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# Intra Peritoneal Onlay Mesh (IPOM) and IPOM PLUS for primary ventral hernias: A comparative study

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**ABSTRACT**

**Background**: The laparoscopic technique for repairing ventral hernias (LVHR) is now well established. However, several issues related to laparoscopic repair, such as seroma formation, mesh bulging/eventration is associated with IPOM. To solve these problems, IPOM-Plus has been introduced in the past decade.

**Materials and Methods:** A Prospective Comparative study was conducted in 90 patients with primary ventral hernias between January 2019 to June 2020. Patients (aged 18 to 60 years) with primary ventral hernias in the midline and a defect size of 2 to 5 cm were included. Patients were categorized into IPOM and IPOM PLUS groups using simple random sampling.. Post-Op pain was assessed using VAS score. Descriptive statistics were used to present the results.

**Results**: Majority of the study patients were 25 to 40 years of age (51% were males). Epigastric hernias were more than umbilical hernias (74% vs 36%). Average size of the defect was 3.49 cm intra-operatively. Operative time was longer in IPOM PLUS (64.15 vs 52.82 min, p=0.0001). Seroma formation was more in IPOM ( 8 vs 1, p=0.03). IPOM PLUS had increased post-op pain(7.97 vs 6.60, p=<0.0001) on POD 1; less duration of hospital stay (1.64 vs 1.93, p=0.04); and faster return to activity (7.35 vs 8.08 days, p=0.014).

**Conclusion** : Due to lower incidence of seroma formation, bulging and shorter hospital stay, IPOM PLUS was found to be superior to IPOM in the management of medium size primary ventral hernias.

**Keywords**: IPOM; IPOM-PLUS; Defect closure; Primary ventral hernias; LVHR; Umbilical Hernia; Lap Hernia Repair

## INTRODUCTION

Primary ventral hernias form 10% of all abdominal wall hernias and its repair is possible only when the defect is small (2 cm in diameter) with viable surrounding tissue. Larger defects (>2 cm in diameter) have a high recurrence rate if closed primarily and are repaired with a prosthesis [1].

Except from general acceptance that use of prosthetic material for good hernia repair is essential, it is extremely difficult to find agreed international consensus on what would be the most optimal surgical approach for treatment of a particular abdominal wall defect. This is in part due to the ongoing development and release of new prosthetic materials, improvement of existing technologies and description of innovative surgical techniques [2].

The laparoscopic technique for repairing ventral hernias (LVHR) is now well established. However, several issues related to laparoscopic repair, such as seroma formation, mesh bulging/eventration, and non-restoration of the abdominal wall rigidity/function with only bridging of the hernial orifice using standard laparoscopic intraperitoneal

onlay mesh repair (IPOM). To solve these problems, laparoscopic fascial defect closure with IPOM reinforcement (IPOM plus) has been introduced in the past decade, and a few studies have reported satisfactory outcomes [3]. IPOM plus also maximizes the amount of tissue in growth into the mesh as the surface area between the prosthesis and the abdominal wall is significantly increased [2]. With this context, this study aimed to compare the effectiveness and safety of IPOM with IPOM plus in the management of primary ventral hernias.

## Materials and methods

This prospective, comparative study included patients with primary ventral hernias visiting the department of general surgery, ESIC MC PGIMSR, from January 2019 to June 2020. The study was approved by the institutional ethical review board and required consent was obtained from patients at enrolment.

### *Sample size calculation*

Considering the prevalence of seroma formation is 5.6% in IPOM plus when compared to IPOM (27.8%), the expected frequency of seroma was 13. Therefore, the sample size required with a confidence interval of +/- 7 was 89. The current study included 90 patients (45 in each group by simple random sampling) based on the above consideration.

### *Patient population*

Patients (males and females, aged 18 to 60 years) with primary ventral hernias in the midline and a defect size of 2 to 5 cm were included in this study. Whereas those with divarification of recti/Malgaigne's bulges, unfit general anesthesia, complicated hernias (obstructed, strangulated), pregnant women, and not willing to participate in the study were excluded.

A detailed clinical assessment of patients was performed in the outpatient department including history, clinical examination and baseline investigations for complete preoperative workup and abdominal ultrasound to measure the size of the defect pre-operatively. Patients were categorized into two groups using simple random sampling. Ninety envelopes were prepared, with 45 containing IPOM and 45 containing IPOM Plus written in them. Patients were asked to pick an envelope and underwent the surgical technique accordingly. Post-Op pain was assessed using VAS score.[4] Antibiotic prophylaxis (Ceftriaxone) was used in all of our patients. All patients were operated under GA.

### Technique:

The procedure was performed under general anesthesia and the patient was placed in a supine position with both arms tucked in at his side. Pneumoperitoneum was established with Veress needle at palmers point and intraabdominal pressure was maintained to 12mmHg. A 10mm trochar was inserted in left anterior axillary line at the level of umbilicus and $30^0$ scope was inserted through it to visualize the abdominal contents. Two working ports of >5mm were inserted in left midclavicular line. The contents reduced and adequate hemostasis was maintained during the procedure.

For IPOM, a dual Mesh (15x15cm) was fixed by trans-fascial sutures with overlapping of 4-5 cm from the defect margin. Once complete haemostasis was achieved, port closure was done with Prolene 1-0, transfacial Sutures, and titanium tackers.

For IPOM plus, defect was sutured with Prolene 1-0, continuous Sutures. Dual Mesh (15x15cm) was kept over the sutured defect. Mesh kept in place with prolene 1-0, transfacial sutures, and titanium tackers. For both these procedures, skin was approximated with skin stapplers.

### *Post op care*

All patients were mobilized on post-operative day 1 and were started with incentive spirometry, as part of respiratory physiotherapy. IV and oral NSAIDS were used for analgesia.

## Results

The mean age of patients was 44.77 years (IPOM: 43.77yrs and IPOM PLUS: 45.77yrs). Majority of patients in IPOM-PLUS were between 51 to 60 years age group and majority were males (51%). With a mean BMI of 27.59 $kg/m^2$, majority of the study patients (N=59, 65.55%) were overweight.

Epigastric hernias were predominant in our study, comprising about $3/4^{th}$ of the total study population. There were 23 cases of umbilical hernias (26%) and 67 cases of epigastric hernias (74%). Both the groups were majorly comprised of epigastric hernias (76% in IPOM; 73% IPOM PLUS) when compared to umbilical hernias (Table 1).



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The pre-operative average size of the defect in patients who underwent IPOM was 3.45 cm on USG and 3.59 cm intra-operatively (measured using a sterile tape) whereas it was 3.25 cm and 3.38 cm in IPOM PLUS, respectively. It was seen that 36 cases (80%) in the IPOM group were medium size defects (as per EHS classification) and 9 (20%) were large size defects. However, in IPOM PLUS group, 39 (87%) cases were medium size defects and 6 (13%) were large size defects.

Intra-operative complications were reported in 41% of the cases, which included adhesions (26%) and bleeding (15%). There were 12 (26.6%) cases of adhesions and 7 cases (15.5%) of bleeding in patients who underwent IPOM. Likewise, in patients who underwent IPOM-PLUS, there were 11 (24.4%) incidences of adhesions and 7 (15.5%) cases of Bleeding. Rest of the cases in both groups were uneventful. The average duration of surgery from the time of Veress insertion, till Port site closure of skin was 52.82 mins for IPOM and 64.15 mins for IPOM-PLUS technique. The difference in duration between the two surgeries was 11.33 mins ($p<0.00001$, Figure 1).

Post-operative seroma was the most common complication (IPOM: N=8, IPOM PLUS: 1, $p=0.03$) followed by hematoma and bulging at the site of hernia defect (Table 2).

The average VAS Score on post-operative day 1 for IPOM group was 6.6, while that for IPOM PLUS was 7.97 ($p = 0.00001$). However, the VAS scores decreased on day 7 in patients who underwent IPOM-PLUS when compared to IPOM (1.6 vs. 1.77, $p = 0.13$; Figure 2).

All patients in IPOM group were discharged between post-operative day 1 and 4. Similarly, all patients in IPOM PLUS group were discharged between Post op day 1 and 4. The difference in hospital stay between the two groups was found to be statistically significant, $p=0.046$.

All patients in IPOM group returned to work / routine activity between 7- and 14-days post operatively, whereas IPOM PLUS group returned to work/routine activity between 7- and 12-days Post operatively ($p =0.014$).

**Discussion**

The current study assessed the peri- and post-operative events in patients with primary ventral hernias undergoing two surgical procedures, IPOM vs IPOM plus. We observed that IPOM PLUS was superior to IPOM in treating primary ventral hernias in the midline, for medium size defects (2-5cm).

Although the post-operative pain as assessed by VAS was significantly higher in IPOM PLUS on POD 1 (7.97 vs 6.60, $p = 0.0001$) when compared to IPOM, the scores were comparable on POD 3 (4.75 vs 4.35, $p = 0.089$) and POD 7 (1.60 vs 1.70, $p = 0.139$) between the 2 techniques.

Post-op pain, assessed using VAS score was only significant on the first day (IPOM PLUS > IPOM). VAS scores at the end of 72 hours was comparable with Roberto et al [5] study. We also observed that patients undergoing IPOM PLUS technique returned to normal day-to-day activity faster than those with IPOM (8.0 days vs 7.0 days, $p = 0.014$). Duration of Hospital stay was comparable between the two groups and also comparable to Palanivelu and Reiko studies [6, 7]

The difference in duration of surgery was 11.3 mins, comparable to a study by Roberto et al [5] (11 mins). However, the longer duration for each surgery can be attributable for larger hernias. Size of the defect in that study was up to 10 cm and incisional hernias were also included. The mean operating time in the Palanivelu et al [7] study was 94 mins for IPOM-PLUS (defect closure technique). The increase in duration is because the study included recurrent incisional hernias and larger defect sizes upto 10 cm.

Seroma formation, one of the most common post-operative complication, was significantly more in IPOM group. In IPOM-PLUS, our study had just 2% cases of seroma compared to Palanivelu et al [7] with 12% and Roberto et al [5] with 11.5% for closure. Again, attributable for larger defect sizes and inclusion of incisional hernias. Reiko et al [8] reported 0% seroma rates for defect closure, which was comparable with our study. All cases of seroma was managed conservatively with a sterile cotton ball placed over the defect and application of compressive elastic bandage (dynaplast) over it. Additionally, oral serratiopeptidase was prescribed to all patients.

A systematic review by Nguyen et.al [9] found that IPOM plus resulted in lower recurrence rate (0–5.7%



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vs. 4.8–16.7%) when compared with classic non-closure IPOM. Seroma formation rates were lower in closure group (5.6– 11.4% vs. 4.3–27.8%). There were no recurrences in our study in both the groups during the short-term follow-up of three months.

Clapp et al[10] examined additionally bulging, chronic pain, functional status and patient satisfaction. The bulging rate in closure vs. non-closure group was 8.3% vs. 69.4%, respectively. Suwa et al [3] identified 16 reports in which the recurrence rate, incidence of seroma formation, and incidence of mesh bulging were clearly lower in the defect closure group. Whereas in our study, there was no bulging in IPOM PULS (0%) when compared to IPOM (8.0%).

Both IPOM and IPOM PLUS are recommended surgeries for ventral hernias as they are associated with less complications compared to open methods. Furthermore, IPOM PLUS had lesser / acceptable complications when compared to IPOM for primary ventral hernias.

Two main drawbacks of IPOM PLUS seems to be increased duration of surgery and severe post-operative pain on day 1. Owing to the significant decrease in other complications, an acceptable amount of time (10 to 12mins) can be spared. Also, Post-op pain on POD 1 can be managed by NSAIDS alone, and VAS scores were similar to IPOM after 24 to 48hrs of surgery, which is acceptable. Patients were discharged sooner and returned to activity was significantly faster with IPOM-PLUS.

Hence, we consider IPOM PLUS superior to IPOM in the treatment of primary ventral hernias in the midline, for medium size defects (2-5cm).

However, a long-term follow-up of the patients is necessary to evaluate recurrences, which defines the success rate of any Hernia Repair in general. Also, comparative studies with larger defects and incisional hernias are required in the future, before accepting IPOM PLUS as the standard of care for midline ventral hernias.

**References**


1. Courtney.M.Townsend RDB& BME& KLM (2017) Sabiston textbook of Surgery, 20th ed. elsevier
2. Berney CR (2015) Correspondence: Laparoscopic repair of abdominal wall hernia - “how i do it” - Synopsis of a seemingly straightforward technique. BMC Surgery 15:1–15. https://doi.org/10.1186/s12893-015-0080-7
3. Suwa K, Okamoto T, Yanaga K (2015) Closure versus non - closure of fascial defects in laparoscopic ventral and incisional hernia repairs : a review of the literature. Surgery Today 0–11. https://doi.org/10.1007/s00595-015-1219-y
4. Beilin Y (2018) The Visual Analog Scale for Pain Clinical Significance in Postoperative Patients. 1356–1361
5. Rea R, Falco P, Izzo D, et al (2012) Laparocopic ventral hernia repair with primary transparietal closure of the hernial defect. 12:2–5
6. Wiessner R, Vorwerk T, Tolla-Jensen C, Gehring A (2017) Continuous Laparoscopic Closure of the Linea Alba with Barbed Sutures Combined with Laparoscopic Mesh Implantation (IPOM Plus Repair) As a New Technique for Treatment of Abdominal Hernias. Front Surg 4:62. https://doi.org/10.3389/fsurg.2017.00062
7. Palanivelu C, Jani K V., Senthilnathan P, et al (2007) Laparoscopic sutured closure with mesh reinforcement of incisional hernias. Hernia 11:223–228. https://doi.org/10.1007/s10029-007-0200-0
8. Wiessner R, Vorwerk T, Tolla-Jensen C, Gehring A (2017) Continuous Laparoscopic Closure of the Linea Alba with Barbed Sutures Combined with Laparoscopic Mesh Implantation (IPOM Plus Repair) As a New Technique for Treatment of Abdominal Hernias. Frontiers in Surgery 4:1–6. https://doi.org/10.3389/fsurg.2017.00062
9. Nguyen DH, Nguyen MT, Askenasy EP, et al (2014) Primary Fascial Closure With Laparoscopic Ventral Hernia Repair: Systematic Review. World Journal of Surgery 38:3097–3104. https://doi.org/10.1007/s00268-014-2722-9




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10. Clapp ML, Hicks SC, Awad SS, Liang MK (2013) Trans-cutaneous closure of central defects (TCCD) in laparoscopic ventral hernia repairs (LVHR). World Journal of Surgery 37:42–51. https://doi.org/10.1007/s00268-012-1810-y.

**Table 1: Type of hernias in the study groups**

| | Umbilical | Epigastric |
|---|---|---|
| **IPOM** | 11 (24%) | 34 (76%) |
| **IPOM PLUS** | 12 (27%) | 33 (73%) |
| **Overall** | 23 (26%) | 67 (74%) |

**Table 2: Comparison of post-operative complications between the groups**

| Post Op | Seroma | Hematoma | Bulging | SSI | Recurrence |
|---|---|---|---|---|---|
| **IPOM** | 8 | 0 | 4 | - | - |
| **IPOM-PLUS** | 1 | 1 | 0 | - | - |
| | p= 0.03 | p= 2.74 | p=0.0001 | | |

**Figure 1: Duration of surgery from the time of Veress insertion, till Port site closure of skin**

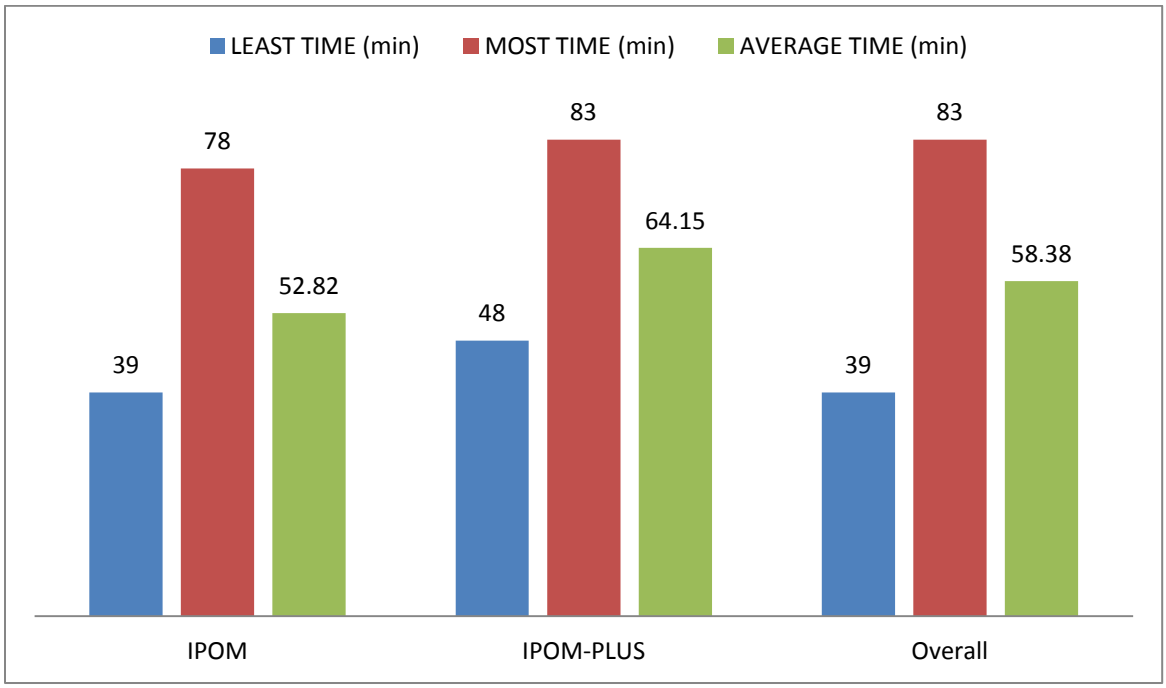




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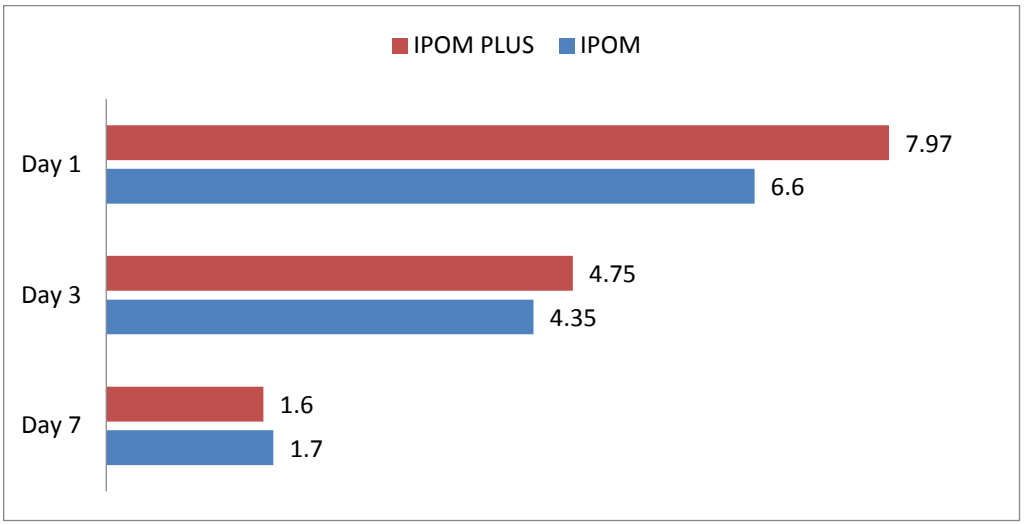
**Figure 2: Post-operative pain using VAS**



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