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**Original Research Article**

# A study to compare outcomes in patients undergoing intraperitoneal onlay mesh plus and eTEP repair for ventral wall and incisional hernia

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## ABSTRACT

**Background:** The introduction of minimally invasive surgery in the early 1990s enabled the possibility of laparoscopic ventral or incisional hernia repair in 1993. At present IPOM Plus (intraperitoneal onlay mesh) is the most frequent technique used for laparoscopic ventral hernia repair, and the mesh is placed just under the peritoneum and enhanced view totally extraperitoneal repair. A relatively new approach based on TEP repair for inguinal hernia has also shown to be safe and effective. our study is primarily aimed at assessing and comparing outcomes of lap IPOM plus and eTEP, in terms of operative time, postoperative pain, length of hospital stay.
**Methods:** This is a retrospective cohort study. Data were collected from successive patients who have undergone minimally invasive ventral hernia repair from January 2020 to June 2022, in Global hospital Hyderabad). Data were entered into a prospectively maintained database and retrospectively analysed. Pateints were distributed into two groups IPOM plus and eTEP. Perioperative data were analysed using statistical tests.
**Results:** In this study, a total of 76 patients with ventral and incisional hernias were included, with 40 patients undergoing IPOM plus repair and 36 patients undergoing eTEP repair. Both groups were similar in terms of risk factors, types of hernias, defect size. The duration of surgery was significantly shorter in the IPOM plus group (85.6 minutes) compared to the eTEP group (121.6 minutes). Postoperative pain, according to the VAS score at postoperative day 1 and 3, was significantly higher in the IPOM plus group (7.5 and 5.6, respectively) compared to the eTEP group (3.8 and 1.6, respectively). However, at day 30, pain scores in both groups were not statistically significant (IPOM plus-1.2 vs. eTEP 1.1). The mean length of hospital stay in the IPOM plus group (5.3 days) was significantly longer than in the eTEP group (3.1 days).
**Conclusions:** The eTEP technique exhibits significantly lower postoperative pain and results in a reduced length of hospital stay. However, it is worth noting that the eTEP procedure does require a longer operative time compared to IPOM Plus.

**Keywords:** IPOM plus, eTEP, Intraperitoneal onlay, Ventral wall hernia, Incisional hernia

## INTRODUCTION

Ventral hernias of the abdomen are defined as a non-inguinal, nonhiatal defect in the fascia of the abdominal wall.[1] Due to the increasing incidence of obesity the incidence of ventral wall hernia is also increasing.[2] Before the introduction of minimally invasive surgeries all hernias were repaired with open techniques. The introduction of minimally invasive surgery in the early 1990s enabled the possibility of laparoscopic ventral or incisional hernia repair in 1993.[3] There is enough evidence in literature about superiority of these minimally invasive surgeries over open surgeries with respect to decreased blood loss, reduced hospital stay, early return to work and decreased

perioperative pain and low risk of surgical site infection. Inspite of these advantages minimally invasive approach has been faced with technical challenges including longer learning curve and higher cost of prosthetic meshes and fixation devices, multiple approaches to laparoscopic hernia repair have been described so far in an attempt to mitigate these challenges. The mesh placement methods in minimally invasive hernia surgery vary from intraperitoneal mesh placement to, transabdominal abdominal preperitoneal (TAPP), and totally extraperitoneal (TEP). At present IPOM Plus (intraperitoneal onlay mesh) is the most frequent technique used for laparoscopic ventral hernia repair, and the mesh is placed just under the peritoneum and enhanced view totally extraperitoneal repair (eTEP).[4,5] A relatively new approach based on TEP repair for inguinal hernia has also shown to be safe and effective. It offers the advantage of low-cost mesh and decreased post operative pain. Our study is primarily aimed at assessing and comparing outcomes of lap IPOM plus and eTEP, in terms of operative time, postoperative pain, length of hospital stay. Secondary aim of the study is to compare perioperative complications, and recurrence rates of the two approaches.

## METHODS

This is a retrospective cohort study. Data were collected from successive patients who have undergone minimally invasive ventral hernia repair from January 2020 to June 2022, in Global hospital Hyderabad. All patients above 18 years were included in the study. Patients with complicated hernia, and those requiring component separation techniques were excluded from the study. Sample size was based on study duration. Data were entered into a prospectively maintained database and retrospectively analysed. The distribution of IPOM + or eTEP approaches were studied and grouped the outcomes of patients who underwent surgery using the eTEP approach were compared with those of patients who underwent IPOM + approach. Demographic data like Age, gender, body mass index, risk factors, type of hernia as either ventral and incisional hernia and defects size in millimeter as measured by preoperative ultrasound were collected for all the patients. Both surgical techniques were performed by a single surgeon.[6,7] Perioperative data like operative time in minutes, intraoperative complications, post operative complications, post operative pain according to VAS score on Day 1, 3 and 30 and length of hospital stay well collected for both groups, patients were followed up at I month, 3 month and 6 months with history and clinical examination, and assessed for recurrence or complaints of chronic pain. Both the groups were compared primarily in terms of operative time, post operative pain on day 1,3 and 30, length of hospital stay and secondary outcome regarding perioperative complications and recurrences were analysed. Statistical analyses were performed using SPSS software 26$^{th}$ version. Continuous variables were described as means with standard deviation (SD), and categorical variables were reported as absolute or relative frequencies. Continuous variables were compared using nonparametric tests (Mann-Whitney U and Wilcoxon tests). The Chi-square test was used to evaluate categorical data. Reported p values of <0.05 were considered statistically significant.

## RESULTS

In this study, a total of 76 patients with ventral and incisional hernias were included, with 40 patients undergoing IPOM plus repair and 36 patients undergoing eTEP repair.

**Table 1: Distribution according to demographic and risk factors.**

| Variables | | eTEP (N=36) frequency (%) | IPOM+ (N=40) frequency (%) | P value |
|---|---|---|---|---|
| **Age** | | 59.4 (10.5) | 56.2 (12.5) | 0.233 |
| **Gender** | Male | 20 | 24 | 0.695 |
| | Female | 16 | 16 | |
| **BMI (Kg/m$^2$)** | | 26.5 (4.5) | 27.2 (5.6) | 0.552 |
| **Risk factors** | Smoking | 10 (27.8) | 12 (30) | 0.856 |
| | Diabetes Mellitus | 19 (52.7) | 20 (50) | 0.808 |
| **Type of Hernia** | Ventral Hernia | 20 (55.5) | 14 (35) | 0.071 |
| | Incisional Hernia | 16 (44.5) | 26 (65) | |
| **Defect area (mm$^2$)** | | 34.2 (5.2) | 33.5 (4.8) | 0.545 |

The mean age of the patients was 56.2 (±12.5) years for IPOM plus and 59.4 (±10.5) years for eTEP, and the male-to-female ratio was similar in both groups (24/16 vs. 20/16). The body mass index was 26.5 (±5.6) in the IPOM plus group and 27.2(±4.5) in the eTEP group. Both groups were similar in terms of risk factors such as smoking and diabetes mellitus, as well as the types of hernias. The defect size in patients who underwent IPOM plus (34.2 mm) and eTEP (33.5 mm) was not statistically significant. Patient characteristics are summarized in (Table 1). The duration of surgery was significantly shorter in the IPOM plus group (85.6 minutes) compared to the eTEP group (121.6 minutes). Postoperative pain, according to the VAS score at postoperative day 1 and 3, was significantly higher in the IPOM plus group (7.5 and 5.6, respectively) compared to the eTEP group (3.8 and 1.6, respectively). However, at day 30, pain scores in both groups were not

statistically significant (IPOM plus-1.2 vs. eTEP 1.1). The mean length of hospital stay in the IPOM plus group (5.3 days) was significantly longer than in the eTEP group (3.1 days).

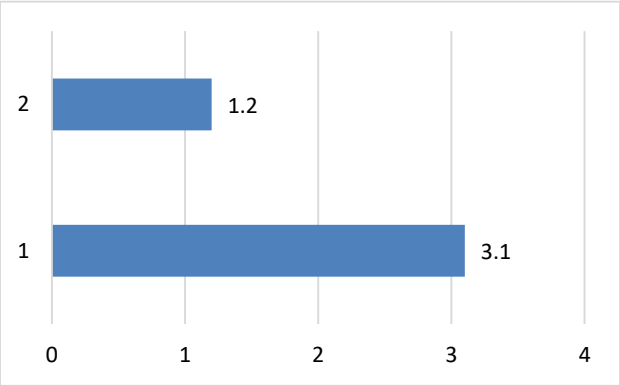


**Figure 1: Length of hospital stay (days).**

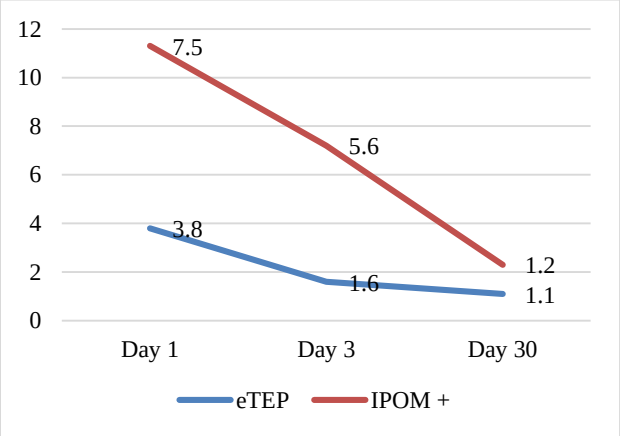


**Figure 2: Pre and postoperative pain eTEP vs IPOM+.**

During surgery, one patient in the IPOM plus group experienced an uneventful inferior epigastric artery injury, which was managed by ligation, and no other complications were reported in both groups. Postoperatively, 7 patients in the IPOM plus group experienced paralytic ileus, while none did in the eTEP group. Seroma was developed in 4 patients in the IPOM plus group compared to 1 patient in the eTEP group. Ecchymosis was present in 2 patients in the eTEP group. None of the patients developed recurrence during the mean follow-up duration of 6.9 months in the IPOM plus group and 6.5 months in the eTEP group. Outcomes are summarized in (Table 2).

## DISCUSSION

Since the introduction of minimally invasive surgery for ventral/incisional hernias, various procedures have been performed worldwide. Each procedure has its own set of advantages and disadvantages. One of the most commonly performed surgeries in the last few decades has been IPOM, which later modified to IPOM plus by closing the defect primarily with sutures.[8] However this procedure has faced criticism due to issues such as severe post-operative pain, likely caused by the use of tackers for fixation, the need for composite mesh (leading to increased surgery costs), and several reports of intra-abdominal adhesions resulting from the intraperitoneal location of mesh. Additionally, many series have reported a higher incidence of paralytic ileus, reaching up to 52%.[9,10] In response to these challenges, efforts have been made to introduce new procedures, leading to the introduction of the eTEP procedure.[6] By positioning mesh outside the peritoneal cavity, this technique offers advantages such as the use of low-cost mesh, a reduced incidence of paralytic ileus, and the elimination of traumatic mesh fixation, making it a viable alternative.

**Table 2: Outcome measurements.**

| Variable | | eTEP (N=36) frequency (%) | IPOM+ (N=40) frequency (%) | P value |
|---|---|---|---|---|
| **Operation time (min)** | | 121.6 (21.3) | 85.6 (15.6) | <0.001 |
| **Length of hospital stay (days)** | | 3.1 (0.8) | 5.3 (1.2) | <0.001 |
| **Follow-up (months)** | | 6.5 (2.9) | 6.9 (3.2) | 0.571 |
| **Pain** | Day 1 | 3.8 (0.9) | 7.5 (1.8) | <0.001 |
| | Day 3 | 1.6 (0.4) | 5.6 (1.5) | <0.001 |
| | Day 30 | 1.1 (0.2) | 1.2 (0.3) | 0.09 |
| **Intraoperative complications** | Bleeding from IEA injury | 0 (0) | 1 (2.5) | - |
| | Paralytic ileus | 0 (0) | 7 (17.5) | - |
| | Seroma | 1 (2.7) | 4 (10) | - |
| | Ecchymosis | 2(1) (5.5) | 0 (0) | - |

The safety and efficacy of this eTEP technique have been demonstrated in various studies. There is a high incidence of post-operative pain in IPOM Repair, ranging from 20% to 40%.[11] On the other hand, the major advantage of the eTEP procedure is reduced pain scores, as reported by previous studies, probably due to non-fixation of the mesh with tackers. Our study yielded similar results. However, at the 1-month follow up, there was an insignificant difference in pain scores between the two groups. Salido

et al in their initial report, had a mean operative time of 126 minutes for the eTEP procedure.[12] On the other hand, the more commonly performed IPOM Plus had a mean operative time of 111.05±28.14 minutes.[8] We noticed a decrease in operative time in the IPOM Plus group compared to the eTEP group, which was significant. eTEP is a technically challenging procedure with a learning curve.[13] In our study, surgeon has relatively more experience with the IPOM procedure compared to eTEP. Thus, these results need to be cautiously interpreted. In their study on IPOM repair, Andreus et al reported a 52% incidence of paralytic ileus and post-operative adhesions owing to placing a foreign body in the peritoneal cavity.[10] In our study, 17.5% of patients experienced paralytic ileus, requiring the insertion of a nasogastric tube and being kept nil by mouth, but we did not encounter any patients with bowel obstruction or mesh erosion into the bowel during our 6-month follow-up.

The mean length of hospital stay in our study was significantly longer in the IPOM Plus group compared to the eTEP group, owing to post-operative pain and delayed recovery of bowel function. Four patients in the IPOM Plus group developed seroma but resolved with conservative management. Also, we noticed ecchymosis in the anterior abdominal wall in 2 patients in the eTEP group and none in the IPOM group. eTEP has the potential advantages of having low pain scores, non-traumatic mesh fixation, short duration of hospital stay, and low mesh cost. With mastery of techniques and an increasing number of performed cases, the operative time can be reduced. Although eTEP has the potential advantages of avoiding intra-abdominal complications, there are case reports of bowel adhesions to the mesh through gaps in the peritoneum. If adequately mastered, eTEP can be of great benefit in properly selected patients; however, long-term results need to be assessed in terms of recurrence.

### *Limitations*

Our study is simple and cost-effective but is limited by the fact that it's a retrospective study with a small sample size and short duration of follow-up to predict recurrence. To further validate the results, a randomized controlled trial is necessary

## CONCLUSION

In conclusion, eTEP technique for ventral or incisional hernia repair demonstrates several advantages over the commonly performed IPOM Plus procedure. The eTEP technique exhibits significantly lower postoperative pain and results in a reduced length of hospital stay. However, it is worth noting that the eTEP procedure does require a longer operative time compared to IPOM Plus. Despite this, the eTEP approach has shown a favorable safety profile with no major intraoperative complications reported. Furthermore, our study indicates that the IPOM Plus group experienced a higher incidence of paralytic ileus and seroma formation, suggesting potential benefits in avoiding these complications with the eTEP technique. Overall, the eTEP procedure proves to be a promising option for ventral or incisional hernia repair, offering improved postoperative outcomes and safety. However, considering the slightly longer operative time, a comprehensive assessment of patient-specific factors and surgeon expertise is necessary to make informed decisions on the choice of surgical approach. Further research and long-term follow-up studies are warranted to validate the durability and recurrence rates of eTEP compared to IPOM Plus.

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## REFERENCES

1. Smith J, Parmely JD. Ventral hernia. Treasure Islands: Stat Pearls Publishing; 2021.
2. Veilleux E, Lutfi R. Obesity and Ventral Hernia Repair: Is There Success in Staging?. J Laparoendosc Adv Surg Tech. 2020;30(8):896-899.
3. LeBlanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafuoroethylene: preliminary fndings. Surg Laparosc Endosc 1993;3(1):39-41.
4. Park Y, Chung M. Laparoscopic Ventral Hernia Repair. J Minimal Invas Surg. 2017;20(3):93-100.
5. Belyansky I, Daes J, Radu VG, Balasubramanian R, Reza ZH, Weltz AS, et al. A novel approach using the enhanced-view totally extraperitoneal (eTEP) technique for laparoscopic retromuscular hernia repair. Surg Endosc. 2011;32(3):1525-32.
6. Baig SJ, Priya P. Extended totally extraperitoneal repair (eTEP) for ventral hernias: Short-term results from a single centre. J Minim Access Surg. 2019;15(3): 198-203.
7. Malik S, Wijerathne S. Laparoscopic Intraperitoneal Onlay Mesh (IPOM) and IPOM Plus. In: Lomanto D, Chen WTL, Fuentes MB, eds. Mastering Endo-Laparoscopic and Thoracoscopic Surgery. Singapore: Springer. 2011.
8. Basukala S, Tamang A, Rawal SB, Malla S, Bhusal U, Dhakal S, Sharma S. Comparison of outcomes of laparoscopic hernioplasty with and without fascial repair (IPOM-Plus vs IPOM) for ventral hernia: A retrospective cohort study. Ann Med Surg. 2022;80: 104297.
9. Jamry A, Jałyński M, Piskorz L, Brocki M. Assessment of adhesion formation after laparoscopic intraperitoneal implantation of Dynamesh IPOM mesh. Arch Med Sci. 2013;9(3):487-92.
10. Domen A, Stabel C, Jawad R, Duchateau N, Fransen E, Vanclooster P, de Gheldere C. Postoperative ileus after laparoscopic primary and incisional abdominal hernia repair with intraperitoneal mesh (DynaMesh®-IPOM versus Parietex™ Composite): a single

institution experience. Langenbecks Arch Surg. 2021; 406(1):209-18.
11. Bansal VK, Asuri K, Panaiyadiyan S, Kumar S, Subramaniam R, Ramachandran R, et al. Comparison of Absorbable Versus Nonabsorbable Tackers in Terms of Long-term Outcomes, Chronic Pain, and Quality of Life After Laparoscopic Incisional Hernia Repair: A Randomized Study. Surg Laparosc Endosc Percutan Tech. 2016;26(6):476-483.
12. Salido FS, Fraile VM, Osorio SI, Georgiev HT, Bernar de OJ, González-Ayora S, et al. Extended Totally Extraperitoneal (eTEP) Approach for Ventral Hernia Repair: Initial Results. Cir Esp. 2020;98(5):260-6.
13. Choi YY, Kim Z, Hur KY. Learning curve for laparoscopic totally extraperitoneal repair of inguinal hernia. Can J Surg. 2012;55(1):33-6.

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