Keywords: Inguinal hernia, laparoscopic hernia repair, TAPP, TEP, polypropylene mesh, minimally invasive surgery

1. Introduction

Inguinal hernia is one of the most common conditions encountered in general surgical practice and accounts for a significant proportion of elective surgical procedures worldwide. Approximately 27% of men and 3% of women develop an inguinal hernia during their lifetime. Surgical repair remains the definitive treatment to relieve symptoms and prevent complications such as incarceration, obstruction, and strangulation.[1]

The evolution of minimally invasive surgery has significantly changed the management of inguinal hernia. Since the introduction of laparoscopic hernia repair in the early 1990s, both the Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) approaches have gained widespread acceptance because of reduced postoperative pain, faster recovery, lower incidence of chronic groin pain, shorter hospital stay, and improved cosmetic outcomes compared with conventional open mesh repair.[2-4]

The TAPP technique involves entering the peritoneal cavity, creating a peritoneal flap, and placing a prosthetic mesh within the preperitoneal space before closing the peritoneum. This approach provides excellent visualization of the myopectineal orifice, facilitating identification of anatomical landmarks and making it particularly useful for bilateral, recurrent, and complicated hernias.[3]

The TEP approach, in contrast, avoids entry into the peritoneal cavity and directly creates a working space within the preperitoneal plane. Preservation of peritoneal integrity reduces the risk of bowel injury, postoperative adhesions, and intraperitoneal complications. However, TEP offers a limited operative field and requires greater technical expertise, contributing to a steeper learning curve.[3,4]

Although numerous randomized trials and systematic reviews have shown that both procedures produce comparable recurrence rates and long-term outcomes, differences remain regarding operative duration, postoperative pain, complications, learning curve, and patient recovery. The optimal procedure continues to depend on surgeon experience, patient characteristics, and institutional resources.[5-9]

The present prospective observational study was therefore undertaken to compare TAPP and TEP laparoscopic inguinal hernia repair in terms of operative time, postoperative pain, hospital stay, perioperative complications, return to normal activity, chronic groin pain, and recurrence in patients undergoing elective laparoscopic inguinal hernia repair at a tertiary care teaching hospital.[10]

2. Materials and Methods

1) **Study Design:** This prospective comparative observational study was conducted in the Department of General Surgery, Vilasrao Deshmukh Government Medical College and Hospital (VDGMC&H), Latur, Maharashtra, India.
2) **Study Population:** Thirty adult patients with uncomplicated inguinal hernia who fulfilled the inclusion criteria and underwent elective laparoscopic inguinal hernia repair were included in the study.
   Patients were divided into two equal groups:
   Group A: Transabdominal Preperitoneal (TAPP) repair (n = 15)

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Group B: Totally Extraperitoneal (TEP) repair (n = 15)
Both procedures were performed in the same institution under identical perioperative conditions by surgeons experienced in laparoscopic hernia repair. The same operation theatre setup, anaesthesia protocol, perioperative antibiotic policy, mesh type, postoperative analgesic regimen, and follow-up schedule were maintained for both groups to minimize institutional and treatment-related bias.

3) **Inclusion Criteria:** Patients aged 18 years or older, Primary unilateral or bilateral reducible inguinal hernia, Patients fit for general anaesthesia, Patients providing written informed consent.
4) **Exclusion Criteria:** Obstructed or strangulated hernia, Recurrent hernia after previous laparoscopic repair, Patients with severe cardiopulmonary disease contraindicating laparoscopy, Patients unwilling to participate,
5) **Surgical Technique:** In the **TAPP** group, pneumoperitoneum was established and a standard three-port technique was used. After creating a peritoneal flap, the preperitoneal space was dissected, the hernia sac reduced, and a polypropylene mesh measuring approximately 10 × 15 cm was placed over the myopectineal orifice. The peritoneal flap was closed with absorbable sutures.

In the **TEP** group, the preperitoneal space was created without entering the peritoneal cavity. Following adequate dissection and reduction of the hernia sac, an identical polypropylene mesh was placed in the preperitoneal plane, ensuring complete coverage of the myopectineal orifice.

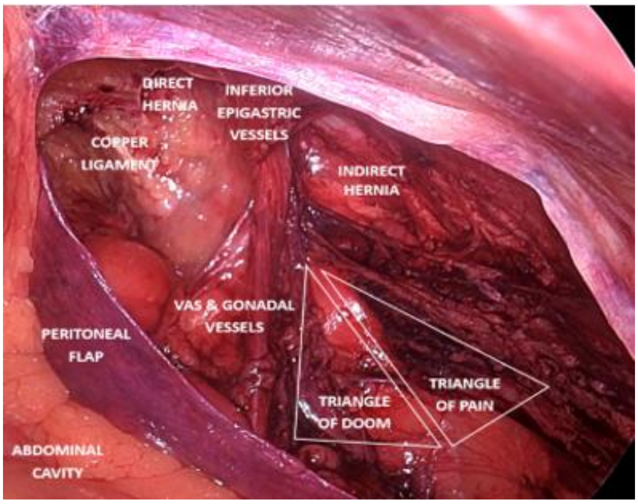


Figure 1: Surgical anatomy of Transabdominal Pre peritoneal (TAPP) hernioplasty

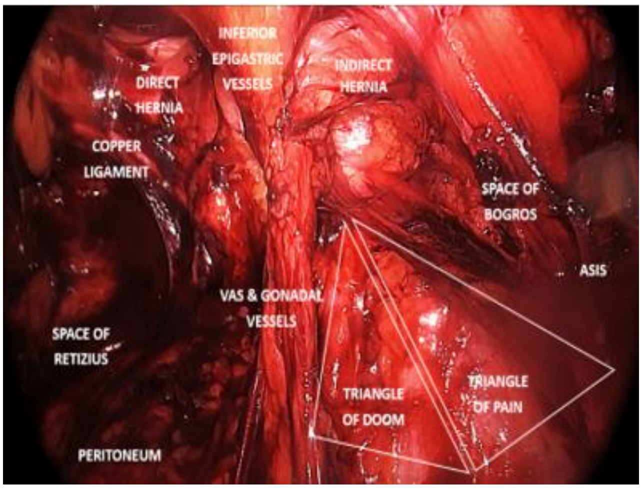
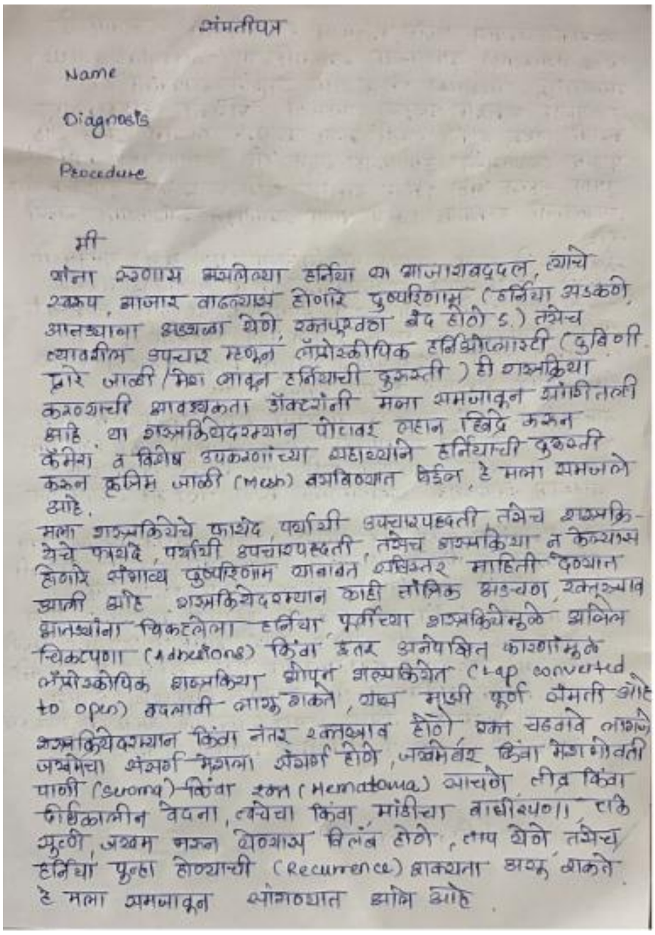


Figure 2: Surgical anatomy of Totally extraperitoneal hernioplasty

Consent


संमतीपत्र

Name

Diagnosis

Procedure

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यांना स्वतःस असलेल्या हर्निया या आजाराबद्दल, त्याचे स्वरूप, आजार वाढल्यास होणारे दुष्परिणाम (हर्निया अडकणे, आतड्यांना अडथळा येणे, रक्तपुरवठा बंद होणे इ.) तसेच त्यावरील उपचार म्हणून लॅप्रोस्कोपिक हर्निओप्लास्टी (दुर्बिणी द्वारे जाळी/मेश लावून हर्नियाची दुरुस्ती) ही शस्त्रक्रिया करण्याची आवश्यकता डॉक्टरांनी मला समजावून सांगितली आहे. या शस्त्रक्रियेदरम्यान पोटावर लहान छिद्रे करून कॅमेरा व विशेष उपकरणांच्या सहाय्याने हर्नियाची दुरुस्ती करून कृत्रिम जाळी (Mesh) बसविण्यात येईल, हे मला समजले आहे.

मला शस्त्रक्रियेचे फायदे, पर्यायी उपचारपद्धती, तसेच शस्त्रक्रिया न केल्यास होणारे संभाव्य दुष्परिणाम याबाबत सविस्तर माहिती देण्यात आली आहे. शस्त्रक्रियेदरम्यान काही तांत्रिक अडचणी, रक्तस्राव, आतड्यांना चिकटलेला हर्निया, पूर्वीच्या शस्त्रक्रियेमुळे आलेला चिकटपणा (Adhesions) किंवा इतर अनपेक्षित कारणांमुळे लॅप्रोस्कोपिक शस्त्रक्रिया ओपन शस्त्रक्रियेत (Lap converted to open) बदलावी लागू शकते, याला माझी पूर्ण संमती आहे. शस्त्रक्रियेदरम्यान किंवा नंतर रक्तस्राव होणे, रक्त चढवावे लागणे, जखमेचा संसर्ग, मेशला संसर्ग होणे, जखमेवर किंवा मेशभोवती पाणी (Seroma) किंवा रक्त (Hematoma) साचणे, तीव्र किंवा दीर्घकालीन वेदना, त्वचेचा किंवा मांडीचा बधीरपणा, टाके सुटणे, जखम भरून येण्यास विलंब होणे, ताप येणे तसेच हर्निया पुन्हा होण्याची (Recurrence) शक्यता असू शकते हे मला समजावून सांगण्यात आले आहे.

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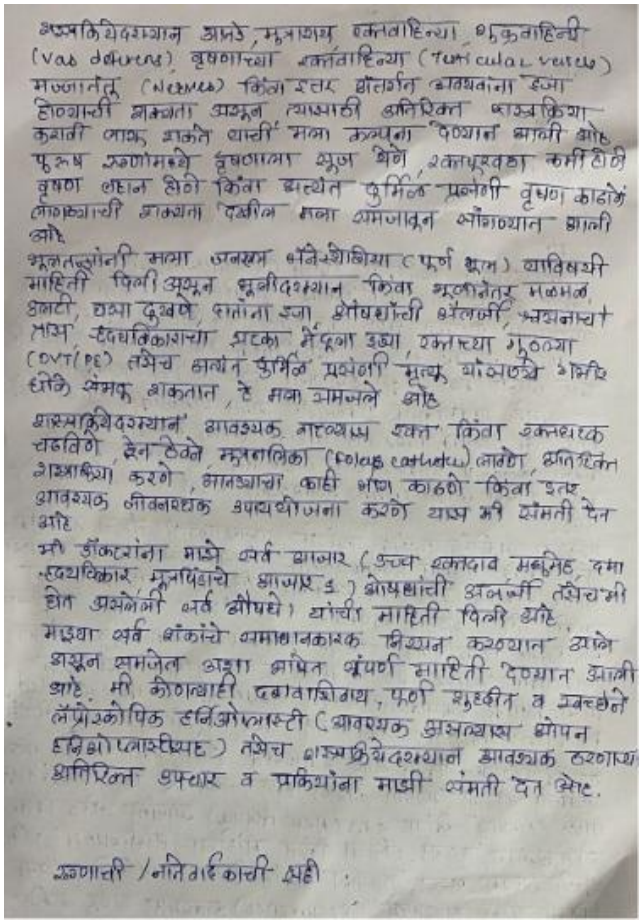

Outcome Measures

The following variables were analysed: Age, Duration of symptoms, Associated comorbidities, Operative time, Intraoperative complications, Postoperative pain (VAS at 6 hours and 24 hours), Time to ambulation, Duration of hospital stay, Return to routine work, Post operative complications (Seroma, Hematoma, Surgical site infection, Urinary retention), Chronic groin pain, Hernia recurrence.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation and compared using the independent Student's t-test. Categorical variables were analysed using the Chi-square test or Fisher's exact test wherever applicable. A p-value of less than 0.05 was considered statistically significant.

3. Results

A total of 30 patients with uncomplicated inguinal hernia were included in the study. Fifteen patients underwent Transabdominal Preperitoneal (TAPP) repair and fifteen underwent Totally Extraperitoneal (TEP) repair.

1) Baseline Characteristics of the Study Population:

Variable	TAPP (n=65)	TEP (n=65)
Mean age (years)	47.23	49.86
Mean BMI (kg/m²)	26.04	25.65
Sex	100% Male	100% Male

The demographic profile of patients in both groups was broadly comparable. The mean age was 47.23 years in the Lichtenstein group and 49.86 years in the TAPP group. Mean body mass index was slightly higher in the TAPP group.

2) Operative Time:

Procedure	Mean Operative Time (minutes)
TAPP	72.60
TEP	64.67

Observation: The mean operative time was shorter in the TEP group than in the TAPP group.

3) Intraoperative Complications:

Complication	TAPP	TEP	Total
None	11	10	21
Minor bleeding	2	3	5
Peritoneal tear	2	2	4
Total	15	15	30

Observation: No major intraoperative complications or conversion to open surgery occurred. Minor bleeding and peritoneal tears were managed laparoscopically.

4) Mean Postoperative Pain Score (VAS)

Time	TAPP	TEP
VAS at 6 hours	4.27	3.67
VAS at 24 hours	1.67	1.40

Observation: Patients in the TEP group experienced slightly lower postoperative pain scores at both 6 and 24 hours.

5) Mean Time to Ambulation, Hospital Stay and Return to Work

Parameter	TAPP	TEP
Ambulation (hours)	8.40	8.67
Hospital stay (days)	2.67	2.27
Return to work (days)	8.40	8.07

Observation: Patients undergoing TEP repair had a marginally shorter hospital stay and earlier return to work.

6) Early Postoperative Complications

Complication	TAPP	TEP
Seroma	1	2
Hematoma	1	2
Surgical site infection	0	1
Urinary retention	1	1

Observation: Early postoperative complications were infrequent in both groups and were managed conservatively.

7) Follow-up Outcomes

Outcome	TAPP	TEP
Mild chronic groin pain	5	3
Hernia recurrence	0	0

Observation: No recurrence was observed in either group during follow-up. Mild chronic groin pain was reported by five patients in the TAPP group and three patients in the TEP group.

4. Discussion

Laparoscopic inguinal hernia repair has gained widespread acceptance because of its advantages of reduced postoperative pain, early ambulation, shorter hospital stay, faster return to work, and superior cosmetic outcomes. The present prospective comparative study was conducted to compare the perioperative and short-term outcomes of Transabdominal Preperitoneal (TAPP) and Totally

Extraperitoneal (TEP) repair in patients with uncomplicated inguinal hernia.[2,3]

A total of 30 patients were included, with 15 patients each in the TAPP and TEP groups. The demographic characteristics of both groups were comparable. The majority of patients belonged to the 51–60 years age group, which is consistent with the increased incidence of inguinal hernia in middle-aged and elderly males. All patients in the present study were male, reflecting the higher prevalence of inguinal hernia among men due to anatomical and physiological factors.[1,11]

The mean operative time in the TAPP group was 72.6 minutes compared with 64.7 minutes in the TEP group. Although TAPP provides excellent visualization of the groin anatomy, additional operative steps such as creation and closure of the peritoneal flap may contribute to a longer operative duration. The shorter operative time observed in the TEP group in the present study may also reflect increasing surgical experience with the extraperitoneal approach at our institution.[4,5]

Postoperative pain assessed using the Visual Analogue Scale was slightly lower in the TEP group at both 6 and 24 hours after surgery. The avoidance of peritoneal incision in TEP may contribute to reduced postoperative discomfort. However, the difference between the two techniques was small, and both procedures were associated with satisfactory postoperative pain control.[5,6,8]

The average duration of hospital stay was marginally shorter in the TEP group (2.27 days) compared with the TAPP group (2.67 days). Similarly, patients undergoing TEP repair returned to routine activities slightly earlier than those who underwent TAPP repair. These findings support the concept that minimally invasive preperitoneal repair facilitates rapid postoperative recovery irrespective of the laparoscopic approach employed.[4,5,7]

Early postoperative complications were infrequent in both groups. Minor complications such as seroma, hematoma, urinary retention, and superficial surgical site infection occurred in a small number of patients and were managed conservatively without the need for reoperation. No major intraoperative complications, bowel injury, bladder injury, vascular injury, or conversion to open surgery were encountered in either group, demonstrating that both procedures are safe when performed by experienced laparoscopic surgeons.[2,3,4]

No hernia recurrence was observed during the follow-up period in either group. Chronic groin pain was reported in a small number of patients, with a slightly lower incidence following TEP repair. Although the follow-up duration in the present study was relatively short, the findings suggest that both techniques provide satisfactory short-term outcomes with low recurrence rates.[2,7]

The results of the present study are comparable with previously published studies, which have demonstrated similar recurrence and complication rates between TAPP and TEP repair. Most authors conclude that the choice between the two techniques should depend primarily on the surgeon's expertise, familiarity with the procedure, and patient-specific factors rather than the superiority of one technique over the other.

The strengths of the present study include the prospective design, equal allocation of patients to both groups, and performance of all procedures at a single tertiary care institution under uniform perioperative protocols. This minimized variations related to operative setup, anaesthesia, postoperative care, and follow-up. The principal limitations of the study include the relatively small sample size and short duration of follow-up, which may limit the assessment of long-term recurrence and chronic postoperative pain.[4,5,14]

5. Conclusion

Both Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) laparoscopic inguinal hernia repair are safe, effective, and reliable procedures for the treatment of uncomplicated inguinal hernia.

In the present study, TEP repair was associated with a shorter operative time, marginally reduced postoperative pain, shorter hospital stay, and earlier return to routine activities. TAPP repair, however, provided excellent visualization of the inguinal anatomy and was technically straightforward, particularly during dissection and mesh placement.

No major intraoperative complications or conversions to open surgery were encountered, and no hernia recurrence was observed during the follow-up period. Postoperative complications were minimal and comparable between the two groups.

Based on the findings of this study, both TAPP and TEP can be recommended as effective laparoscopic techniques for inguinal hernia repair. The choice of procedure should be individualized according to patient characteristics, surgeon experience, and available institutional expertise.

Further multicentric studies with larger sample sizes and longer follow-up are recommended to evaluate long-term recurrence, chronic groin pain, quality of life, and cost-effectiveness.

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