

Outcomes of the eTEP Approach for Incisional Ventral Hernia Repair: Initial Results from Can Tho General Hospital

La Van Phu^{1,2}, Tong Hai Duong¹, Doan Anh Vu²

1. Can Tho General Hospital, 2. Can Tho University of Medicine and Pharmacy

Corresponding author:

La Van Phu

Can Tho General Hospital

04 Chau Van Liem, Ninh Kieu,

Can Tho, Vietnam

Mobile: +84 913 136 189

Email: lvphu@ctump.edu.vn

Received date: 28/4/2025

Accepted date: 20/6/2025

Published date: 11/8/2025

Abstract

Introduction: The extended-view totally extraperitoneal (eTEP) approach has emerged as an innovative technique for incisional ventral hernia repair, offering several advantages such as reduced postoperative pain, fewer skin-related complications, and improved cosmetic outcomes. This study aims to evaluate the early outcomes of the eTEP technique for incisional ventral hernia repair at Can Tho General Hospital.

Patients and Methods: A retrospective study was conducted on 30 patients who underwent laparoscopic eTEP repair for incisional ventral hernias between June 2022 and February 2025. Patient demographics, hernia characteristics, surgical details, intraoperative and postoperative complications, postoperative pain scores (measured using the Visual Analog Scale VAS), and length of hospital stay were analyzed.

Results: The mean age of the patients was 63.47 ± 12.76 years, with a mean BMI of 24.06 ± 3.55 kg/m². Most hernias were located at the umbilical site (46.67%), and 90% were primary incisional hernias. The mean operative time was 164.5 ± 54.02 minutes, and the average hospital stay was 4.97 ± 2.89 days. Postoperative pain scores decreased significantly from 24 hours post-surgery (VAS 4.67 ± 1.35) to discharge (VAS 1.03 ± 0.32). Intraoperative complications were minimal (3.33%), while early postoperative complications included small bowel perforation (6.67%) and seroma formation (6.67%). The recurrence rate was 3.33% after a mean follow-up period of 18.9 ± 6.84 months.

Conclusions: The eTEP approach for incisional ventral hernia repair offers promising early outcomes with low complication and recurrence rates, minimal postoperative pain, and short hospital stays. It represents a safe and effective minimally invasive option for appropriately selected patients.

Keywords: eTEP, incisional ventral hernia, laparoscopic repair, initial outcomes.

Introduction

Incisional ventral hernias are common postoperative complications, often leading to discomfort, impaired quality of life, and serious morbidity if left untreated [1]. Traditional repair techniques, such as open sublay repair and laparoscopic intraperitoneal onlay mesh (IPOM), have been widely used but are associated with several limitations, including higher rates of postoperative pain, longer hospital stays, and a higher risk of intraperitoneal adhesions [1,2].

In response to these challenges, minimally invasive retromuscular approaches have been developed, notably the enhanced-view totally extraperitoneal (eTEP) technique [3]. Originally described by Jorge Daes for inguinal hernia repair and subsequently adapted for ventral hernia repairs, the eTEP technique offers a minimally invasive alternative that allows for placement of a large mesh in the retromuscular plane without entering the peritoneal cavity [4,5].

The eTEP approach combines the advantages of the Rives-Stoppa repair with the benefits of laparoscopic surgery, aiming to reduce postoperative pain, minimize complications, and shorten recovery time [5,6]. Several studies have demonstrated that eTEP repair for ventral hernias results in favorable outcomes, including reduced postoperative pain, shorter hospital stays, lower recurrence rates, and fewer mesh-related complications compared to conventional IPOM techniques [3,7,8].

Despite its promising outcomes, the eTEP technique remains technically demanding and requires a steep learning curve [9,10]. Mastery of the approach demands careful patient selection, meticulous surgical technique, and a thorough understanding of abdominal wall anatomy [9,11].

In Vietnam, the adoption of the eTEP technique for incisional ventral hernia repair remains limited. To the best of our knowledge, no studies have been published evaluating its outcomes within the Vietnamese clinical context.

This study aims to evaluate the early outcomes of eTEP repair for incisional ventral hernias at Can

Tho General Hospital, providing initial data on its feasibility, safety and effectiveness in Vietnam.

Patients and Methods

Study Design and Patients

A Prospective descriptive study was conducted on patients who underwent laparoscopic extended-view totally extraperitoneal (eTEP) repair for incisional ventral hernias at Can Tho General Hospital between June 2022 and February 2025. A total of 30 patients were included in this analysis.

All surgeries were performed by two experienced surgeons specializing in laparoscopic surgery and abdominal wall hernia repair.

Inclusion and Exclusion Criteria

Patients over 18 years of age who were diagnosed with incisional ventral hernias and underwent laparoscopic eTEP repair were included. Patients with a history of abdominal mesh infection, giant hernias unsuitable for laparoscopic repair, or severe comorbidities contraindicating general anesthesia were excluded.

Surgical Technique

Under general anesthesia, an extended-view totally extraperitoneal (eTEP) approach was performed to create a retromuscular plane. The hernia defects were closed with sutures, followed by mesh placement in the retromuscular space without entering the peritoneal cavity. In cases of complex or large defects, transversus abdominis release (TAR) was added. Meshes measuring 15×15 cm in size were used, ensuring at least a 5 cm overlap beyond the defect margins. Mesh fixation was selectively applied using either sutures or tacks as needed. Carbon dioxide (CO₂) was evacuated and the trocar sites were closed.

Hernia Classification

Incisional ventral hernias were classified according to the European Hernia Society (EHS) classification, based on the anatomical location and the width of the defect.

Data Collection

Collected data included patient demographics, body mass index (BMI), ASA classification, previous

surgical history, hernia characteristics (location, size, contents, presence of strangulation), surgical details (type of procedure, number of trocars, method of defect closure, mesh size and fixation), and postoperative outcomes.

Postoperative outcomes assessed included pain scores measured by the Visual Analog Scale (VAS) at 24 hours, 48 hours, and at discharge, operative time, length of hospital stay, early postoperative complications (such as seroma formation, bowel perforation), and recurrence rates during follow-up.

Statistical Analysis

Data were analyzed using SPSS version 23.0 (IBM Corp, Armonk, NY, USA). Continuous variables were expressed as means \pm standard deviations (SD), and categorical variables were presented as frequencies and percentages.

Ethical Considerations

This study was approved by the ethics committee of Can Tho General Hospital. All patients provided written informed consent before surgery. Patient data confidentiality and ethical standards were maintained throughout the study.

Results

A total of 30 patients underwent laparoscopic extended-view totally extraperitoneal (eTEP) repair for incisional ventral hernias at Can Tho General Hospital between June 2022 and February 2025. The mean age was 63.47 ± 12.76 years, and 63.33% of patients were female. The mean BMI was 24.06 ± 3.55 kg/m². Most patients (60%) had associated comorbidities, and the majority were classified as ASA I or II (Table 1).

Regarding hernia characteristics, 90% of the cases were primary incisional hernias, while 10% were recurrent. According to the European Hernia Society (EHS) classification, the most common hernia location was umbilical (M3, 46.67%), and the majority of hernia defects were classified as W1 (66.67%) or W2 (33.33%) based on defect width (Table 2).

All procedures were completed laparoscopically using the eTEP approach, with 20% of cases requiring additional transversus abdominis release

(TAR). Defect closure was successfully achieved in all patients (Table 3). The mean operative time was 164.5 ± 54.02 minutes, and the average postoperative hospital stay was 4.97 ± 2.89 days. Early postoperative complications included small bowel perforation (6.67%) and seroma formation (6.67%). The recurrence rate was 3.33% after a mean follow-up of 18.9 ± 6.84 months (Table 4).

Table 1. Patient Characteristics

Characteristic	Value
Mean age (years)	63.47 ± 12.76 (range 44–88)
Gender	Male 11(36.6%)
	Female 19(63.33%)
BMI (kg/m ²)	24.06 ± 3.55 (range 16.9–31.28)
Comorbidities	60% (18 patients)
ASA	I 12(40%)
	II 17(56.67%)
	III 1(3.33)

BMI: Body Mass Index; ASA: American Society of Anesthesiology

Table 2. Hernia Characteristics and EHS Classification

Characteristic	Value
Type of hernia (EHS)	Incisional 27 (90%)
	Recurrent 3(10%)
Location of hernia (EHS)	Epigastric (M2) 2(6.67%)
	Umbilical (M3) 14(46.67%)
	Infraumbilical (M4) 5(16.67%)
	Suprapubic 3(10%)
Defect Width (EHS)	Subcostal (L1) 1(3.33%)
	Flank (L2) 4(13.33%)
	Iliac (L3) 1(3.33%)
	W1(<4cm) 20 (66.67%)
Defect size (cm ²)	W2(4 -10cm) 10(33.33%)
	W3 0
Defect size (cm ²)	$16,58 \pm 13,21$ (1 – 50)

EHS: European Hernia Society

Table 3. Intraoperative variables

Intraoperative characteristics		Results	
Number of trocars	3 trocars	22	(73.33%)
	4 trocars	4	(23.33%)
	5 trocars	1	(3.33%)
Surgical technique	eTEP	24	(80.00%)
	eTEP-TAR	6	(20%)
Defect area (cm ²)	Mean ± SD	16,58 ± 13,21 (1 – 50)	
Defect closure		30(100%)	
Mesh size (cm ²)	15cm x15cm (225)	29(96.67%)	
	10cm x 15cm (150)	1(3.33%)	
Mean operating time (min)	Mean ± SD	164.5 ± 54.02 (90–300)	

Table 4. Surgical outcomes

Operative outcomes		Results	
Postoperative pain (VAS)	24 hours	4.67 ± 1.35 (2 – 7)	
	48 hours	3.60 ± 1.49 (1 – 7)	
	Discharge	1.03 ± 0.32 (0 – 2)	
Intraoperative complications	Bleeding	1(3.33%)	
Postoperative complications	Small intestine injury	2(6.67%)	
	Seroma	2(6.67%)	
Postoperative hospital stay (days)	Mean ± SD	4.97 ± 2.89 (2–17)	
Hernia recurrence	18,9 + 6,84 (5 – 31) month follow-up	1(3.33%)	

VAS: Visual Analogue Scale

Discussion

The enhanced-view totally extraperitoneal (eTEP) approach has emerged as a promising minimally invasive technique for incisional ventral

hernia repair, aiming to combine the advantages of the Rives-Stoppa open repair with the benefits of laparoscopic surgery [1,3]. This study presents the initial experience with eTEP repair at Can Tho General Hospital, providing preliminary evidence of its feasibility, safety, and effectiveness within the Vietnamese clinical setting.

The patient population in our study demonstrated typical characteristics of incisional ventral hernia cases. Most defects were located along the midline, especially particularly in the umbilical region, and were classified as W1 or W2 according to the European Hernia Society (EHS) classification [1]. These small to moderate midline defects were particularly amenable to laparoscopic retromuscular dissection and defect closure using the eTEP approach.

Our surgical outcomes are consistent with previously published data [3,5]. The mean operative time was 164.5 ± 54.02 minutes, reflecting the technical demands of the procedure, especially during the initial learning curve. The mean postoperative hospital stay was 4.97 ± 2.89 days, comparable to other studies using similar techniques [3,5] and indicative of the advantages of minimally invasive extraperitoneal dissection in reducing recovery time and complications. All hernia defects were successfully closed, with adequate mesh overlap achieved in all cases—an essential factor contributing to repair durability and reduced recurrence [6]. The observed recurrence rate of 3.33% after a mean follow-up of 18.9 months aligns with outcomes reported in international literature, suggesting that the eTEP approach offers effective mid-term results in incisional ventral hernia repair [3,5].

Overall, these findings support the use of the eTEP technique for managing incisional ventral hernias with favorable short- and mid-term outcomes when performed with appropriate patient selection and meticulous surgical technique.

Despite these encouraging results, several complications were encountered. Intraoperatively,

one patient (3.33%) experienced bleeding from a branch of the inferior epigastric artery, which was successfully managed with hemoclip application without conversion to open surgery. Intraoperative bleeding has been recognized as a potential complication of the eTEP approach and is most commonly associated with trocar placement or posterior dissection [4,6].

Early postoperative complications included two cases (6.67%) of seroma formation. One case resolved spontaneously within two weeks, while the other required ultrasound-guided aspiration at four weeks postoperatively. Seroma remains a common issue in ventral hernia repair, particularly in cases with larger dissection areas, and its incidence has been reported to range from 5% to 8% [7,8].

Conservative management is generally effective, however aspiration may be necessary when symptoms persist [8].

Importantly, two cases of small bowel injury were recorded, leading to significant morbidity. In the first case, a hemoclip applied during posterior rectus sheath closure inadvertently entrapped a loop of small bowel, resulting in early signs of intra-abdominal sepsis. The patient underwent reoperation on postoperative day 2, during which the mesh was removed, the bowel injury was repaired, and the abdominal wall was reinforced. Although rare, bowel injury during eTEP has been reported and is usually related to closure techniques or dissection errors [6,9].

In the second case, the patient had an incarcerated hernia with dense adhesions between the small bowel and the hernia sac. During dissection, a small bowel injury occurred but was not recognized intraoperatively. The patient developed peritonitis on postoperative day two. Emergency reoperation revealed a small bowel perforation and management included mesh removal, abdominal lavage, small bowel repair and reinforced closure of the abdominal wall. Dense adhesions have been recognized as a risk factor for bowel injury during laparoscopic retromuscular hernia repairs [9,10].

The occurrence of two bowel injuries (6.67%) in our series highlights the technical challenges associated with the eTEP approach, especially when dealing with complicated or incarcerated hernias. This emphasizes the importance of careful patient selection and meticulous surgical technique, particularly during adhesiolysis and posterior closure [4,9].

Compared to IPOM repair, the eTEP approach offers several advantages, including placement of the mesh in a retromuscular position without intraperitoneal contact, which potentially reduces mesh-related complications, adhesion formation, and postoperative pain [3,5,7]. Furthermore, the eTEP technique allows for anatomical restoration of the midline and minimizes the need for extensive dissection or component separation in selected cases [6,11].

Nevertheless, the eTEP technique is technically demanding and has a recognized learning curve. Previous studies suggest that proficiency is typically achieved after approximately 20 to 30 cases [9,10]. Structured training, a gradual increase in case complexity and adherence to meticulous surgical technique are essential to optimize patient outcomes and minimize complications. In carefully selected patients and experienced hands, the eTEP approach represents a valuable evolution in ventral hernia repair.

To reduce the risk of complications such as bowel injury, meticulous adhesiolysis under direct vision is essential, especially in patients with previous abdominal surgeries or dense adhesions. Techniques such as using blunt dissection during the initial steps, limiting the use of energy devices near the hernia sac, and utilizing intraoperative laparoscopic assistance when necessary may further enhance surgical safety. Importantly, when closing the posterior rectus sheath, hand-sewn suturing is recommended over hemoclip application, as it offers better control and visualization, thereby reducing the likelihood of inadvertent bowel entrapment.

Although prospective in design, this study has some limitations, including a relatively small sample size, single-center setting and limited follow-up duration. Further large-scale, multicenter prospective studies are needed to validate the findings and optimize outcomes.

Conclusion

The eTEP approach for incisional ventral hernia repair demonstrated favorable early outcomes, with high rates of defect closure, low complication and recurrence rates, and rapid recovery. Despite its technical complexity, eTEP offers significant advantages by avoiding intraperitoneal mesh placement. With proper training and careful patient selection, eTEP is a safe and effective option. Further large-scale, multicenter studies are needed to validate its long-term efficacy and generalizability.

Acknowledgements

The authors would like to express their sincere gratitude to Can Tho General Hospital and Can Tho University of Medicine and Pharmacy for supporting the study and facilitating the research process.

Conflicts of interest

The authors declare that they have no conflicts of interest related to this study.

Funding

This research received no external funding.

References

1. Bittner R, Bain K, Bansal VK, Berrevoet F, Bingener J, Chen DC, et al. Update of guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias. *Surg Endosc*. 2019;33(10):3069–3139.
2. Badiger S, Koppad SN, Kulkarni A, Kodliwadmth H. Comparative analysis of open versus laparoscopic ventral hernia repair. *Int Surg J*. 2016 Aug;3(3):1167–1172.
3. Aliseda D, Sanchez-Justicia C, Zozaya G, Lujan J, Almeida A, Blanco N, et al. Short-term outcomes of minimally invasive retromuscular ventral hernia repair using an enhanced view totally extraperitoneal (eTEP) approach: systematic review and meta-analysis. *Hernia*. 2022;26(6):1511–1520.
4. 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.
5. Wieland L, Alfarawan F, Bockhorn M, El-Sourani N. Comparison of eTEP and IPOM for ventral hernia surgery in the early postoperative period: a retrospective cohort study of a tertiary university centre. *Hernia*. 2024;28(6):2195–2206.
6. Daes J. Enhanced-view totally extraperitoneal access for repair of ventral hernias: advantages and liabilities. *Cir Esp (Engl Ed)*. 2023;101(Suppl 1):S33–S39.
7. Tryliskyy Y, Demykhova I, Kebkalo A, Vinnitskyi I, Kravchenko O. Minimally invasive extended totally extraperitoneal versus transabdominal retromuscular ventral hernia mesh repair: systematic review and meta-analysis. *J Laparoendosc Adv Surg Tech A*. 2024;34(1):39–46.
8. Li J, Wang Y, Wu L. The comparison of eTEP and IPOM in ventral and incisional hernia repair: a systematic review and meta-analysis. *Surg Laparosc Endosc Percutan Tech*. 2022;32(2):252–258.
9. Belyansky I, Daes J, Radu VG, Balasubramanian R, Zahiri HR, Weltz AS, et al. A novel approach using the enhanced-view totally extraperitoneal (eTEP) technique for laparoscopic retromuscular hernia repair. *Surg Endosc*. 2018;32(3):1525–1532.
10. Sanna A, Targa S, Mantovan B, De Luca M. The Enhanced-View Totally Extraperitoneal Repair for Ventral and Incisional Hernia: Midterm Results of an Evolving Technique. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2025 Jan;35(1):48–54.
11. Novitsky YW, Elliott HL, Orenstein SB, Rosen MJ. Transversus abdominis muscle release: a novel approach to posterior component separation during complex abdominal wall reconstruction. *Am J Surg*. 2012;204(5):709–716.