Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Extended Totally Extra-Peritoneal Repair (Etep) Vs Conventional Laparoscopic Repair With Defect Closure (Ipom Plus) For Umbilical Hernias: A Single-Center Study

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Cite this paper as: Dr. Rahul Kenawadekar , Dr. Tanmay Patil , Dr. Sadyojata Bhavani , Dr. Akshay Gokak , Dr. Ravi Kiran , Dr. Nithin. H , Dr. Shrey Siddharth, Dr. Saubhagya Shikhar (2025) Extended Totally Extra-Peritoneal Repair (Etep) Vs Conventional Laparoscopic Repair With Defect Closure (Ipom Plus) For Umbilical Hernias: A Single-Center Study. *Journal of Neonatal Surgery*, 14 (32s), 7153-7163.

ABSTRACT

Background: General surgery professionals carry out umbilical hernia repair as a frequently repeating surgical procedure. Medical professionals have widely accepted IPOM repair with defect closure (called IPOM plus) for conventional intraperitoneal onlay mesh procedures. Medical professionals currently focus on extended totally extra-peritoneal repair (eTEP) because this procedure shows promise in decreasing postoperative complications as well as pain levels and improving recovery periods.

Methods: The study performed in a single tertiary care center utilized a prospective observational approach when examining IPOM plus techniques and eTEP procedures for treating umbilical hernias. The researchers distributed sixty qualified patients between two groups: Group A (IPOM plus) and Group B (eTEP). The study tracked postoperative outcomes which included pain (Visual Analog Scale) measurement together with operative duration and hospitalization length and hernial complications like seroma and wound infection and recurrence. The manuscript displays numerical data using numbers alongside percentages as descriptive statistics. All data analysis used t-test combined with Fisher's Exact test with chi-square test according to the appropriate scenario and accepted a significance level below 0.05.

Results: The cohort participants had an average age of 48.15 years, although they showed a minor male majority throughout the study sample. Patients who underwent IPOM plus experienced procedure duration that was considerably shorter than patients in the other group. Postoperative pain ratings showed better results among eTEP patients who demonstrated lower scores during the time period from day 1 until day 7 and months 1 and 3 ($p < 0.05$). The eTEP group spent fewer days at the hospital than patients undergoing eTEP (6.8 days) (5.8 days) ($p < 0.05$). The risk of seroma formation together with wound infections remained similar for both patient groups.

Conclusion: The eTEP hernia repair method outperforms IPOM plus surgery because it leads to shorter operative durations as well as reduced postoperative pain and decreased hospitalization periods. The solution of eTEP demonstrates potential to serve as a superior choice than IPOM plus for treating umbilical hernias. Further research involving multiple hospitals will need to confirm these study findings.

Keywords: *Umbilical Hernia, eTEP, IPOM plus, Postoperative Pain, Hospital Stay.*

1. INTRODUCTION

A defect in the umbilical fascia leads to intra-abdominal contents protruding through such tears thus creating umbilical hernias which remain common surgical conditions. [1]. These dramatic changes in laparoscopic ventral hernia repairs occurred throughout the past twenty years because of progress in minimal invasiveness surgery and enhanced prosthetic materials [2]. Research shows that the conventional intraperitoneal onlay mesh repair (IPOM) remains a primary method both with defect closure and without it [3]. Different surgical treatments become necessary because patients express worry about mesh complications such as migration and adhesions and postoperative pain during their procedures [4].

During IPOM plus surgery the healthcare provider first does laparoscopic hernia defect closure before placing the mesh inside the intraperitoneal position. Medical experts believe that performing the closure reduces seroma formation risk and minimizes hernia site bulging after surgery [5]. The placement of intra-abdominal mesh results in ongoing clinical challenges because hospital patients experience adhesions to bowel or omentum together with persistent chronic pain [6].

Extended totally extra-peritoneal (eTEP) repair represents a new technique which addresses various weaknesses which existed previously. The procedure maintains an extraperitoneal position to stop mesh contact with visceral organs which reduces the risk of adhesion formation inside the abdominal cavity [7]. The eTEP procedure permits a wide mesh extension into vascularized retromuscular tissue which leads to expected favorable outcomes concerning postoperative pain intensity alongside recurrence events. [8] Placing mesh in the retromuscular position gives the repair additional durability alongside decreasing the duration of long-term discomfort...

Although eTEP was originally described for complex ventral hernias, its application has expanded to include smaller defects such as umbilical hernias. However, the existing literature offers limited direct comparisons between eTEP and IPOM plus in terms of outcomes such as postoperative pain scores, duration of hospital stay, operative time, and overall complication rates. This paucity of data complicates decision-making for surgeons who may be considering adopting eTEP as a routine practice, especially for relatively straightforward hernias like umbilical defects.

The current research evaluated eTEP and IPOM plus for umbilical hernia surgery within a single medical facility throughout a twelve month period. The main objectives examined changes in pain intensity after the operation together with surgery duration and hospitalization time as well as postoperative complications like infection and seromas and hernia recurrence. Research findings from this study will help surgeons and hospital administrators determine the best surgical method for umbilical hernia procedures.

2. MATERIALS AND METHODS

Study Design

The investigation took place as an observational prospective study throughout a one-year duration in a tertiary care hospital based in Belagavi Karnataka. The research study obtained approval from the Institutional Research Ethics Committee before starting patient enrollment. The researchers received written consent from every participant who took part in the study.

Inclusion and Exclusion Criteria

Inclusion Criteria:

Patients aged 18–80 years.

Patients providing informed written consent.

All patients undergoing laparoscopic umbilical hernia repair.

Exclusion Criteria:

Previous mesh placement in either a retromuscular or intraperitoneal position.

Contraindications to general anesthesia.

Incarcerated or strangulated hernias.

Uncontrolled hypertension, poorly controlled diabetes mellitus, or other significant comorbidities rendering the patient high risk for surgery.

Patient Allocation

A total of 60 patients fulfilling the inclusion criteria were enrolled. They were randomly allocated into two groups:

Group A: IPOM plus (conventional laparoscopic intraperitoneal mesh repair with defect closure)

Group B: eTEP (extended totally extra-peritoneal repair)

Surgical Techniques

IPOM plus: A general anesthesia procedure allowed the creation of pneumoperitoneum while standard port locations were established. Non-absorbable sutures were used for primary hernia defect closure during laparoscopic surgery. A suitable prosthetic mesh received placement between the peritoneal layers to cover the defect while achieving sufficient quantity of mesh overlap.

eTEP: The surgeon marked the hernia location prior to developing an extraperitoneal space through endoscopic techniques. Medicine staff reduced the hernia sac before placing a mesh properly in the retromuscular space. The surgeons performed the suture from the retromuscular side to close the fascial defects without permitting mesh contact with intra-abdominal contents.

Postoperative Care

The study team monitored the patients from both groups for their pain levels and wound complications and seroma development as well as their total recovery progress. Patients used Visual Analog Scale to rate their pain experience at postoperative day 1 and day 7 and month 1 and month 3. All patients received standard analgesic medication combined with prophylactic antibiotic treatment based on hospital protocols. The clinical team released patients for discharge after success in achieving pain control together with diet tolerability and normal activities of ambulation.

3. OUTCOME MEASURES

Primary Outcomes: Postoperative pain score (VAS), duration of operation, and length of hospital stay.

Secondary Outcomes: Wound infection, seroma formation, recurrence rate, and any other intra- or postoperative complications.

Statistical Analysis

The study team assessed both groups of patients concerning their pain levels and wound incident rates and seroma formation in addition to complete recovery progress. The Visual Analog Scale (VAS) measured patient pain during day 1 and day 7 after surgery and month 1 and month 3. Medical staff provided all patients both standard pain medicine together with infection-preventive antibiotics according to standard hospital protocols. The clinical team released patients for discharge after success in achieving pain control together with diet tolerability and normal activities of ambulation.

4. RESULTS

In total, 60 patients meeting the eligibility criteria were enrolled and randomized into two equal groups of 30 patients each: Group A (IPOM plus) and Group B (eTEP). The following sections summarize the key findings:

Patient Demographics

Overall, the mean age of the study population was **48.15 years**, with a range from 29 to 76 years. On comparison between groups, there was no statistically significant difference in mean age ($p = 0.45$). A slight male preponderance was noted in both arms of the study, but this difference was not significant ($p = 0.28$).

TABLE 1. MEAN AGE DISTRIBUTION BETWEEN GROUPS

Group	Mean Age (years)	Standard Deviation	p-value
Group A (IPOM plus)	47.6	10.2	0.45
Group B (eTEP)	48.7	9.7	

(No significant difference in mean age between the groups.)

Clinical Presentation

Nearly all patients presented with a straightforward umbilical hernia. There were no statistically significant differences between groups in terms of comorbidities (e.g., hypertension, controlled diabetes), or the presence of multiple hernial defects

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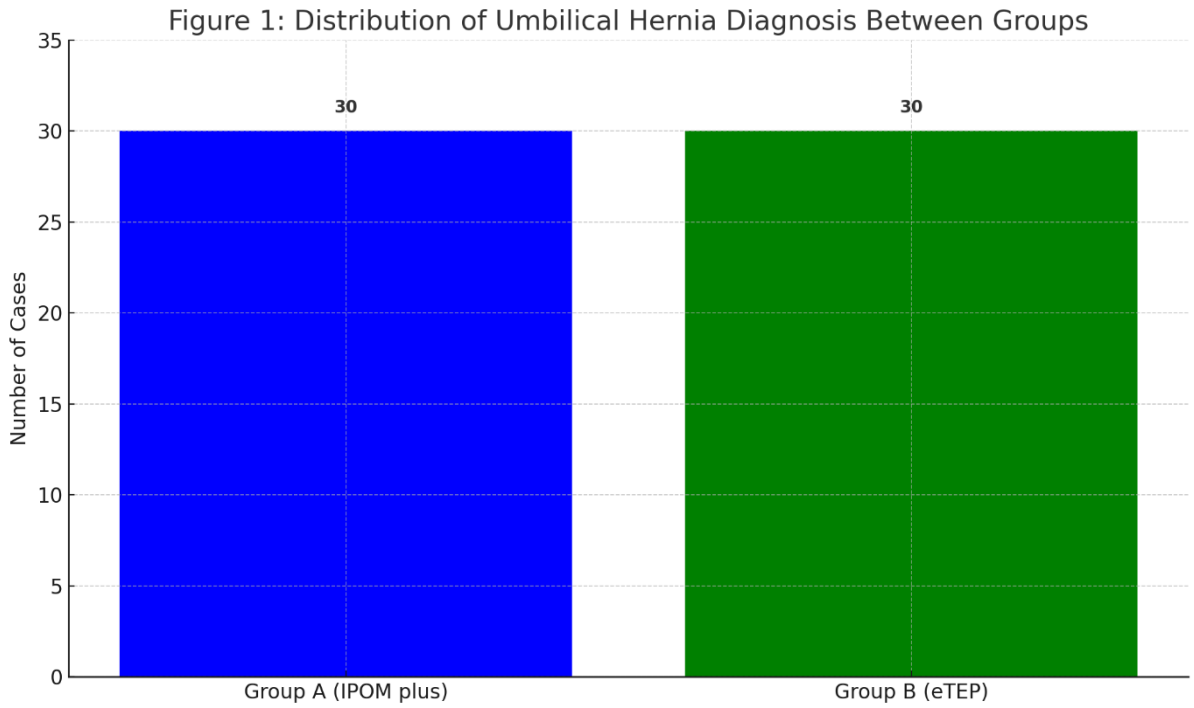
FIGURE 1. DISTRIBUTION OF UMBILICAL HERNIA DIAGNOSIS



As a graph, showing the distribution of umbilical hernia diagnosis between the two groups, Group A (IPOM plus) and Group B (eTEP). Each group had 30 cases, illustrating an equal distribution.

Operative Time

The average duration of surgery was notably different between the two groups. Patients in the IPOM plus group (Group A) had a significantly shorter mean operative time compared to those in the eTEP group (Group B). The difference was statistically significant ($p < 0.05$).

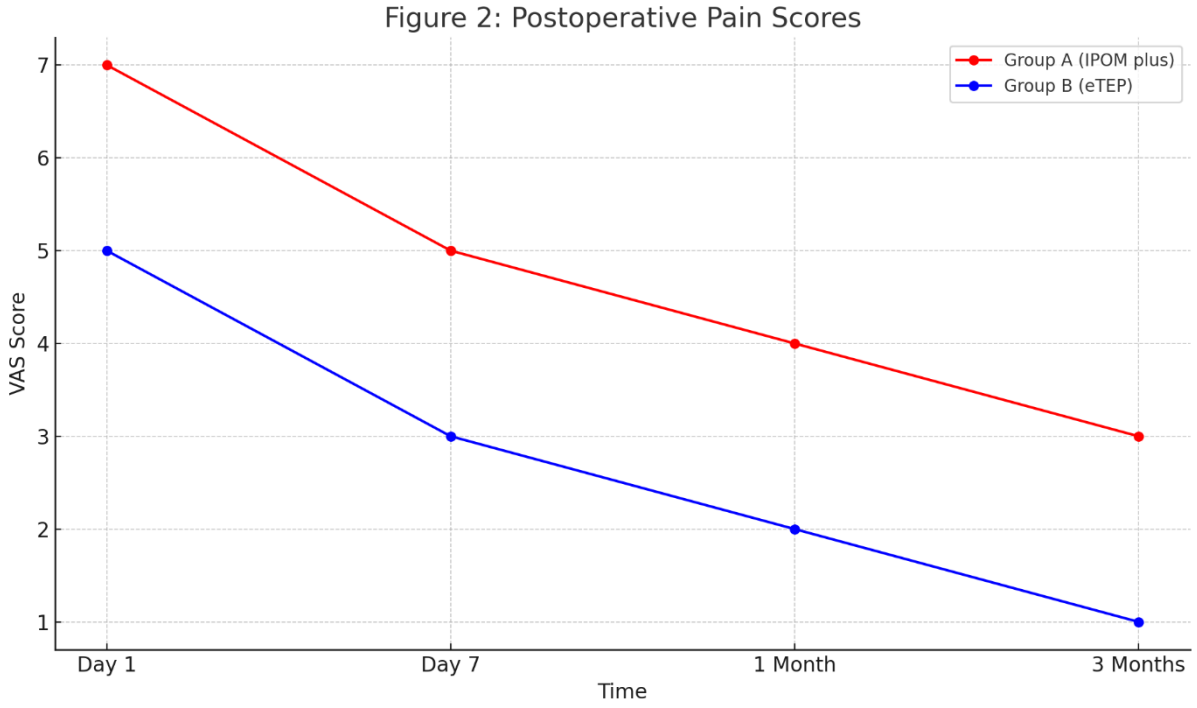
TABLE 2. COMPARISON OF OPERATIVE TIME

Group	Mean Operative Time (minutes)	p-value
Group A (IPOM plus)	60.5 ± 12.3	< 0.05
Group B (eTEP)	75.8 ± 15.1	

Postoperative Pain

Postoperative pain was assessed using the Visual Analog Scale (VAS) at various time points. Group B (eTEP) demonstrated consistently lower pain scores compared to Group A (IPOM plus), with the difference reaching statistical significance on day 1, day 7, at one month, and three months postoperatively (all $p < 0.05$).

FIGURE 2. POSTOPERATIVE PAIN SCORES



Postoperative Pain Scores – This line chart shows the Visual Analog Scale (VAS) scores over time for both groups. It highlights that the eTEP group (Group B) consistently reported lower pain scores at all measured intervals compared to the IPOM plus group (Group A).

Seroma Formation and Wound Infection

Seroma formation was evaluated clinically and by ultrasound when indicated. There was no statistically significant difference in seroma formation between the groups ($p = 0.67$). Wound infection rates were similarly low in both groups (2/30 in Group A vs. 1/30 in Group B; $p = 0.55$).

TABLE 3. COMPARISON OF POSTOPERATIVE COMPLICATIONS

Complication	Group A (n=30)	Group B (n=30)	p-value
Seroma Formation	3 (10%)	2 (6.7%)	0.67
Wound Infection	2 (6.7%)	1 (3.3%)	0.55
Recurrence	0 (0%)	0 (0%)	–

(No recurrences were detected in either group during the 3-month follow-up period.)

Hospital Stay

The length of hospital stay was significantly shorter in the eTEP group, with a mean of **5.8 days** compared to **6.8 days** in the IPOM plus group ($p < 0.05$). Early mobilization and lower pain scores in the eTEP group likely contributed to earlier discharge.

TABLE 4. MEAN HOSPITAL STAY

Group	Mean Hospital Stay (days)	p-value
Group A (IPOM plus)	6.8 ± 1.2	< 0.05
Group B (eTEP)	5.8 ± 1.0	

(Significantly shorter duration of hospital stay in the eTEP group.)

IPOM PLUS

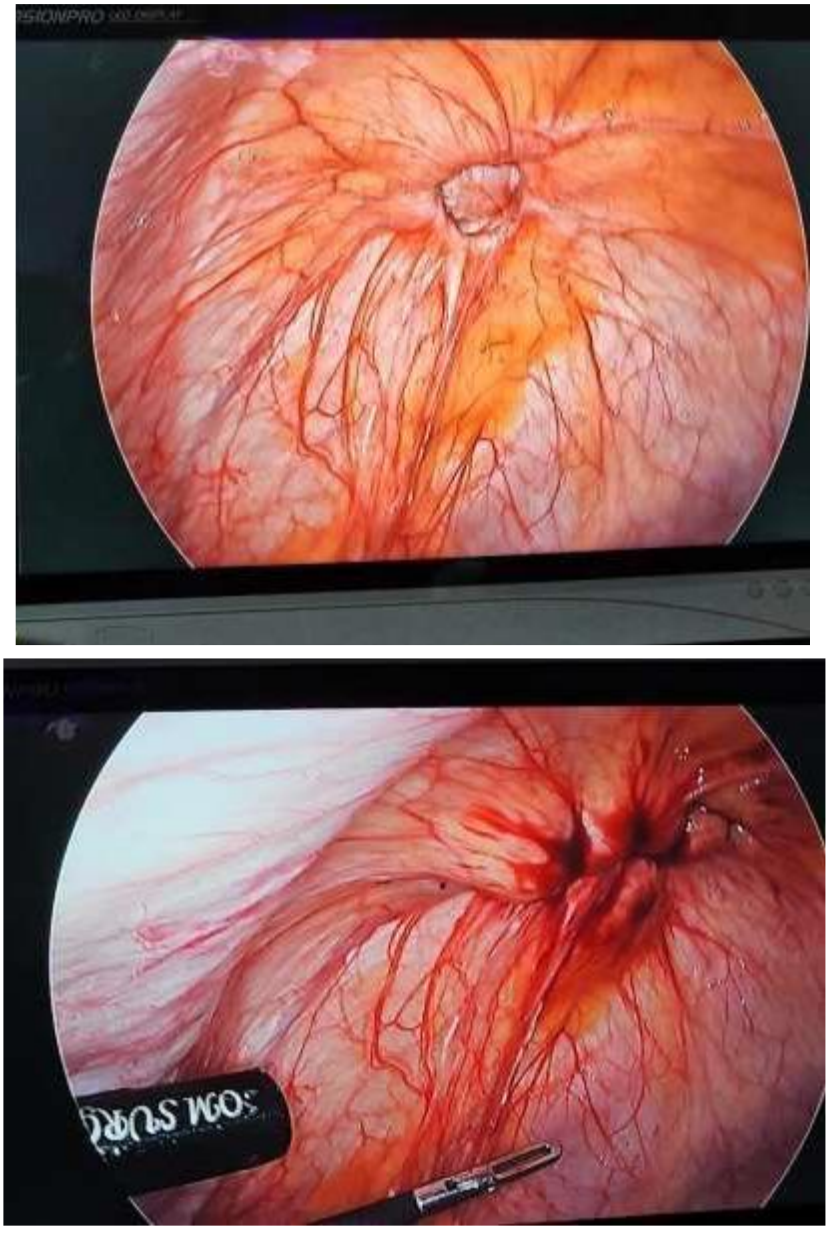


FIGURE1. (A) UMBILICAL DEFECT SIZE; FIGURE 1.(B) PRIMARY CLOSURE OF THE DEFECT.

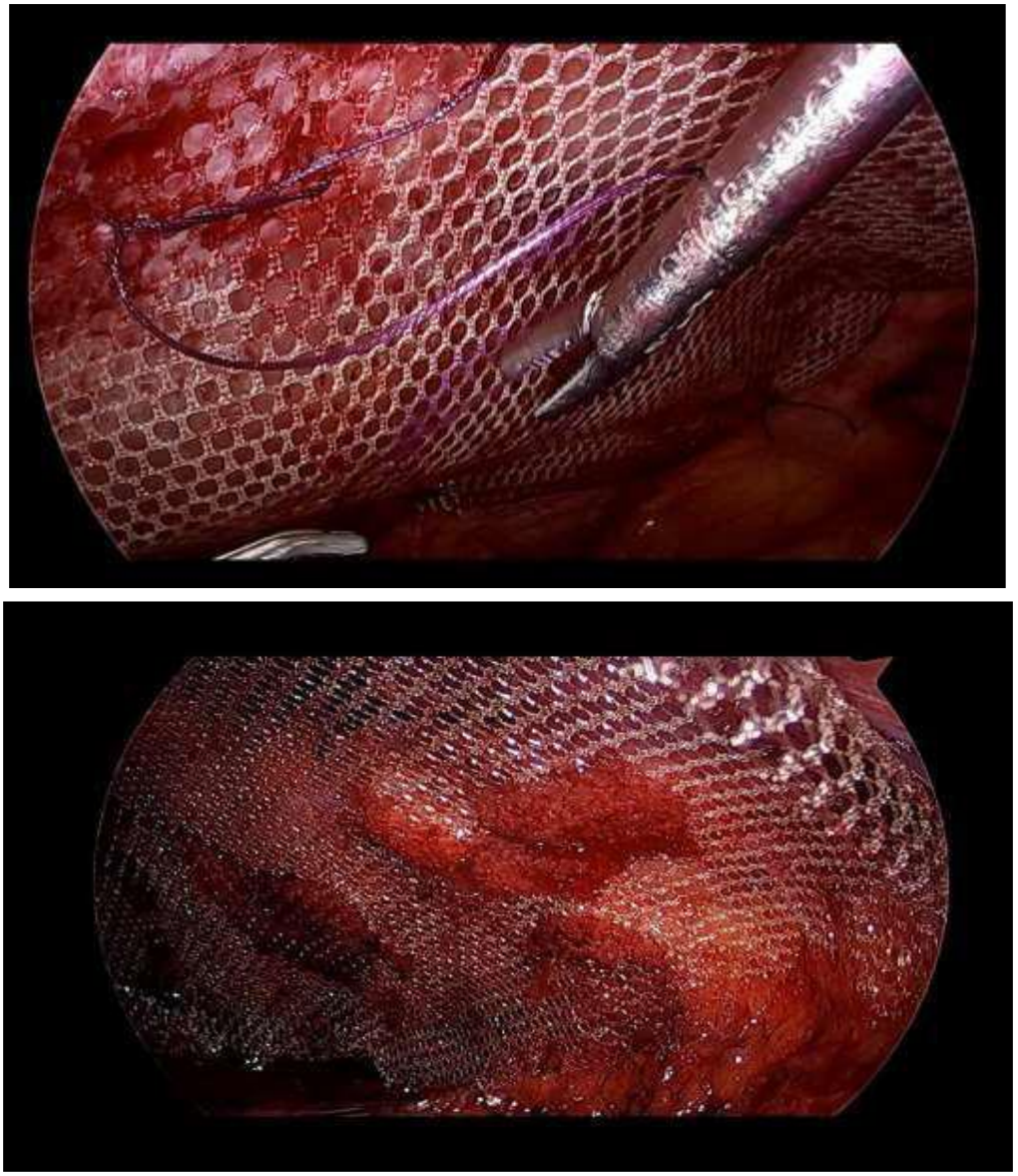


FIGURE 2A.COMPOSITE MESH FIXATION WITH VICRYL 2-0 SUTURES; 2B. POST MESH FIXATION

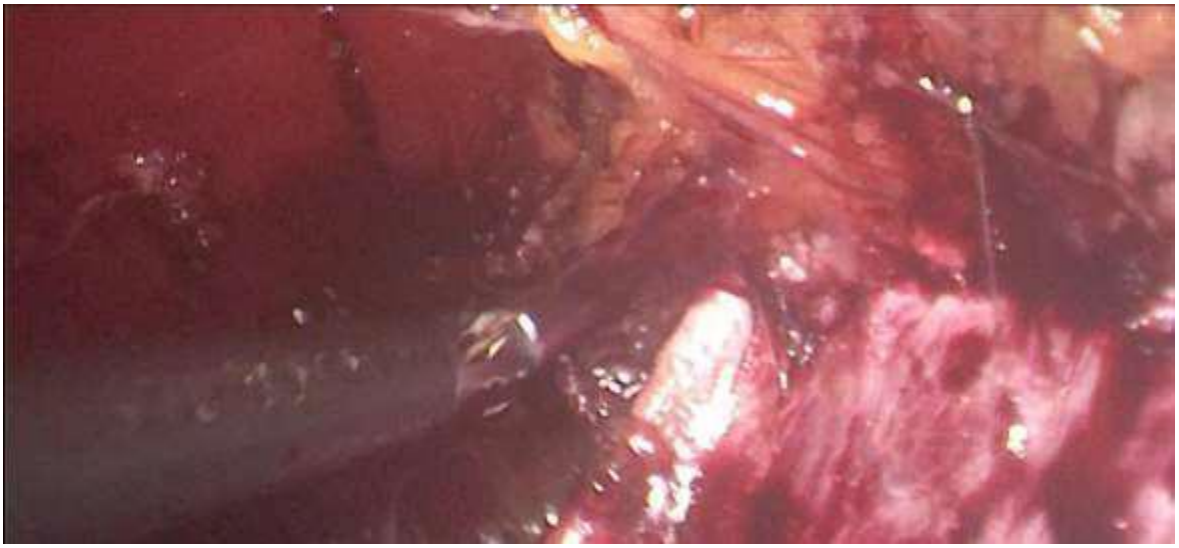
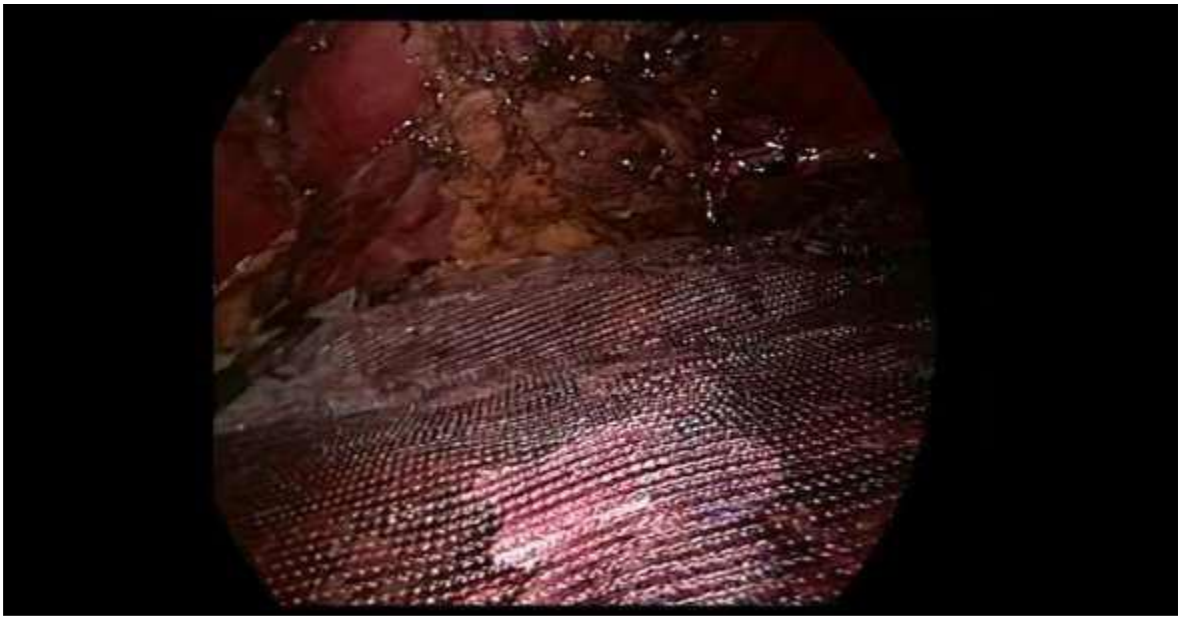


FIGURE 3A,3B: DISSECTION OF RECTO-RECTUS PLAIN



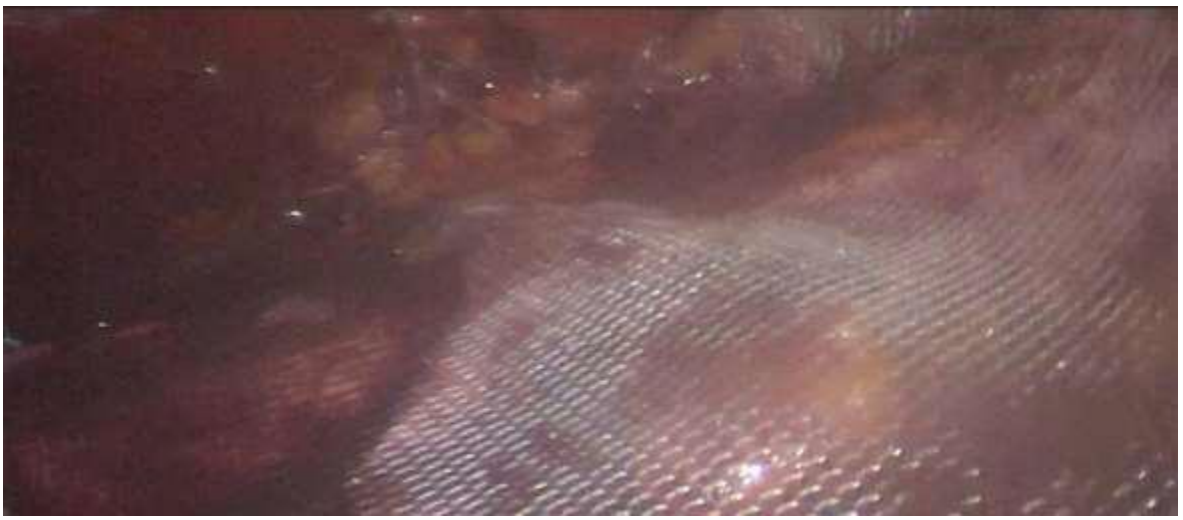


FIGURE 4A,4B: PROLENE MESH PLACEMENT IN THE RECTO-RECTUS PLAIN.

5. DISCUSSION

The research analyzed the effectiveness of eTEP hernia repair against standard IPOM plus treatment for umbilical hernia treatments. The study data established that demographic factors like age and gender matched between IPOM and eTEP groups similar to what research had demonstrated for ventral hernia repairs [9].

The main finding showed that IPOM plus required less operating time than other techniques. The research agrees with previous studies showing surgeons frequently prefer peritoneal methods since that technique requires less steps during dissection [10]. Although eTEP has gained popularity because of its potential advantages it demands complex surgical dissection and longer learning period [11]. Staff performed surgery on eTEP patients longer than patients in the control group but the procedure resulted in lower pain scores across all recorded periods. The placement of mesh between muscular layers during the operation reduces symptoms and discomfort because it positions away from peritoneal and visceral contact [12].

The sample group received eTEP procedure which allowed them to leave the hospital earlier. The speed of patient recovery combined with diminished postoperative pain needs leads to earlier hospital discharge and thus decreases both treatment expenses and healthcare resource needs [13]. The known complication of seroma formation after laparoscopic hernia repairs showed similar low incidence statistics between groups and proved not statistically different. The reported observation might result from improvements in surgical techniques combined with better mesh quality standards and selective patient selection processes during the past years [14].Interestingly, no recurrences were observed in either group during the three-month follow-up period. While this finding is encouraging, a longer follow-up is necessary to draw definitive conclusions about recurrence, especially given that hernia recurrences can manifest months to years after the initial repair. Nonetheless, both

techniques proved to be effective in maintaining short-term repair integrity.

One should also note that the single-center design and relatively small sample size limit the generalizability of these findings. Moreover, the postoperative evaluation period of three months may be too short to capture late complications or recurrences comprehensively. Despite these limitations, the data strongly suggest that while IPOM plus offers the advantage of shorter operative times, eTEP appears to confer benefits in terms of less postoperative pain and quicker discharge. The implications for surgical practice are significant, given the current drive towards patient-centered care, cost-effectiveness, and rapid recovery protocols.

In conclusion, eTEP seems to be a promising alternative to IPOM plus, especially for patients in whom postoperative pain control and rapid recovery are priorities. Future larger, randomized trials with extended follow-up are warranted to further investigate the long-term outcomes and cost-effectiveness of both procedures.

6. CONCLUSION

This study in a single hospital setting revealed that IPOM plus and eTEP provided effective hernia repair results without reporting any treatment failure at short-term follow-ups. Patients undergoing IPOM plus surgery needed less time for operations but received better postoperative comfort and spent shorter periods in the hospital through eTEP procedures. The surgical patients presented equal rates for seroma development as well as wound-related infections throughout both groups. The data indicates eTEP functions as an advantageous surgical technique to provide patients with comfort and fasten their hospital stay durations. Evaluations with extended time ranges among larger test subjects need to validate the present encouraging data

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