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Original Research Article

A study of comparison of perioperative complications in intraperitoneal onlay mesh technique vs extended view totally extraperitoneal ventral hernia repair

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ABSTRACT

Background: Abdominal hernia occurs through the layers of the abdominal wall at a weak point. Laparoscopic ventral hernia repair (LVHR) is an established treatment for ventral hernias. This study was conducted in patients who underwent e-TEP and IPOM surgery for ventral hernia to characterize postoperative pain, recovery time, and quality of life. Predefined preoperative and peri-operative factors were examined for their potential impact.
Methods: A prospective study on a total of 50 patients who underwent IPOM and e-TEP for ventral hernia was conducted, who fulfilled the inclusion criteria. Patients were randomized by simple random sampling technique and were divided into two groups of 25 each (Group A- e-TEP and Group B- IPOM). Data of both groups were compared and analysed for statistical significance using Chi square test and Student 't' test.
Results: The eTEP approach provides benefits compared to IPOM in terms of reduced hospital stay, earlier return to work and cost effective. However, eTEP is linked to complex learning process and in the end the decision of the surgery type should be made on the basis of specific patient's conditions, surgeon's expertise and availability of resources
Conclusions: In study we found that both surgeries were comparable, with each having some benefits over the other.

Keywords: Ventral hernia, e-TEP, IPOM, Technique, Laparoscopic

INTRODUCTION

A hernia is a condition where an organ or tissue protrudes through a weakened area in its surrounding wall. While hernias can occur in various body parts, abdominal wall hernias, particularly in the ventral region, are most common. These hernias can be classified into different types, such as inguinal, umbilical, epigastric, and incisional hernias. Abdominal wall hernias are widespread, affecting about 1.7% of the general population and up to 4% of those over 45.[1] Inguinal hernias are the most common, making up 75% of abdominal wall hernias, with a lifetime risk of 27% for males and 3% for females.[2] Each year, over 20 million hernia repairs are performed worldwide, often as urgent procedures in individuals aged 50 and above. Hernias may be congenital or acquired. Congenital hernias are present at birth and include conditions like omphalocele and gastroschisis. Acquired hernias, such as spontaneous or incisional types, can develop due to factors like increased abdominal pressure from obesity or pregnancy. Symptoms of hernias can be vague, including mild discomfort, pain, nausea, or acute complications like intestinal obstruction or strangulation. Diagnosis typically involves a detailed medical history and physical examination. Imaging techniques like ultrasound (US)

and computed tomography (CT) are used for more accurate diagnosis, especially in complicated cases. Surgical intervention is the primary treatment for hernias. Various techniques are used, including laparoscopic procedures and mesh repairs.[3] Innovations like the extended totally extraperitoneal (eTEP) approach, introduced in 2012, have improved the surgical treatment of hernias by providing better access and reducing complications associated with mesh placement.[4] Despite advancements, hernia repair still faces challenges such as recurrence rates and potential complications from mesh placement. The eTEP method offers benefits like reduced contact with abdominal contents and improved outcomes but also requires a steep learning curve and longer procedure time.[5] This study aims to compare the outcomes and complications of intraoperative onlay mesh repair with totally extraperitoneal ventral hernia repair to determine the most effective surgical approach

METHODS

Study design

This was a prospective comparative study.

Study place

The study was conducted at Department of General Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan.

Study duration

Study period was of 18 months.

Sample size

Sample size was of 50 patients, divided into 25 cases for each treatment group.

Ethics approval

The study was approved by the institutional ethical committee.

Inclusion criteria

Patients aged 18 to 70 years of either gender. ASA (American Society of Anesthesiologists) grade I or II. Patients who consented to laparoscopic hernia repair. Patients undergoing laparoscopic repair for ventral hernia

Exclusion criteria

Incarcerated, irreducible, or strangulated hernias, or any evidence of vascular compromise on imaging**,** Inguinal hernias, Uncontrolled bleeding diathesis. After confirming the hernia to be of ventral origin, and obtaining an informed consent from the patient, further investigations, including routine blood parameters viz. complete blood counts, renal and hepatic function tests, coagulation profile were evaluated and documented. Patient with medical co-morbidities like diabetes, hypertension, underlying malignancy etc., were evaluated and if declared fit for surgery by the concerned specialist physicians will be included for the laparoscopic hernia repair. After pre-anaesthetic check-up, and preparing patient for Operation, patient was operated under general anaesthesia. Strict intra-op monitoring of the patients was done. Hernia repair was done laparoscopically either e-TEP or IPOM.

Statistical analysis

To analyze the data acquired, statistical package of social services version 20 was used to execute it on a computer (SPSS). The student's t test (T) is used to assess the data while dealing with quantitative independent variables. Pearson chi-square and chi-square for linear trend were used to assess qualitatively independent data. The significance of a P value of 0.05 or less was determined.

RESULTS

In eTEP group, almost one third (32%, 8/25) cases were of 51-60 years age group, followed by six (24%) of 41-50 years age group, and five (20%) cases were of >60 years age group. In IPOM group similar distribution of cases were seen as per their age.

Table 1: Age wise distribution of cases.

Age group (in years)	eTEP	IPOM
21-30	3 (12)	3 (12)
31-40	3 (12)	3 (12)
41-50	6 (24)	5 (20)
51-60	8 (32)	8 (32)
>60	5 (20)	6 (24)
Total	25 (100)	25 (100)

Table 2: Sex wise distribution of cases.

Sex	eTEP	IPOM
Female	10 (40)	15 (60)
Male	15 (60)	10 (40)
Total	25 (100)	25 (100)

Table 3: Difference in time of surgery, hospital stay, and return to work.

Variable	eTEP (n=25)	IPOM (n=25)	P value
Time of surgery (mins)	132.52±21.53	131.56±26.88	0.89
Hospital stays (Days)	2.52±0.65	3.6±0.91	<0.001
Return to work (Days)	13.28±2.51	17.72±7.48	0.007

In eTEP group, 15 (60%) cases were male and rest 10 (40%) were female. And in IPOM group 15 (60%) were female and rest 10 (40%) were male. There was no significant difference in age group or gender between both study groups (p>0.05)

In eTEP group maximum eight (32%) cases had diagnosis of epigastric, followed by six (24%) of umbilical hernia. In IPOM group, half of cases (48%,12/25) were of incisional hernia, five (20%) cases were of umbilical hernia.

In eTEP group, around two third (68%, 17/25) cases had 3-5 cm defect size, six (24%) cases had <3 cm defect size. In IPOM group, around three fourth (76%, 19/25) cases had 5-10 cm defect size, followed by 3-5 cm in five (20%) cases.

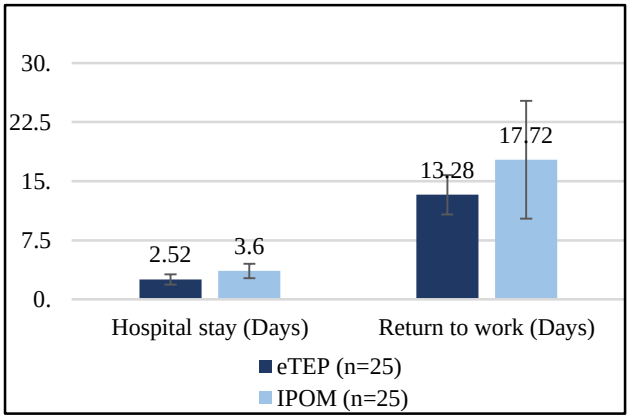

Figure 1: Hospital stay and return to work (days).

In our study, time duration of surgery was comparable in both study groups. The duration of hospital stays and time of return to work was significantly higher in IPOM group compared to eTEP group (p<0.05).

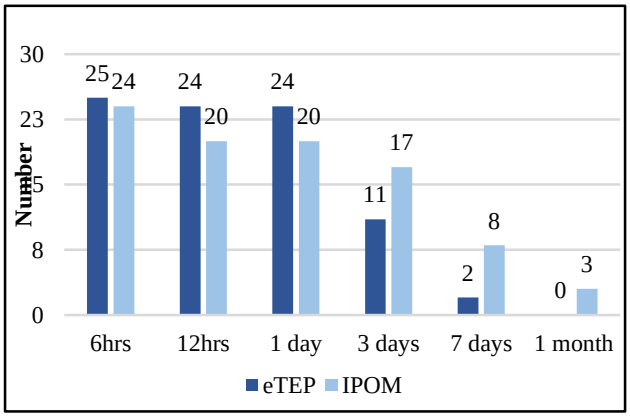

Figure 2: Distribution of pain at different time intervals.

Above chart depicts the number of participants with pain at different time intervals. At six hours almost all cases of both study groups, this proportion reduces with time in both study groups. And the difference in proportion of cases with pain between both study groups at different time intervals was found to be statistically insignificant (p>0.05)

In IPOM group, no case with hematoma was seen. At 12 hours, 1 day, and 3 days one case with Haematoma was seen in eTEP group. This difference between both study groups at 12 hours, 1 day, and 3 days was found to be statistically insignificant (p>0.05). In IPOM group, no case with surgical site infection was seen. At 7 days, one case with surgical site infection was seen in eTEP group.

In IPOM group, no case with numbness/parathesia was seen. In eTEP group, one case at 6 hours had numbness, four (16%) cases had at 12 hours, five (20%) cases at 1 day, four (16%) cases at 3 days, one (4%) case at 7 days and one (4%) at one month had numbness. The difference between both groups in terms of numbness/paraesthesia at different time intervals was statistically insignificant (p>0.05)

At 3 days, eight (32%) cases of IPOM group had chronic pain, and none in eTEP group had chronic pain. This difference in chronic pain proportion was found to be statistically significant (p<0.05). At 7 days, 1 month, and 6 months proportion of cases with chronic pain was higher in IPOM group compared to eTEP group, although this difference was found to be statistically insignificant (p>0.05)

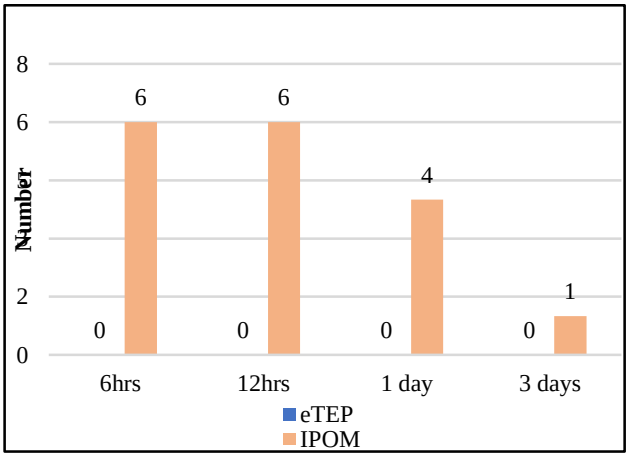

Figure 3: Distribution of post-operative ileus.

In eTEP group, none of case had postoperative ileus at any time interval. Six (24%) cases had postoperative ileus at 6 hours, and 12 hours. At one day four (16%) cases had postoperative ileus in IPOM group and one (4%) case had postoperative ileus at 3 days. Difference in proportion of postoperative ileus at 6 and 12 hours was statistically significant (p<0.05), and at 1-and 3-days it was statistically insignificant (p>0.05) In eTEP group, two (8%) cases had intraoperative vascular complication, and in IPOM group one (4%) case had vascular

complications, and this difference was statistically insignificant (p>0.05).

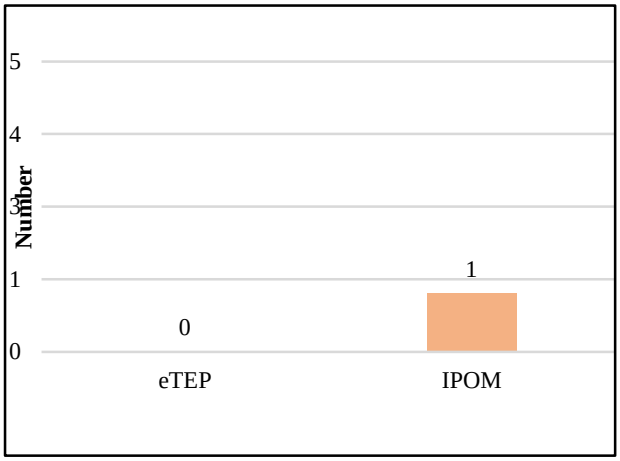

Figure 4: Bowel or visceral injury (Introperative).

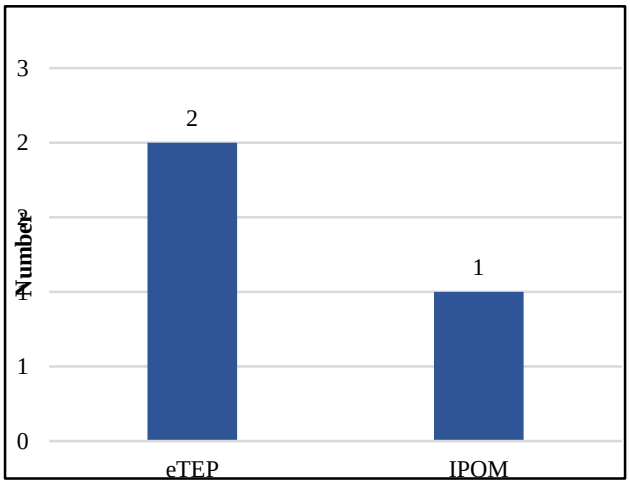

Figure 5: Vascular complications intraoperatively.

In eTEP group, none of case had bowel or visceral injury at any time interval. In IPOM one (4%) case had bowel or visceral injury. This difference in proportion of bowel or visceral injury between both study group was found to be statistically insignificant (p>0.05)

In IPOM group, no case with seroma formation was seen at any time interval. In eTEP group two (8%) cases had seroma formation at 3 days, and one (4%) case had seroma formation at 7 days. The difference in proportion of cases with seroma formation between both study groups was found to be statistically insignificant (p>0.05)

In IPOM group, none of case had subcutaneous emphysema at any time interval. In eTEP group, at 6 hours all cases had subcutaneous emphysema, this proportion of cases with subcutaneous emphysema was decreasing with time. This difference in proportion of subcutaneous emphysema between both study groups at 6 hours, 12 hours, one day, and 3 days was found to be statistically significant, and difference at 7 days was statistically insignificant (p>0.05).

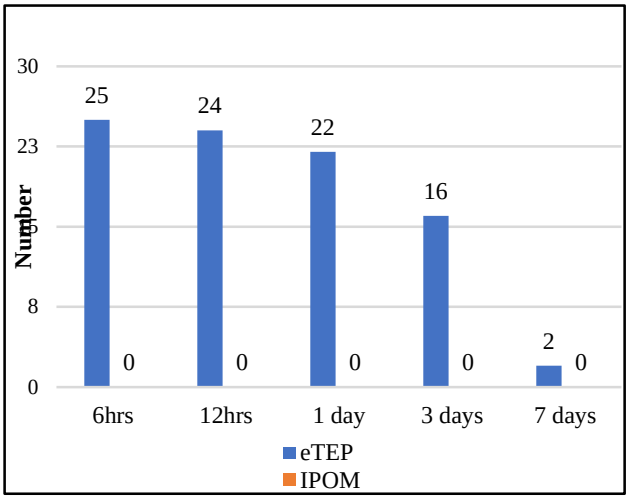

Figure 6: Vascular complications intraoperatively.

DISCUSSION

Overview

Ventral hernias, characterized by an abnormal protrusion of abdominal organs through a defect in the abdominal wall, are commonly treated with various surgical techniques. The discussion compares the outcomes of two hernia repair methods: Intra-peritoneal Onlay Mesh (IPOM) and the Extended Totally Extraperitoneal (eTEP) technique.

Diagnosis and demographics

Both IPOM and eTEP groups had similar age and sex distributions, indicating that both methods are applicable across a broad range of patient demographics. Common hernia types varied, with IPOM frequently used for incisional hernias and eTEP for epigastric and umbilical hernias. Defect sizes differed significantly, with IPOM often addressing larger defects compared to eTEP.

Surgical time and hospitalization

Surgical times for both methods were comparable, though some studies suggest IPOM is quicker. eTEP showed a shorter hospitalization period and quicker return to work compared to IPOM, which is advantageous for patient recovery.

Kumar et al, found that the average defect size was 3.89±0.85 cm^2 in the eTEP group and 4.00±0.76 cm^2 in the IPOM plus group. In this study defect size was comparable between both study groups.[6] Xu et al reported the mean defect size of 3.9 cm in eTEP group and 4.1 cm in IPOM plus group. Both these groups were comparable in terms of defect size.[7]

Perioperative complications

Pain

Both methods reported pain, but eTEP had less chronic pain and a lower incidence of long-term pain compared to IPOM. Joshi et al, found that all patients were administered a single dose of postoperative analgesic in the form of an intramuscular injection of NSAIDs. However, 30% of patients in the e-TEP group required additional analgesics compared to 45% of patients in the IPOM group.[8]

Taşdelen et al showed that pain levels on the first and 10th days after surgery were considerably lower in eTEP group than IPOM group ($p<0.001$).[9] Urinary retention and hematoma, minor differences, with no significant statistical impact. Postoperative wound infection minimal cases observed, with no significant differences between the methods.

Chronic pain

Significantly lower in the eTEP group.

Seroma formation

Slightly higher in eTEP but not statistically significant. Arish et al, reported that four cases of seroma occurred in the IPOM plus group, while only one case occurred in the eTEP group.[10] This finding is in contrast to our results. Khetan et al found that the incidence of seroma and paralytic ileus using eTEP technique was 20.7%.[11]

Recurrence

No recurrences in eTEP and one in the IPOM group; however, this was not statistically significant. Penchev et al, published that in the IPOM group, only one required readmission due to recurrence. However, none of the patients in the e-TEP group needed to be readmitted.[12]

Postoperative Ileus

More common in IPOM compared to eTEP. Joshi et al found that the incidence of postoperative paralytic ileus was higher in the IPOM group compared to the e-TEP group, perhaps due to the fact that the IPOM method is completely intraperitoneal.[8]

Vascular and organ injuries

Minimal and not significantly different between the groups.

Subcutaneous emphysema

Higher in eTEP shortly after surgery but diminished over time.

Cost

eTEP is notably less expensive due to lower mesh costs and the absence of fixation devices, making it more cost-effective compared to IPOM. The study's small sample size and short follow-up period limit its predictive accuracy for long-term outcomes. Future research should involve larger sample sizes and longer follow-up to better assess recurrence rates and long-term complications.

Given the limited duration of this study's follow-up, it did not investigate potential long-term consequences following surgery, such as abdominal adhesions. To ensure the accuracy of the findings, a multicentre randomized controlled trial with an extended follow-up period is required. In summary, while both techniques are safe and effective, eTEP offers several advantages over IPOM in terms of recovery time, pain management, and cost-effectiveness.

CONCLUSION

Both IPOM and eTEP are effective for ventral hernia repair. eTEP demonstrates advantages in reduced hospitalization, less chronic pain, and lower costs, though it requires a longer learning curve and has some risks like seroma formation. IPOM remains a viable option, especially for larger defects.

Recommendations

eTEP is preferable for patients where cost and recovery time are critical, and its benefits may be more pronounced in specific scenarios. However, the technique’s complexity and longer operative time are factors that need consideration. IPOM remains a viable and effective option, especially in settings where the surgeon’s experience with IPOM is greater or where eTEP is less feasible. Ultimately, the choice between eTEP and IPOM should be tailored to each patient's unique condition, the surgeon's expertise, and the available resources. Both techniques are effective, and the decision should consider all factors to optimize patient outcomes.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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