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Laparoscopic Intra Peritoneal Onlay Mesh Plus (IPOM Plus) repair of Ventral Hernias – Experience in a Tertiary Hospital

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Abstract:

Introduction: Laparoscopic Ventral Hernia Repair (LVHR) was first described by Karl Leblanc in 1992 and has increasingly been gaining popularity in this present era of minimal access surgery. Laparoscopic Intraperitoneal Onlay Mesh (IPOM) repair with its modification intraoperative Onlay Mesh Plus (IPOM Plus) repair is now being well-accepted option for the treatment of ventral hernias.

Objective: To assess the safety and efficacy of the laparoscopic IPOM plus modality in the management of ventral hernias.

Methods: This is a descriptive observational study, carried out on 22 patients who underwent Laparoscopic ventral hernia repair by IPOM Plus technique between January 2017 to December 2018 at CMH Dhaka. Patients who had ventral hernia with a defect size> 2 cm but < 10 cm were included in this study. Primary subcutaneous transfascial suture closure of all ventral hernias with defect size >2 cm were done using prolene 1-0.Optimized composite mesh (Parietex^{TM}) and Polymesh composite partially absorbable mesh were used as prosthesis anchored with four corner sutures and fixed with non absorbable tacking device. Follow up period was one year.

Results: A total of 22 patients underwent Laparoscopic IPOM Plus repair of ventral hernias. Intraoperative and postoperative complications were negligible. No seroma, bulging of mesh, intestinal obstruction, mesh infection and recurrence observed in one year follow up time. But one patient developed de novo spigelian hernia on the right side outside the mesh system after one year. One patient (4.5%) developed post operative persisting pain requiring analgesic at 2 months.

Conclusion: Laparoscopic IPOM plus repair of ventral hernia is a safe, effective and well accepted modality.

Keywords: Laparoscopic Ventral Hernia Repair (LVHR), Laparoscopic Intraperitoneal Onlay Mesh Plus (IPOM Plus) repair, Optimized composite mesh (Parietex^{TM}), Polymesh composite partially absorbable mesh, non absorbable tacking device.

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Introduction:

Ventral hernia repair is one of the most common surgical procedure performed by general surgeons.[1] Laparoscopic ventral hernia repair (LVHR) was first described by Karl Leblanc in 1992.This technique has increasingly been gaining popularity in the present era of minimal access surgery. LVHR has become a well accepted surgical option for the management of both the primary and incisional ventral hernia.[2-4] This novel technique has the advantages of shorter hospital stays, less postoperative pain, less wound infection, earlier recovery and less recurrence(<5%) than open repair of ventral hernia.[2 4]

Standard laparoscopic ventral hernia repair involves bridging the defect from the peritoneal side by placing a composite mesh in an onlay or underlay fashion via the laparoscopic intraperitoneal approach, known as "intraperitoneal onlay mesh (IPOM) repair. IPOM repairs are associated with significant higher incidence of eventration of mesh, recurrence, seroma formation and suboptimal restoration of abdominal muscle function.[5 7]

To obviate these problems, extracorporeal subcutaneous transfascial suture closure of the defect followed by

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intraperitoneal onlay or underlay placement of a composite mesh, termed as the " Intraperitoneal Onlay mesh Plus (IPOM plus) repair is now the recommended technique in the guideline of the International Endohernia Society.[8-13]

This study was conducted to assess the safety and efficacy of the IPOM plus repair of ventral hernias from January 2017 to December 2018 at Combined Military Hospital (CMH) Dhaka.

Methods:

This is a descriptive observational study. The study was carried out at Combined Military Hospital (CMH) Dhaka from January 2017 to December 2018. A total of 22 adult patients of either sex, who had symptomatic ventral hernia, underwent laparoscopic IPOM plus repair, were studied. Patients with symptomatic ventral hernia with defect size >2 cm and <10 cm and patients with incarcerated ventral hernias in their early presentation phase were included in this study. Patients with obstructed ventral hernia, comorbid with COPD, unfit for general anesthesia and unwilling for laparoscopic hernia repair (IPOM Plus) ,were excluded from the study.

Preoperatively patients were evaluated by a detail history, physical examination and relevant investigations including USG of abdomen. Location, size of the defect and content of hernias were noted. Informed written consent was taken for general anesthesia and intended surgical procedure for all patients. Ethical clearance for the study was taken from hospital ethical committee. Patients were followed up for one year period. Follow up was done in the outpatient department and sometimes by cell phone at 1st month, 3rd month, 6th month and one year respectively.

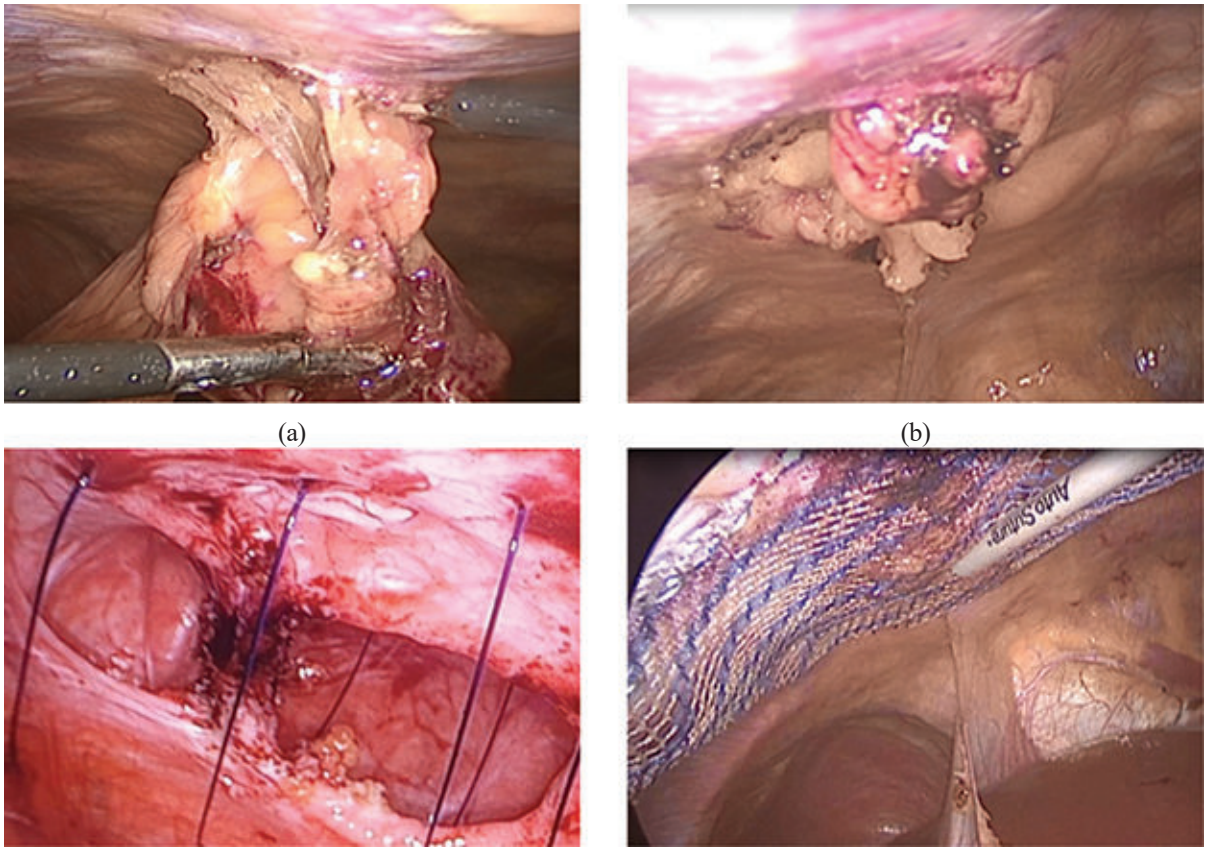
Variables considered in this study were age, gender, hernia type, operative time, intraoperative and postoperative complications, postoperative pain and length of hospital stay. Data was collected manually by the residents and surgeons for statistical analysis. All data were fed into IBM SPSS vs 23 program and necessary statistical analysis was done.

Surgical Technique:

After written informed consent patient was put under general anesthesia with ETT and placed in supine position. Width of the defect was measured as the maximum distance between medial edges of the fascial gap of ventral hernia in the supine position. Palmer's point or infra umbilical initial entry as deemed necessary into the peritoneal cavity was achieved by veress needle or direct trocar insertion (DTI) method and pneumo peritoneum created. This initial entry site was used for 10 mm camera port. Initial laparoscopy was done. Other conventional 2 lateral 5 mm ports for IPOM were made as required as per baseball diamond concept. Hernia contents were reduced carefully by a combination of blunt, sharp and electrocautery dissection. Empty peritoneal hernial sac was left in situ. Extra corporeal subcutaneous primary transfascial sutures closure (using Prolene 1-0) of all hernias greater than 2 cm were done using laparoscopic port closure system. Then a "Landing zone" was prepared with removing extra fatty tissue and adhesions around the defect. After that an optimized composite mesh (Parietex ™) or a Polymesh composite partially absorbable mesh of adequate size, sufficient to ensure a minimal overlap of 5 cm all around over the edges of the defect, was introduced for intraperitoneal onlay placement covering the defect. Optimized composite mesh (Parietex™) in 12 cases and Polymesh composite partially absorbable mesh in 10 cases were used as prosthesis. The meshes were prepared extracoporeally by placing 4 sutures at the corners using prolene 2-0 keeping both the ends of the knot long enough to hold easily with laparoscopic port closure system and introduced into the abdominal cavity through 10 mm port. Meshes were anchored with four corner tension free extra corporeal subcutaneous transfascial suture with 2-0 prolene. Meshes were than fixed as onlay pattern with nonabsorbable tacking device (CapSure™ tacker) as double crowning fashion.

Post Operative Pain:

Postoperative pain was quantified by asking patients to level their pain with Visual Analog scale (VAS) and recorded as VAS score (0-10). Pain was recorded in the hospital at the 4th hour after operation. After that pain was recorded as VAS scores 8 hourly during hospital stay. Then daily for one week. Then once a week for the next 12 weeks postoperatively.



(a) (b)

(c) (d)

Fig.-1: *(a) Reduction of hernia content. (b) Hernia content reduced. (c) Hernia defect closed by transfascial sutures (d) Composite Mesh placed over the closed hernia defect and fixed with nonabsorbable tackers (CapSure™ tacker).*

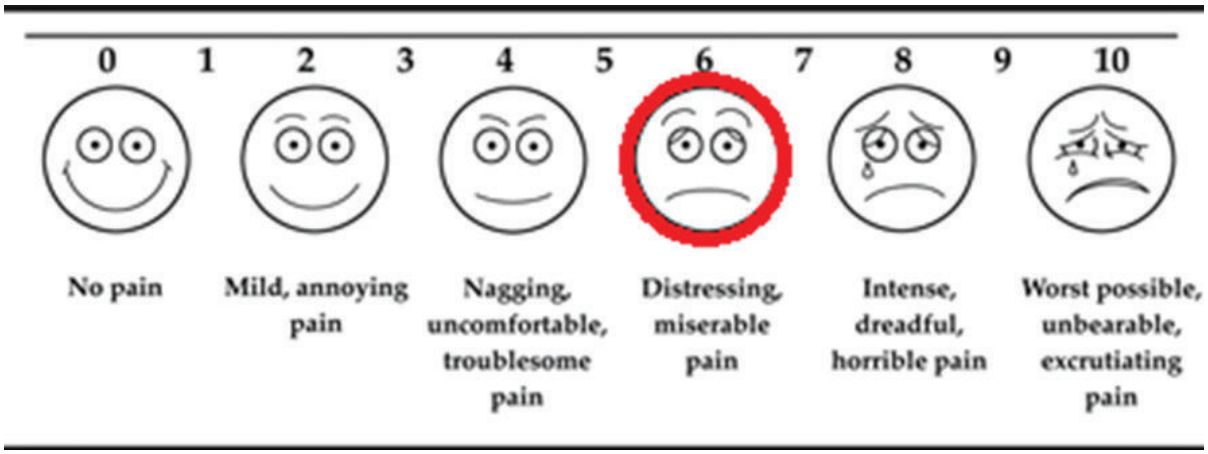


Fig.-2: *Visual Analog Scale (VAS):*

Fig 2 showed Visual analog scale (VAS) used to quantify the post operative pain.

Mean post operative pain score (VAS score) was 6 at the 4th hour after operation (Range 4-8).

Results:

A total of 22 patients underwent Laparoscopic IPOM Plus repair of ventral hernia in a span of 2 years.

Table-I

Demography of Patients (n=22)

Variables	Value
Age (years)	Mean 42
	Range 28 - 55
Gender	
Male	10 (45%)
Female	12 (55%)

Table I showed age and sex distribution of patients in this study. Mean age of the patients was 42 years (range 28-55). Study population comprises 12 female (55%) and 10 male (45%).

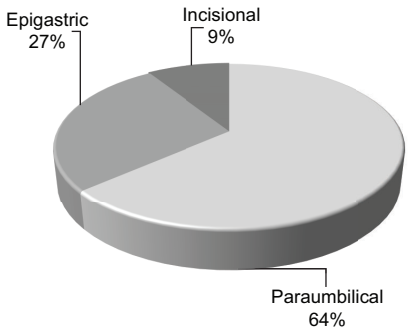


Fig 3: *Types of Hernia*

Fig 3 showed types of hernia in this series. Maximum cases were paraumbilical hernia 14 (64%) followed by epigastric 6 (27%) and incisional hernia 2 (9%).

Table II

Major perioperative parameters.

Variables	Value	
	Mean	Range
Defect size	5.2 cm	2.4 -7.8 cm
Operative time	80 minutes	60-120 minutes
Post operative pain (VAS) score	6	4-8
Post operative hospital stay	2.5 days	2- 5 days

Table-III

Correlation between defect size and post operative pain score

Variables	Mean	SD	r	P Value
Defect size	5.2 cm	1.027	0.589	0.004
Post operative pain score	6	1.023		

Table III (Pearson correlation) showed defect size of the hernia is passively correlate with post operative pain score (r = 0.589) which is statistically significant (P<0.05).

Table IV

Correlation between operative time and post operative hospital stay.

Variables	Mean	SD	r	P Value
Operative time	80 minutes	15.087	0.866	0.000
Post operative hospital stay	2.5 days	0.801		

Table IV (Pearson correlation) showed operative time is positively correlate with post operative hospital stay (r = 0.866) which is statistically highly significant (P < 01).

Table-V

Intraoperative complications (n=22)

Variables	Frequency	Percentage
Extraperitoneal insufflation	01	4.54
Intraoperative visceral injury	nil	-
Omental laceration	01	4.54
Intraoperative vascular injury	nil	-
Conversion to open	nil	-

Table-VI

Postoperative complications (n=22)

Variables	Frequency	Percentage
Bulging or eventration of mesh	nil	-
Seroma formation	nil	-
Port site infection	01	4.54
Mesh infection	nil	-
Persistent pain (taking analgesics at 2 month)	01	4.54
Intestinal obstruction	nil	-
Recurrence	nil	-
Port site hernia	nil	-
Mortality	nil	-

Discussion:

Laparoscopic intraperitoneal onlay mesh (IPOM) repair was commenced as a minimal access technique in the management of ventral hernias. Advantages of IPOM (where no transfascial closure of hernia defect done) over conventional open approach, are less surgical site infections, less blood loss, less postoperative pain, shorter hospital stay and less recurrence as stated by Updated International Endohernia Society guidelines.[9-13] IPOM plus where hernia defect was closed by transfascial suture with prolene 1-0, results in lesser recurrence, seroma formation and bulging.[7]

In this study, we unfolded our experience in laparoscopic repair of ventral hernias with IPOM plus repair. In this series, mean operating time was 80 minutes (range 60-120 minutes), which is more than the study carried out by Gupta et al (45 minutes) but less than the study carried out by Palanivelu et al which was 95 minutes.[7,9] There was no intraoperative visceral and vascular injury encountered in this study. Palanivelu et al reported 0.3% bowel injury in his study.[9] No patient needed conversion to open procedure in this study in contrast to other studies carried out by palanivelu et al (1%) and Sieda Bassem M et al (4.3%).[9,10]

Several RCTs, comparative studies and Meta analysis showed a significant lower rate of short term postoperative complications in Laparoscopic IPOM repair of ventral hernias compared to open surgery [10-12]. In this study, postoperative complications were negligible in the follow up period of one year, comparable to other studies.[7,10-12] Only one patient (4.54%) developed superficial port site infection in the Palmar's point camera port which was managed with regular dressing comparable to other studies.[10] There was no incidence of mesh infection in this study compared to other studies.[10,14]

International Endohernia Society stated that defect closure followed by IPOM repair(IPOM plus) was associated with decreased incidence of seroma formation and decreased incidence of chronic pain.[7] In this study, mean post operative VAS pain score was 6 at the 4th hour after operation (range 4-8) requiring opioid analgesic. After that all patients were managed with NSAID analgesics. One patient (4.5%) had persistent pain requiring analgesics for 2 months comparable to other studies done by Jitendra T Sankpal et al (6.67%) and Palanivelu et al (5%).[9, 14] This study also showed that larger the hernia defect size, larger the post operative VAS pain score ($r = 0.589$, $P<0.05$).

In this study, the hernia defect size more than 2 cm was closed with transfascial prolene 1-0 sutures and there was no seroma formation observed. Palanivelu et al and Sieda Bassem M et al reported 7.6% and 14.5% seroma formation in their studies respectively.[9,10]

Several comparative studies between IPOM and IPOM plus concluded that IPOM plus was associated with more favorable surgical outcomes.[11,12] In this study we also observed very negligible intra and postoperative complications with favorable surgical outcome. No bulging or eventration of mesh was observed in this study comparable to other studies.[10,14] No features of intestinal obstruction were observed in the follow up period. No recurrence reported in the one year follow up time compared to other studies done by Gupta et al (0.4%) and Palanivelu et al (0.55%).[7,9] But one patient developed de novo spigelian hernia on the right side outside the mesh system. No mortality reported in this study.

Average hospital stay in this study was 2.5 days, range being 2-5 days. Gupta P et al in their study showed mean hospital stay was 1.4 days (range 1-4 days).[7] Yavuz N et al in his study showed mean hospital stay was 2.5 days, compatible with our study.[15] In this study we also observed that longer the operative time, longer the hospitals stay ($r =0.866$, $P<0.01$).

In this series, we used optimized composite mesh (Parietex^{TM}) in 12 cases and Polymesh composite partially absorbable mesh in 10 cases. But there was no difference in terms of surgical outcome observed. This was also observed in other studies conducted by Yavuz N et al and Vrijland WW et al.[15,16]

The Important limitations of this study are, it's small sample size and short period of follow up. The follow-up period should be at least 2 years to see the recurrence of hernia. More studies incorporating large no of patients in the study sample and long period of follow up are recommended to reach a consensus regarding safety and efficacy of Laparoscopic IPOM plus repair of ventral hernias.

Conclusion:

Laparoscopic IPOM plus results in very less postoperative seroma formation, bulging of mesh and

recurrence. Hence, laparoscopic IPOM Plus remains a safe, feasible and effective surgical option for the repair of ventral hernias. We recommend laparoscopic IPOM plus over laparoscopic IPOM for all ventral hernias having defect size>2 cm but <10 cm.

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