

A Cross Sectional Study of Advantages of Laparoscopic Intraperitoneal ONLAY Mesh Technique (IPOM) Vs Conventional Open Mesh Repair in a Tertiary Care Hospital

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Abstract:

Background and objectives: Ventral hernias (VH) occur as a result of weakness in the musculofascial layer of the anterior abdominal wall. The ventral hernia (VH) repair is based on the principle of Rives Stoppa open tension free mesh repair. In the laparoscopic technique, the mesh is placed in an intraperitoneal location and where the rise in the intra-abdominal pressures (IAP) is totally diffused along each square inch and keeps the mesh in place. This study aims to draw a comparison between the open mesh repair vs the laparoscopic IPOM procedures with regards to several parameters.

Methodology: This is a Prospective Study involving 50 patients with ventral hernia, those presented during the period of 24 months, followed by a 1 year follow up of the patients in a tertiary care hospital. Patients were subjected to either repair by open or laparoscopy and were followed for a period of up to 1 year from the date of surgery.

Results: The results of the study revealed post-operative pain, average hospital stay, average duration of surgery, post-operative complications (seroma, wound infection and recurrence), are less in laparoscopic ventral hernia repair compared with open ventral hernia mesh repair, and early return to normal activity, attained in laparoscopic ventral hernia repair, as compared to open mesh repair.

Conclusion: So, laparoscopic repair (IPOM) should be considered as the preferred method of repair in patients with ventral hernia.

Keywords: Laparoscopy, Abdominal Hernia, Ventral Hernia, Open Hernia Repair, Laparoscopic hernia repair.

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Introduction

Ventral hernias (VH) are occurring as a result of weakness in the musculofascial layer of the anterior abdominal wall. [1,2] The ventral hernia (VH) repair is based on the principle of Rives Stoppa open tension free mesh repair. [3] In the laparoscopic technique, the mesh is placed in an intraperitoneal location and where the rise in the intra-abdominal pressures (IAP) is totally diffused along each square inch and keeps mesh in place. The laparoscopic approach provides complete visualization of the fascia underlying the previous incision which allows for identification of smaller swiss cheese defects that may be missed in an open approach. Open hernia repair can be a major surgery with considerable morbidity due to mesh-related complications. An increasing interest in laparoscopic surgery and the availability of new materials have encouraged the adoption of laparoscopic techniques in ventral hernia repair.

Open Mesh Repair (ONLAY) [4]: Patient is shifted to Operation Theatre and FOLEYS catheter and Nasogastric tube are kept for Patient and Injection Monocef 1gm IV is administered and surgery is performed under General anesthesia and patient is monitored throughout the surgery. The skin incision made according to the site and size of Defect. Subcutaneous flaps raised upto 5cm around the Defect and after that hernia sac dissected and opened, the contents reduced into the abdominal cavity. The defect in the linea alba was closed with nonabsorbable 1-0 prolene suture and an appropriate size of monofilament polypropylene mesh was placed over the anterior rectus sheath and fixed with 2-0 Prolene. Hemostasis was achieved and 16F Romovac suction drain placed. Subcutaneous layer approximated. Skin is closed with 2-0 prolene.

Laparoscopic Repair of Ventral Hernia: In

laparoscopic repair of ventral hernia in all cases bowel preparation is done prior to surgery, bladder was catheterized with Foleys and nasogastric tube placed. After proper cleaning, painting and draping under general anesthesia, The Surgeon stands to the left of the patient, Scrub nurse stands on the opposite side. The monitor was placed opposite to the surgeon and the instrument trolley was towards the leg of the patient. Generally 3 PORTS are adequate for small to moderate size hernias. Pneumoperitoneum created through palmers point, 2-3 cm below the left costal margin in the midclavicular line, using open Hassons method. 10mm trocars at the palmers point and other two 5mm trocars at left lumbar and iliac fossa along the anterior axillary line.

Adhesions of the abdominal contents to the hernia sac and the surrounding abdominal wall are released and the contents of the hernia sac are reduced. Hernia sac is excised, to avoid seroma formation. Transfascial sutures applied with polypropylene 1-0 sutures to obliterate the defect after reducing pneumoperitoneum partially. Size of the defect measured and appropriate size of the defect measured and appropriate size of dual mesh (covidien) composed of monofilament polyester with absorbable collagen film and preplaced sutures and marking covering 5cm beyond the defect was selected. Mesh folded like banana leaf and introduced intraperitoneally through 10mm trocar and mesh is unfolded so that white side polyester facing abdominal wall and marked site coated with absorbable collagen film facing viscera.

Mesh is fixed transfascially in the middle with sutures provided along with mesh with the help of cobbler needle. Absorbable tackers of 5mm size used to fix the mesh all around and corners. Hemostasis was achieved before the removal of the trocars. All 10mm trocar fascial defects were closed with 1-0 prolene and skin with 2-0 prolene. Catheter and Ryles tube removed after extubating the patient.

On Port sites sterile plaster dressing applied. Compressive dressing prepared from gauze is applied over the defect to prevent seroma formation for 5days.

Methodology:

This is a Prospective Comparative Study involving 50 patients with ventral hernia, those resented during the period of august 2020 year to august 2022 year, for a period of 24 months admitted at Osmania General Hospital, Hyderabad, INDIA. Patients were subjected to either repair by open or laparoscopy and were followed for a period of up to one year from the date of surgery.

Study Criteria

Inclusion criteria:

1. Patients consented for inclusion in the study, according to the designated proforma.
2. Patients more than 15 years and less than 75 years of age group in both sexes presenting with ventral hernia.
3. Hernia diameter between 3 and 15 cm, location at ventral abdominal wall.

Exclusion criteria:

1. Patients NOT consented for inclusion in the study, according to the designated proforma.
2. Patients less than 15 years of age and above 75 years.
3. Hernia size less than 3 cm and more than 15 cm.
4. Patients with obstructed and strangulated hernias.
5. Patients with comorbidities like Heart disease, Ascites, Bleeding disorder.

In our study out of 50 patients, 30 patients underwent open ventral hernia (OVH) mesh repair and 20 patients underwent Laparoscopic Intraperitoneal on lay (IPOM) mesh repair for various types of ventral hernia. Patients in both groups were comparable in respect to age.

Results:

The patients in the groups were comparable at baseline in terms of AGE, SEX, the type of hernia in both laparoscopic and open hernia repair. Totally 50 patients underwent laparoscopic and open ventral hernia repair and results analyzed, and following conclusions were drawn. The study group consisted of 20 patients in laparoscopic ventral hernia repair (15 men and 5 women) with a mean age of 41.1 years and 30 patients in open mesh repair (23 men and 7 women) with mean age of 48.1 years. The study consists majority of men (76%) when compared to women (24%). 50% of the study participants had incisional hernia, 18% had paraumbilical hernia, 16% had umbilical hernia, 12% had epigastric hernia and 4% had ventral hernia. The mean defect size IPOM procedure group is 4.2 ± 0.9 mm while it is 5.8 ± 1.8 in open mesh repair procedure group. The means are compared using independent t test and the difference is statistically significant ($p = 0.002$) with IPOM treatment group having lesser defect size. 85% of the IPOM procedure group had a defect size of ≤ 5 mm while in open mesh repair group only 46.7% had a defect size of ≤ 5 mm. The difference between the group is statistically significant.

Table 1: Comparison of defect size in different procedures among the study participants

Defect size	<=5	>5	p-value
IPOM	17	3	0.006
open mesh repair	14	16	

(Chi-square value = 7.48, p = 0.006). The mean surgery duration in IPOM procedure group is 77.7±11.6 mins while 100% of the IPOM procedure group had a surgery duration of <=105 mins while in open mesh repair group only 30% had a surgery duration of <=105 mins. The difference between the group is statistically significant (Chi-square value = 24.13, p-value is <0.001).

Table 2: Comparison of surgery duration in different procedures among the study participants

Procedure	N	Mean (min)	Std. Deviation	P-value
IPOM	20	77.7	11.622	0.005
open mesh repair	30	120.5	18.678	

The mean pain score [6] in IPOM procedure group is 3.5±0.8 mins while it is 5.37±0.7 in open mesh repair procedure group. The means are compared using independent t test and the difference is statistically significant (p value is <0.001) with IPOM treatment group having lesser pain score.

All (100%) of the IPOM procedure group had a pain score of <=5 while in open mesh repair group only 53.3% had a pain score of <=5. The difference between the group is statistically significant (Chi-square value = 12.96, p-value is <0.001).

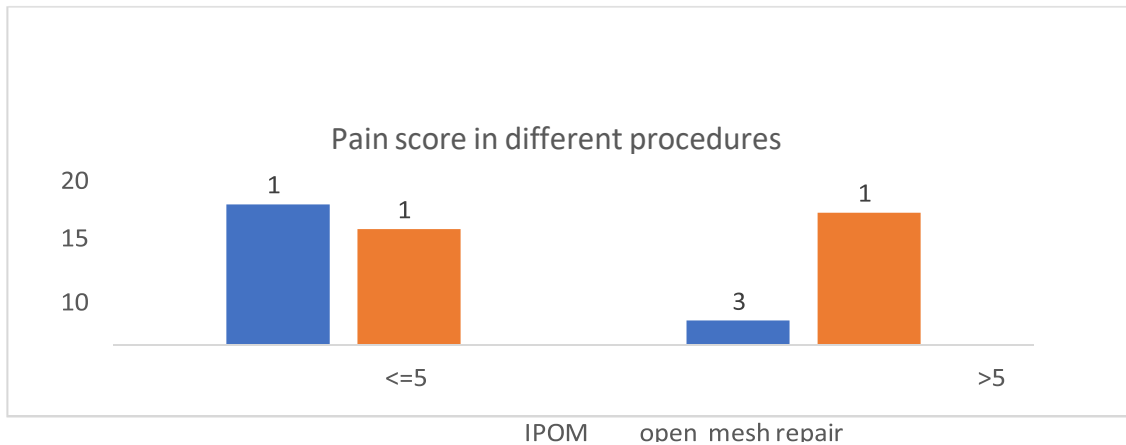


Figure 1: Comparison of pain score in different procedures among the study participants

The mean days of analgesia in IPOM procedure group is 4.4±0.94 days while it is 6.43±1.1 days in open mesh repair procedure group.

The means are compared using independent t test and the difference is statistically significant (p value is <0.001) with IPOM treatment group having lesser days of analgesia. 90% of the IPOM procedure group had a days of analgesia of <= 5 days while in open mesh repair group only 20% had a days of analgesia of <=5 days.

The difference between the group is statistically significant (Chi-square value = 23.56, p-value is <0.001). The mean post-op NBM (nil by mouth) days in IPOM procedure group is 2.45±0.79 days while it is 3.07±0.83 days in open mesh repair procedure group.

The means are compared using independent t test

and the difference is statistically significant (p value is 0.01) with IPOM treatment group having lesser post-op NBM days. 70% of the IPOM procedure group had post-op NBM days of <= 2 days while in open mesh repair group only 30% had post-op NBM days of <=2 days. The difference between the group is statistically significant (Chi-square value = 7.7, p-value is 0.005).

The mean time of hospital stay in IPOM group is 6.5±1.7 days while in Open mesh repair, it is 11.2±1.7 days. The difference is statistically significant (independent t test, p value is <0.001). most of the study participants of IPOM group had less than or equal to 10 days of hospital stay (70.4%) while in Open mesh group most of them had more than 10 days hospital stay (95.7%). The difference is statistically significant (Chi-square statistic = 22.56, p value is <0.001).

Table 3: Comparison of days of hospital stay in different procedures among the study participants

Procedure	No. of study subjects	Mean	Std. Deviation	p-value
IPOM	20	6.5	1.701	<0.001
open mesh repair	30	11.17	1.724	

The mean time taken to return to normal activity in IPOM group is 2.25±0.64 days while in Open mesh repair, it is 4.3±0.78 days. The difference is statistically significant (independent t test). Most of the study participants of IPOM group took less than or equal to 3 days of time to return to activity (79.2%) while in Open mesh repair most of them took more than 3 days to return to activity (96.1%). The difference is statistically significant.

Table 4: Comparison of days to return to activity in different procedures among the study participants

Procedure	No. of study subjects	Mean	Std. Deviation	p-value
IPOM	20	2.25	0.639	<0.001
open mesh repair	30	4.3	0.794	

(Chi-square statistic = 29.501, p value is <0.001).

Table 5: Complications in both procedure groups

	IPOM group			Open mesh repair	
	N	%		N	%
Seroma	9	45%	Seroma	13	43%
Bowel injury	0	0%	Bowel injury	0	0%
Wound infection	1	5%	Wound infection	15	50%
Mesh infections	1	5%	Mesh infections	0	0%
Recurrence	0	0%	Recurrence	0	0%

There were fewer intraoperative and post-operative complications (seroma, bowel injury, wound infection, wound infection, mesh infection) among the patients who underwent laparoscopic repair than among the who had open ventral hernia repair.

Discussion:

Laparoscopic ventral hernia repair was started by Leblanc in 1993 year, after that evaluations were done to make laparoscopic surgery easier and safest for ventral hernia repair, with use of laparoscopic approach large incisions and drain placement can be avoided. [5]

The results of our prospective study revealed that as compared to open repair, laparoscopic repair is associated with shorter duration of surgery, reduced post-operative analgesic requirement and antibiotic

requirement.

Duration of hospital stay and return to the normal activity are significantly shorter for laparoscopic repair, then for open hernia repair.

The reason for this is because of extensive subcutaneous dissection to have 5 cm mesh cover beyond the hernia defect, which causes more pain, longer duration of surgery, requirement of suction drain for longer period of time, and late return of normal daily activity. The complication rate for laparoscopic repair was very low.

The laparoscopic procedure was associated with potentially less wound infection and seroma formation as compared with open repair. Recent analysis also suggested minimal postoperative morbidity, a shorter convalescence period and an acceptable recurrence rates.

Table 6: The results of our study are quite comparable with studies done by Park et al [7], Carbaja et al [8], and Rameshaw et al [9] and the following points were analyzed

Observation	Park [11]		Carbaja [12]		Rameshaw [13]		Our study	
	Lap	Open	Lap	Open	Lap	Open	Lap	Open
Operating time (min)	95	78	87	112	56	82	77.7	120.57
Length of stay(day)	3.4	6.5	2.2	9.1	1.7	2.8	6.5	11.17
Infection rate (%)	00	02	00	18	00	03	01	15
Seroma rate (%)	04	02	13	67	00	00	09	13
Patients	56	49	30	30	79	174	20	30

1. Mean duration of surgery (minutes) Park et al lap-95, open - 78 Carbaja et al lap - 87, open - 112 Rameshaw et al lap-56, open - 82 In our study lap - 77.7, open - 120.5 with SD VALUE for lap - 11.622 and for open - 18.678 with p value < 0.001, which is significant.
2. Mean length of stay (days) Park et al lap - 3.4, open - 6. Carbaja et al lap - 2.2, open -

- 9.1 Rameshaw et al lap - 1.7, opens - 2.8 In our study lap - 6.5, open - 11.17.
3. Mean infection rate (%) Park et al lap - 00, open - 02 Carbaja et al lap - 00, open - 18, Rameshaw et al lap - 00, open - 03 In our study lap - 1, open - 15.
4. Mean seroma rate (%) Park et al lap - 04, open-02, Carbaja et al lap - 13, open - 67, Rameshaw et al lap - 00, open - 00 In our study lap - 9, open - 13.

The results of our study strongly recommend that laparoscopic ventral hernia repair (IPOM) is the procedure of choice in well-trained laparoscopic surgeon's hands.

Conclusion

The present analytical study of comparative analysis and advantages of laparoscopic ventral hernia repair versus open ventral hernia repair was carried out at Osmania General Hospital, Hyderabad during the period of August 2020 to August 2022 Based on the data and results obtained in the present study the following parameters were drawn:

1. The average total duration of surgery is less by using laparoscopic intraperitoneal mesh placement
2. The post-operative pain is less in laparoscopic approach
3. The post-operative drainage is nil in laparoscopic approach
4. The postoperative complications are less in laparoscopic approach (seroma , wound infection , recurrence)
5. The shorter hospital stays in laparoscopic approach.
6. Early return to normal work
7. Early mobilization
8. It is even possible to reduce postoperative time, because of standardized techniques, surgeons getting more skill, and use of mesh fixation devices and newer mesh implantation. So, laparoscopic ventral hernia repair is considered as first line of choice in ventral hernia repair.

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