



A STUDY OF LAPAROSCOPIC INTRAPERITONEAL ONLAY MESH PLUS REPAIR FOR VENTRAL HERNIA

General Surgery

Dr. Atish N. Bansod*

Associate Professor, Department of General Surgery, IGGMCH, Nagpur, Maharashtra, India. *Corresponding Author

Dr. Mauktik Satpudke

Junior Resident, Department of General Surgery, IGGMCH, Nagpur, Maharashtra, India.

Dr Niteen Sawase

Junior Resident, Department of General Surgery, IGGMCH, Nagpur, Maharashtra, India.

Dr. Yusuf Hakim

Junior Resident, Department of General Surgery, IGGMCH, Nagpur, Maharashtra, India.

ABSTRACT

This study aimed to evaluate the effectiveness and safety of laparoscopic intraperitoneal onlay mesh plus (IPOM plus) repair for ventral hernia. Conducted at a tertiary care hospital between March 2022 and August 2024, it included 50 patients who underwent IPOM plus repair. The research focused on the patients' demographic and clinical characteristics, operative details, outcomes, and complications. Among the 50 patients, most (36%) were between 31 and 40 years old, with a female majority (64%). Primary ventral hernias were more common (70%) compared to incisional hernias (30%). Many patients had significant co-morbidities, with diabetes (36%) and hypertension (24%) being the most prevalent. The study also noted that most hernias were between 2-5 cm in size. The surgical procedure had a mean operative time of 85.34 minutes, which indicates a reasonable duration for laparoscopic intervention. Only 6% of patients experienced intraoperative complications, showcasing the safety profile of the procedure. Postoperatively, most patients (92%) were discharged within 2-4 days, highlighting the potential for a faster recovery compared to traditional open surgery. However, some postoperative complications were observed. About 18% of patients experienced issues such as subacute intestinal obstruction, port site infections, and seroma formation. Despite these complications, the overall outcomes were favorable, with no mortality reported and a low recurrence rate during the follow-up period. The study concludes that IPOM+ repair is an effective and safe technique for ventral hernia repair. It offers several advantages, including reduced recurrence, faster recovery, and fewer complications compared to traditional open repair methods. These results suggest that IPOM+ is a viable alternative for ventral hernia surgery, particularly for patients seeking minimally invasive options with favorable outcomes.

KEYWORDS

IPOM plus, ventral hernia, minimally invasive surgery.

INTRODUCTION-

Ventral hernias occur when tissue pushes through a weakened part of the abdominal wall, often after surgery, leading to incisional hernias. Contributing factors include obesity, previous surgeries, and repetitive strain on weak abdominal areas. Symptoms range from discomfort to severe pain, and untreated hernias can result in complications like incarceration (trapped hernia) or strangulation (blood supply loss).

Surgery is often required, especially for symptomatic hernias or those at risk. Traditional open repairs had high recurrence rates, with up to 54% reoccurring, but the use of mesh-based repairs significantly lowered recurrence rates, though mesh infections and other complications remain concerns.

Laparoscopic techniques, particularly intraperitoneal onlay mesh (IPOM) and the advanced IPOM+ method, have improved ventral hernia repair. These minimally invasive approaches have reduced recurrence rates to 0–3% and sped up recovery. While complications like seroma and mesh issues persist, IPOM+ addresses some concerns, making it a preferred option for surgeons.

MATERIALS AND METHODS-

This prospective interventional study was conducted in the Surgery Department of a tertiary care hospital from March 2022 to August 2024, involving 50 patients. Data collection began after obtaining informed consent.

Inclusion Criteria-

- Age 15 years and above giving written valid consent.
- All patients with ventral hernia diagnosed clinically and radiologically.
- Defect size of < 5cms.
- Recurrent hernia following open repair.
- Patients medically fit to undergo the procedure under General Anaesthesia.

Exclusion Criteria-

- Children less than 15 years of age.
- Patients not willing to participate.
- Complicated hernia and who require emergency exploration for complications of hernia like, bowel obstruction, strangulation,

gangrene etc.

- Pregnant females, coagulopathies which are not correctable and patients unfit for GA
- Defect size > 5 cms.
- c/o cirrhosis of liver, ascites and other co morbid condition.
- ASA grade equal or > 4.
- Post laparoscopic recurrent hernia.

Study Design

Data collected from all patients getting operated for ventral hernia with laparoscopic intraperitoneal onlay mesh plus repair.

INVESTIGATIONS-

- Blood: Hb % TLC, DLC, FBS, PPBS, Urea, Serum creatinine
- Urine: Sugar, albumin, microscopy:
- Electro Cardio Gram and Chest X-ray:
- USG Abdomen and pelvis

Operative Procedure-

Preoperative preparation for IPOM+ includes routine blood tests, optional bowel preparation, antibiotic prophylaxis, and a CT scan for cases with complications. Obese patients may need pulmonary function tests, and informed consent is obtained, outlining risks such as enterotomy and seroma. In the operating room, the monitor should be positioned opposite the trocars, with standard height and distance maintained. Essential instruments include a Veress needle (optional), various trocars, a laparoscopic camera with 30° and 5 mm telescopes, atraumatic graspers, curved scissors, bowel clamps, a suction/irrigation device, an energy source (preferably LigaSure), a suture passer or Touhy's needle with nonabsorbable sutures, and tackers (absorbable or nonabsorbable) for mesh fixation. Optional tools like a clip applicator and hook diathermy may also be used.

The IPOM+ procedure starts with marking the hernia defect before entering the abdominal cavity. Pneumoperitoneum is established using either a Veress needle or Hasson's trocar, with the latter being preferred for its lower risk of bowel injury. The first trocar is inserted laterally, typically between the anterior iliac spine and the subcostal margin, with a 30° or 45° laparoscope used to visualize the abdominal wall. Additional working trocars, usually 5 mm, are placed under direct vision, ensuring adequate space around the defect.

Adhesiolysis is performed if necessary to clear the defect margins, avoiding thermal injury to the bowel. Hernia contents are then reduced, with external pressure by an assistant aiding the process. The defect size is measured using an intra-abdominal ruler or laparoscopic instrument, and a prosthetic mesh is chosen to ensure at least a 5 cm overlap around the defect. The mesh is tailored and oriented within the abdomen, with transfascial sutures placed to ensure defect closure and proper mesh positioning.

Mesh fixation is achieved with absorbable or nonabsorbable tacks, sutures, or glue, depending on the site and size of the defect. Absorbable spiral tacks are preferred for reduced post-operative pain and complications. The mesh is adjusted to cover the defect completely, with sutures or tacks placed at appropriate intervals to prevent complications. Finally, the abdominal cavity is inspected for bleeding or injury, CO2 is evacuated, and the trocar sites are closed with nonabsorbable sutures or PDS. Post-operative care involves avoiding strenuous activities and scheduled follow-ups to monitor recovery.

Patients undergoing IPOM+ repair are advised to avoid strenuous activities, heavy lifting, and movements that could stress the abdominal muscles during the early recovery phase. Regular follow-up appointments with the surgeon are crucial for monitoring the healing process and addressing any emerging issues or complications. This minimally invasive technique offers advantages over traditional open hernia repair, including less postoperative pain, shorter hospital stays, and quicker recovery. However, its suitability varies based on patient-specific factors and hernia characteristics, necessitating a tailored approach to surgical decision-making.

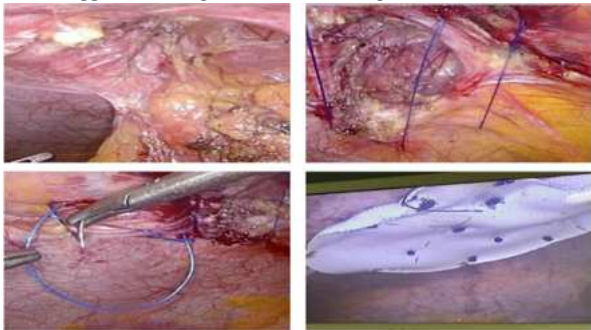


Figure 1- Intraoperative Photos

STUDY FACTORS-

The study focuses on examining the clinical outcomes of laparoscopic IPOM+ repair for ventral hernias, including operating time, complications, hospital stay, recovery time, and recurrence rates. It also explores the impact of patient factors like age, gender, and occupation on these outcomes.

RESULTS-

1) Age and sex Distribution

Out of the 50 patients studied the majority of cases were observed in the 31-40 years age group, accounting for 36% (18 cases). This was followed by 32% (16 cases) in the 41-50 years age group, 14% (7 cases) in the 51-60 years age group, and 4% (2 cases) in those over 60 years.

In our study, there was a notable female preponderance: 32 out of 50 patients (64%) were female, while 18 (36%) were male. This results in a female-to-male ratio of 1.78:1.

Table 1: Age And Sex Distribution Of The Patients

AGE (YEARS)	Number Of Patients	Percentage (%)	Gender	Number Of Patients	Percentage (%)
15-20	0	0	MALE	18	36
21-30	7	14	FEMALE	32	64
31-40	18	36			
41-50	16	32			
51-60	7	14			
>60	2	4			
TOTAL	50	100		50	100

2) Type Of Hernia And H/O Previous Surgery In Incisional Hernia

In our study of 50 patients, the majority had primary ventral hernias, comprising 35 cases (70%). Incisional hernias were observed in 15 cases (30%). Among the 15 cases of incisional hernia in our study, 5 patients (33.33%) had a history of previous lower segment caesarean section (LSCS), 4 patients (26.67%) had undergone hysterectomy or laparoscopic cholecystectomy, and 2 patients (13.33%) had a history of other abdominal surgeries.

Table 2: Type Of Ventral Hernia And H/O Previous Surgery

Type Of Hernia	No. Of Patients	Percentage (%)	Previous Surgery	Number Of Patients	Percentage (%)
Primary Ventral Hernia	35	70	Lower Segment Caesarean Section	5	33.33
Incisional Hernia	15	30	Hysterectomy	4	26.67
			Laparotomy	0	0
			Laparoscopic Cholecystectomy	4	26.67
			Others	2	13.33
TOTAL	50	100		15	100

3) Comorbid Condition

In this study of 50 patients, 25 (50%) had co-morbidities, with diabetes mellitus (DM) being the most common, affecting 9 patients (36%). Hypertension (HTN) was present in 6 patients (24%), followed by chronic obstructive pulmonary disease (COPD) in 5 patients (20%). A history of smoking was noted in 3 patients (12%), and lower urinary tract symptoms (LUTS) were present in 2 patients (8%).

4) Operative Time

In this study, the operative time ranged from 60 to 120 minutes. Most patients fell within the 81-90 minute range, followed by those in the 71-80 minute group. The shortest operative time was 61 minutes, while the longest was 120 minutes, with an average time of 85.34 minutes.

5) Intraoperative Complications

In our study, 3 out of 50 patients (6%) experienced intraoperative complications, specifically bleeding at the port site, which were managed appropriately. The remaining 47 patients (94%) had no intraoperative complications, and their procedures were completed uneventfully.

Table 3: Intraoperative Complications

Intraoperative Complications	No. Of Patients	Percentage (%)
Intraoperative visceral injury	0	0
Port site bleeding	3	6
Intraoperative vascular injury	0	0
Conversion to open	0	0
No intraoperative complications	47	94
TOTAL	50	100

6) Post Operative Hospital Stay

In our study, the postoperative hospital stay varied among patients: 46 out of 50 were discharged within 2-4 days after surgery, while 4 patients who developed post-operative small bowel ileus (SAIO) had a longer stay of 5-7 days. The mean postoperative hospital stay was 3.5 days.

7) Post Operative Complication

In this study of 50 patients, 9 experienced postoperative complications. Four patients (8%) developed post-operative subacute intestinal obstruction (SAIO), which was managed conservatively with NPO, nasogastric tube aspiration, and enemas. Three patients (6%) had port site infections, while 2 patients (4%) developed seromas. No cases of bulging, mesh eventration, mesh infection, additional intestinal obstructions, recurrence, port site hernia, or mortality were reported.

DISCUSSION-

1) Age Distribution:

In our study of laparoscopic IPOM+ repair for ventral hernia, the highest incidence was in the 31-40 years age group (36%), followed by the 41-50 years group (32%). The mean age of participants was 40.28 years. This aligns with findings from other studies: Dildar H et al. (2012) reported a mean age of 47 years, Haque et al. (2023) found it to

be 42 years, and Mushtaq et al. (2018) and Yasin et al.

laparoscopic procedures.

2) Sex Distribution:

In our study on laparoscopic IPOM+ repair for ventral hernia, the male-to-female ratio was 1:1.78, showing a higher prevalence in females. This trend is consistent with other studies, such as Heniford BT et al. (2003) with a 1:1.1 ratio, Hussain et al. (2008) with 1:1.0, Jani et al. (2018) with 1:1.1, and Kaushik K et al. (2023) with 1:2.4. The higher female incidence may be linked to factors like obesity, multiple pregnancies, changes in abdominal wall elasticity, and increased abdominal surgeries.

3) Types Of Hernia Distribution:

In our study on laparoscopic IPOM+ repair for ventral hernia, primary ventral hernias were more common, accounting for 70% of cases, while incisional hernias made up 30%. This aligns with previous studies, such as Olmi S et al. (2020), which reported 56.6% primary and 43.4% incisional hernias, and Kaushik K et al. (2023), which found equal distribution. The predominance of primary ventral hernias is linked to factors like obesity, heavy lifting, persistent coughing, and multiple pregnancies. These results indicate that primary ventral hernias are more prevalent than incisional hernias in our study population.

4) History Of Previous Surgery:

In our study, 30% (15 patients) of incisional hernias were linked to previous surgeries, with 33.33% of these cases occurring after Lower Segment Caesarean Section (LSCS). Additionally, 26.67% were associated with hysterectomy and laparoscopic cholecystectomy. These results align with other studies, such as Shukla A et al. (2018), which reported a 20% incidence after laparoscopic cholecystectomy, and Mushtaq et al. (2018), which noted a 40% rate following LSCS. Jadhav GS et al. (2022) observed a 34.9% incidence tied to lower midline incisions, including LSCS and hysterectomy. Factors influencing incisional hernia risk include emergency surgeries, midline incisions, infections, and poor surgical technique.

5) Co-morbidities:

In our study of laparoscopic IPOM+ repair for ventral hernia, 50% of patients had co-morbidities, with Diabetes Mellitus (DM) being the most common, affecting 36% of patients. This is consistent with Kaushik K et al. (2023), who found a 31.3% incidence of DM, and slightly higher than Shukla A et al. (2018), who reported 21.3%. Hypertension was the second most prevalent co-morbidity, affecting 24% of patients, aligning with Olmi S et al. (2020), who reported a 25% incidence.

Chronic Obstructive Pulmonary Disease (COPD) was present in 20% of patients, while 12% were chronic smokers. These figures are comparable to Shukla A et al. (2018), who found a 17.6% incidence of COPD, and Kaushik K et al. (2023), who reported 12.5%. The association between chronic cough and ventral hernia, likely due to increased intra-abdominal pressure from persistent coughing, aligns with findings from other studies.

6) Operative Time

In our study of laparoscopic IPOM+ repair for ventral hernia, operative times ranged from 60 to 120 minutes, with a mean duration of 85.34 minutes. Most procedures (54%) were completed within 81-90 minutes. This is consistent with findings from Sharma et al. (2010) and Basukala et al. (2022), who reported similar mean times of 81 and 80 minutes, respectively. Other studies showed slightly longer averages: Dildar H et al. (2012) at 94 minutes, Canton et al. (2017) at 97 minutes, and Nardi et al. (2012) at 100 minutes. Heniford BT et al. (2003) reported a mean of 120 minutes, which is longer than our findings. Variations in operative times across studies can be attributed to differences in surgical techniques and the surgeon's experience.

7) Intraoperative Complications

In our study of laparoscopic IPOM+ repair for ventral hernia, 6% of patients (3 out of 50) experienced port site bleeding as an intraoperative complication, which was effectively managed. No other intraoperative issues, such as visceral or vascular injuries, haemorrhage, or enterotomy, were observed. This rate of port site bleeding aligns closely with Canton et al. (2017), who reported 5%, and is similar to Sharma A et al. (2010), who noted a 3% incidence. These findings highlight the importance of meticulous surgical technique and expertise in minimizing complications during

8) Postoperative Hospital Stay

In our study of laparoscopic IPOM+ repair for ventral hernia, the postoperative hospital stay ranged from 2 to 7 days, with an average of 3.5 days. Most patients (46 out of 50) were discharged between days 2 and 4. Four patients with postoperative subacute intestinal obstruction (SAIO) had longer stays, between days 5 and 7. These results are in line with other studies, such as Paic V et al. (2023), who reported a mean stay of 3 days, and Kaushik K et al. (2023), with a mean of 3.8 days. The consistency with these benchmarks suggests effective surgical and postoperative management practices in our study.

9) Postoperative Complications

In our study of laparoscopic IPOM+ repair for ventral hernia, 9 out of 50 patients experienced postoperative complications. Specifically, 8% developed subacute intestinal obstruction (SAIO), managed conservatively with NPO, rectal tube aspiration, and enema. Port site infections occurred in 6% of patients and were treated with routine cleaning and dressing. Additionally, 4% of patients developed seromas, resolved with a single aspiration. These complication rates are consistent with findings from other studies: Wang T et al. (2022) reported a 5% rate of SAIO and 3% of seroma, while Ali F et al. (2022) observed a 6% incidence of port site infection and Basukala S et al. (2022) found an 8% rate of seroma formation. The alignment with these benchmarks suggests that the incidence of complications in our study is comparable to other research, reflecting effective surgical techniques and management.

CONCLUSION-

From the present study of laparoscopic intraperitoneal onlay mesh plus (IPOM +) repair for ventral hernia, it can be concluded that this surgical approach is both feasible and effective, allowing for a short-stay procedure with favourable outcomes. The study found that ventral hernias are predominantly observed in middle-aged females. The laparoscopic technique is associated with a reduction in operative time, minimal blood loss, shorter postoperative hospital stays, and fewer complications, with a low recurrence rate and no reported mortality. Key to achieving these outcomes is strict adherence to safety precautions during dissection and careful identification of the hernial edges, which significantly helps in reducing the incidence of complications. Overall, laparoscopic IPOM + repair demonstrates a highly effective approach to managing ventral hernias with a promising safety profile.

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