

Totally Extraperitoneal Approach for Groin Hernia Repair: Our Experience with 536 Cases

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ABSTRACT

Background: Totally extraperitoneal (TEP) hernia repair has emerged as a preferred minimally invasive approach for inguinal hernias due to its advantages over open and transabdominal methods.

Objective: To evaluate the safety, efficacy, outcomes, and learning curve of the TEP approach in a large cohort of patients with groin hernias.

Materials and methods: This prospective study includes 536 male patients who underwent TEP hernia repair between 2017 and 2025 at two centers in North India. Patient demographics, operative findings, complications, conversions, and recurrence rates were analyzed.

Results: The mean patient age was 42 years. Right-sided hernias were most common (45.5%), followed by left-sided (38%) and bilateral (16.4%). Indirect hernias constituted 49.2% of cases, with 14.1% showing recurrence. Peritoneal breach occurred in 14.9%, and conversion to TAPP or open surgery was required in 5.9%. The overall recurrence rate at 1-year follow-up was 3.7%. Simultaneous laparoscopic cholecystectomy was performed in selected patients without added complications.

Conclusion: Totally extraperitoneal is a safe and effective technique for groin hernia repair, even in recurrent and complex cases. Adequate surgical experience and anatomical knowledge are critical for minimizing complications and improving outcomes.

Keywords: Inguinal hernia, Laparoscopic hernia repair, Minimally invasive surgery, Recurrence, Surgical outcomes, Totally extraperitoneal.

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INTRODUCTION

Laparoscopic techniques have significantly transformed the surgical management of groin hernias. Among the minimally invasive options, the totally extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) approaches have gained wide acceptance in the field of endoscopic hernia repair due to their efficacy and reduced postoperative morbidity.^{1,2} The TEP technique, originally introduced by Dulucq in 1992, has evolved into a preferred method for inguinal hernia repair, especially in centers with advanced laparoscopic expertise.³

Compared to traditional open repair, TEP offers multiple advantages, including lower postoperative pain, faster recovery, early return to daily activities, and the ability to treat bilateral hernias in a single sitting.⁴ Despite these benefits, the adoption of TEP has been relatively slow due to its steep learning curve, which demands detailed knowledge of the preperitoneal anatomy, advanced laparoscopic dissection skills, and the ability to maneuver within a confined working space.⁵⁻⁸

The indications for TEP include primary, recurrent, and bilateral inguinal hernias, as well as groin hernias in females and obese individuals. However, it is contraindicated in cases with prior extensive preperitoneal surgery, large scrotal hernias, strangulated hernias, ascites, or a known bleeding disorder.^{9,10}

The surgeon experiences a pivotal role in minimizing complications such as peritoneal breach, conversions, or recurrences. With structured training and adequate case exposure, the TEP technique demonstrates a favorable learning curve and consistent outcomes across varied patient populations.¹¹

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This study presents our institutional experience with 536 consecutive TEP hernia repairs performed over a seven-year period, focusing on surgical outcomes, intraoperative and postoperative complications, conversion rates, and recurrence. We also explore the impact of the learning curve on procedure time and technique adaptation in complex hernia cases.

MATERIALS AND METHODS

This prospective observational study was conducted at the Departments of General and Minimal Access Surgery, Government JLN Hospital and Government Medical College, Baramulla, Jammu & Kashmir, India. The study included 536 male patients with groin hernias who underwent elective TEP hernia repair between January 2017 and January 2025, all operated on by the same surgical team.

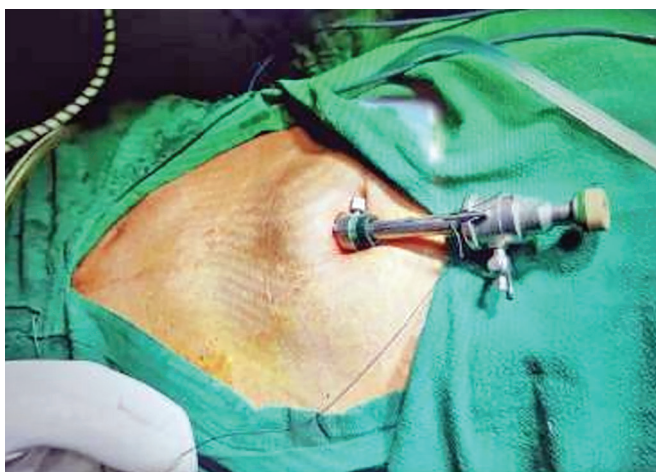


Fig. 1: Initial skin incision and insertion of the first trocar for preperitoneal space access

Preoperative Evaluation

All patients underwent detailed preoperative assessment, including evaluation for chronic cough, constipation, and lower urinary tract symptoms. Comorbid conditions such as obesity, diabetes, and smoking status were optimized before surgery. Any previous history of abdominal, groin, or pelvic surgery was recorded.

A thorough physical examination assessed the reducibility of the hernia, contralateral involvement, and coexisting hernias such as umbilical or femoral types. Scrotal examination ruled out infections, testicular pathology, or previous surgical scars. Abdominal ultrasonography was routinely performed to detect concomitant pathologies such as gallstones or intra-abdominal abnormalities.

Preoperative Preparation

All patients received a single dose of prophylactic intravenous antibiotics on the morning of surgery. Bladder evacuation was ensured before anesthesia induction.

Surgical Technique

Infraumbilical transverse incision was made, and the anterior rectus sheath on the side of the hernia incised, followed by lateral retraction of the rectus muscle and exposing the posterior rectus sheath. A tunnel was formed initially using the index finger, followed by a balloon space maker (made by attaching the glove finger to the tip of the suction irrigation instrument and inflating with saline up to 150 mL). A 10 mm Hasson's trocar was introduced and carbon dioxide insufflation started with pressures between 10 and 12 mm Hg (Fig. 1). A 10 mm 30-degree telescope was introduced, and the space was developed further up to symphysis pubis (Figs 2 and 3) using to-and-fro motion of the telescope. Two 5 mm trocars were placed between the umbilicus and symphysis pubis with a distance of about 2.5–3 cm between the two to avoid sword fighting (Fig. 4). The dissection of all the potential hernia sites starting medially from symphysis pubis and laterally to psoas muscle and the reduction of hernia sacs was done (Figs 5 and 6). For indirect hernias, the sac was identified and closed with an endoloop (Fig. 7). Direct hernia defects were identified, and the contents were reduced. After complete reduction of the hernia, a 15 × 10 cm prolene mesh was placed (Figs 8 and 9) in situ and

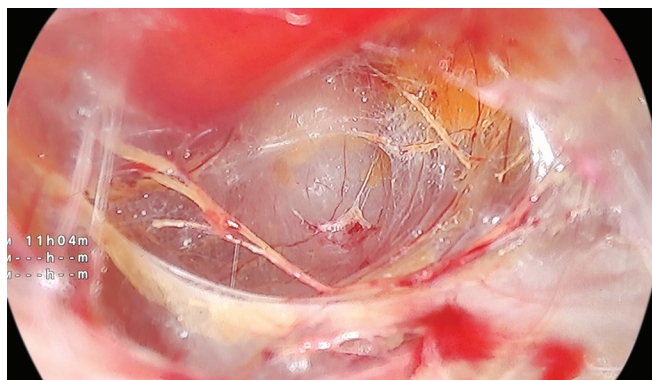


Fig. 2: Endoscopic view showing entry into the preperitoneal space with identification of loose areolar tissue

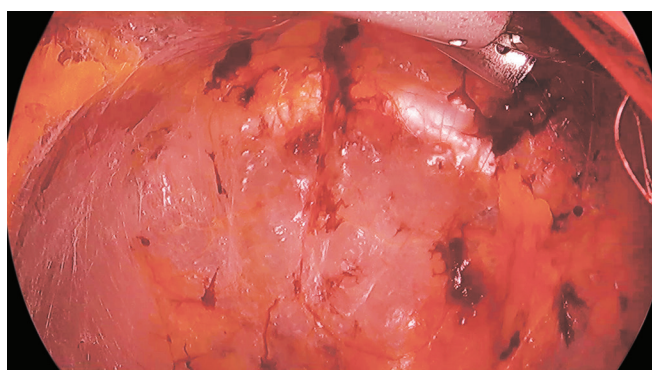


Fig. 3: Blunt dissection of the preperitoneal space with separation of the posterior rectus sheath and transversalis fascia



Fig. 4: Trocar and instrument placement for TEP – triangulation achieved

adjusted to completely cover the defects, i.e., Myopectineal orifice (Fig. 10).

A single or two tacks were placed in the Cooper's ligament area to facilitate the unrolling of mesh and prevent mesh migration. Removal of trocars was done after complete desufflation, and skin incisions were closed.

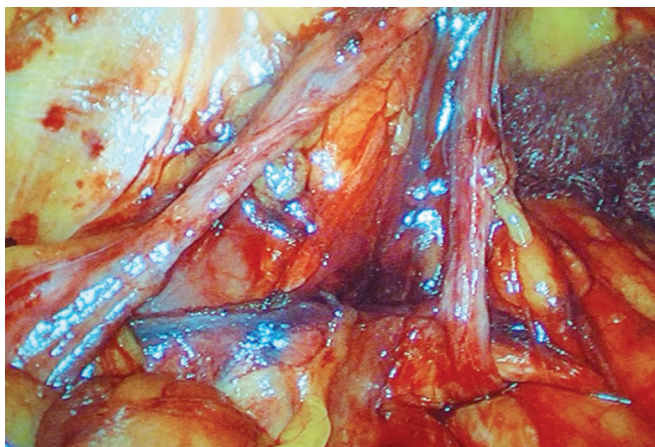


Fig. 5: Identification and dissection of the hernia sac from the cord structures

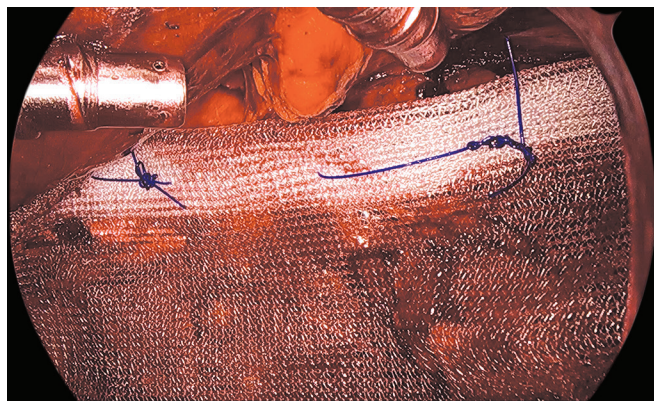


Fig. 8: Introduction and placement of polypropylene mesh into the dissected space

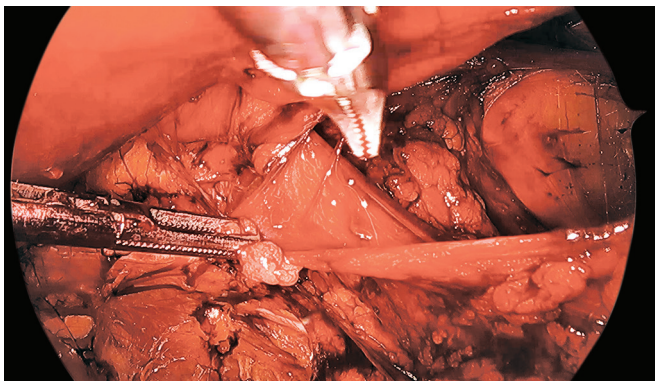


Fig. 6: Complete reduction of the hernia sac and dissection of the myopectineal orifice

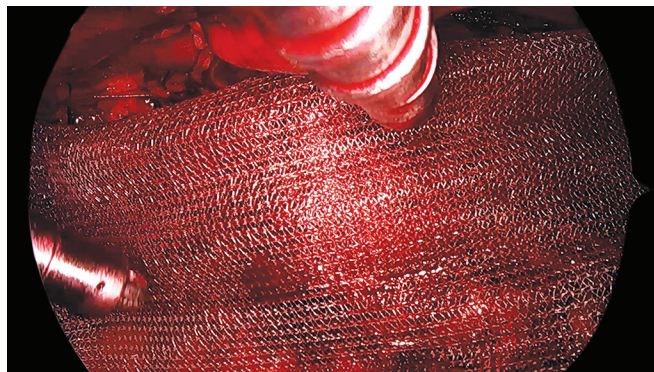


Fig. 9: Mesh positioning with proper orientation, ensuring medial coverage of Hesselbach's triangle

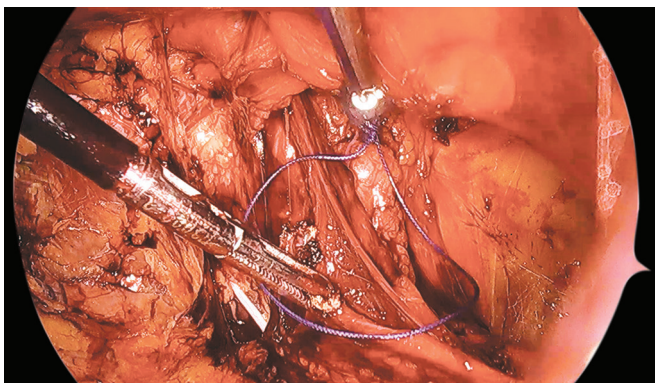


Fig. 7: Identification of the hernial sac and closure with endoloop

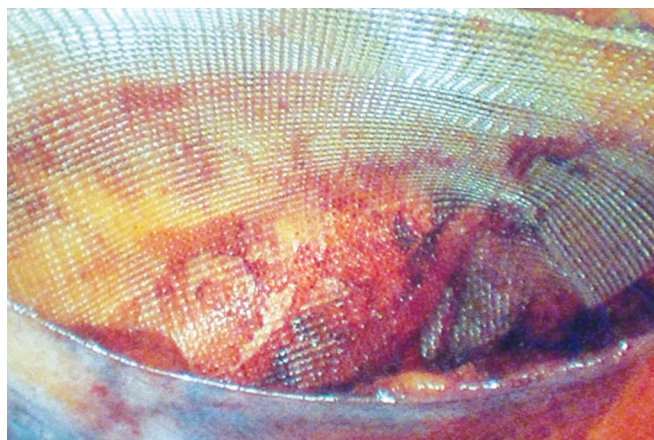


Fig. 10: Final view showing well-settled mesh without fixation, adapted to the anatomical contours

Scrotal support was used, and early ambulation was encouraged in all patients. The patients were discharged on the next day after surgery and advised to avoid heavy strenuous work for 2 weeks. The initial review was at day 7th and day 15th after surgery.

A standard 4-port laparoscopic cholecystectomy was done after completion of TEP in some patients who had concomitant gallstone disease and had consented for the double procedure preoperatively.

RESULTS

A total of 536 male patients underwent TEP hernia repair during the study period. The mean age was 42 years (range: 18–76 years). Of the total hernias, 244 (45.5%) were on the right side, 204 (38%) were on the left, and 88 (16.4%) were bilateral.

In terms of type as follows:

- Indirect hernias: 264 cases (49.2%)
- Direct hernias: 196 cases (36.6%)
- Pantaloon/dual hernias: 76 cases (14.2%)

Forty patients (7.5%) were diagnosed with concomitant gallstone disease and considered for simultaneous laparoscopic cholecystectomy.

Fifty-two patients (9.7%) had a history of previous hernia repair, categorized as recurrent cases.

Operating Time and Intraoperative Events

- Mean operative time for unilateral cases: 65 minutes (range: 40–120 minutes)
- Mean operative time for bilateral cases: 90 minutes (range: 60–150 minutes)

Intraoperative peritoneal breach occurred in 80 patients (14.9%), primarily among those with prior groin surgery. These were managed by inserting a Veress needle at Palmer's point and temporarily increasing insufflation pressure to 15 mm Hg.

- Twelve patients (2.2%) were converted to TAPP due to inadequate visualization following peritoneal breach.
- Twenty patients (3.7%) required conversion to open anterior repair—16 due to obscure anatomy and 4 due to bladder injury.

No major vascular complications were noted. Minor bleeding from the inferior epigastric vessels occurred in 20 cases (3.7%) and was controlled with bipolar coagulation or clips.

Simultaneous Cholecystectomy

Of the 40 patients with gallstones, 30 opted for simultaneous laparoscopic cholecystectomy in the same sitting after TEP repair. All procedures were completed uneventfully using the standard 4-port technique. No additional postoperative complications or prolonged hospital stay were observed in this subgroup.

Postoperative Course and Follow-up

- All patients were discharged on the second postoperative day.
- Follow-up was conducted on postoperative days 7 and 15, followed by monthly visits for 3 months, and a final review at 1 year.

Common complications included as follows:

- Seroma formation: A total of 64 patients (11.9%), mostly in obese patients with direct hernias. Fourteen required needle aspiration.
- Urinary retention: A total of 40 patients (7.5%), predominantly elderly males, managed with short-term catheterization.

The recurrence rate during 1-year follow-up was 3.73% (20 patients). The earliest recurrences ($n = 6$) occurred within the first 2 months, attributed to inadequate dissection or unrecognized indirect sacs.

Table 1: Demographic data of patients undergoing TEP repair

Parameter	Value
Number of patients	536
Mean age (years)	42 (range: 18–76 years)
Gender	Males = 536 (100%), females = 0
Side of the hernia	Right = 244 (45.5%) Left = 204 (38%) Bilateral = 88 (16.5%)
Type of hernia	Indirect = 264 (49.3%) Direct = 196 (36.6%) Dual (Pantaloon) = 76 (14.1%)
Previous hernia surgery (recurrent cases)	52 patients (9.7%)
Coexisting gallstones	40 patients (7.5%)

DISCUSSION

This study demonstrates that the TEP approach is an effective and safe method for groin hernia repair when performed by experienced surgeons. Despite its technical complexity and steep learning curve, the procedure yielded favorable results across a diverse patient population.

The average operative time in our series decreased significantly with experience. Early cases occasionally extended to 120 minutes, particularly in bilateral or recurrent hernias, but after 100 procedures, operative times consistently fell below 60 minutes in unilateral cases. This trend supports previous literature emphasizing the importance of the learning curve in mastering TEP.

Our overall conversion rate (5.9%) was within acceptable international benchmarks (reported range: 2–17%), with most conversions necessitated by dense adhesions or unclear anatomy.^{12,13} Similarly, our peritoneal breach rate (14.9%) was lower than many published reports, which range up to 50%.¹⁴ The judicious use of blunt dissection, minimal cautery, and atraumatic instruments likely contributed to this success.

The postoperative complication rates—including seroma formation (11.9%) and urinary retention (7.5%)—were comparable to established data.^{15–17} These complications were managed conservatively, with no cases of mesh infection or chronic pain.

Our experience also highlights the feasibility of concurrent laparoscopic cholecystectomy in selected patients. Performing both procedures in a single session did not increase the risk of infection or recovery time, making it a viable option in patients with dual pathologies.

The observed recurrence rate (3.73%) aligns with the learning phase of the procedure. Studies indicate that recurrence rates fall below 1% once a surgeon crosses the 60–100 case threshold.^{10,11} Our results reaffirm the need for structured training and supervised experience during the initial phase of adopting TEP.

Patient demographics are summarized in Table 1, and operative details and outcomes are summarized in Table 2.

CONCLUSION

The TEP approach is a reliable and minimally invasive technique for the repair of both primary and recurrent groin hernias. With a relatively low rate of complications and recurrence,

Table 2: Operative details and outcomes of TEP repair

Parameter	Value
Mean operative time	Unilateral: 65 min (40–120 min) Bilateral: 90 min (60–150 min)
Peritoneal breach	80 (14.9%)
Conversion to TAPP	12 (2.2%)
Conversion to open repair	20 (3.7%)
Epigastric vessel bleeding	20 (3.7%) – managed with clips/ cautery
Simultaneous cholecystectomy	30/40 completed successfully
Postoperative seroma	64 (11.9%) – 14 needed aspiration
Urinary retention	40 (7.5%) – mostly elderly patients
Recurrence within 1 year	20 (3.73%) – 6 within the first 2 months
Type of mesh used	Polypropylene mesh in all cases
Use of the drain	6 cases (1.1%)
Mean hospital stay (days)	1.3 ± 0.4
Return to normal activity (days)	5.7 ± 1.9

TEP offers excellent clinical outcomes, particularly in the hands of experienced surgeons. The learning curve remains a critical factor in reducing operative time and avoiding conversions or intraoperative difficulties. Simultaneous laparoscopic cholecystectomy can be safely performed in selected patients with concomitant gallbladder disease without increasing postoperative morbidity. Overall, TEP stands out as a robust and adaptable technique suitable for widespread adoption in modern hernia surgery.

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