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ORIGINAL RESEARCH

Open Retromuscular Sublay Mesh Repair versus Laparoscopic Intraperitoneal Onlay Mesh Repair for Ventral hernias – A Randomized Control Trial

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Abstract

Background: The precise treatment of ventral hernias is still a topic of considerable debate. The aim of this study was to compare the methods of open retromuscular sublay versus laparoscopic intraperitoneal onlay mesh repair for ventral hernias.

Methods: Following approval by the Institutional Ethics Committee, Rohilkhand Medical College and Hospital, Bareilly, 88 patients were randomly divided into two groups in 1:1 allocation ratio, each compromising 44 patients. Patients characteristics, hernia size and postoperative complications were recorded.

Results: Mean operative time was significantly (p= <0.001) lower in the SUBLAY group (55.66±8.34 minutes) than in the IPOM group(68.75±10.44 minutes) .The post-operative pain(VAS) was significantly (p=0.001) lower amongst patients of the IPOM group (2.36±0.61) as compared to the sublay (4.52±0.66) group. The hospital stay was significantly (p=0.001) lower among patients of the IPOM group (3.61±2.28 days) than the sublay group (6.50±1.68 days).

Conclusion: Laparoscopic repair in medium- and large-sized defects is a feasible and safe approach. IPOM compared to SUBLAY significantly reduces postoperative complications and hospital stay.

Keywords: Ventral Hernia, Ventral Hernia Repair, Sublay Repair, Retromuscular Mesh Repair, Intraperitoneal Onlay Mesh Repair, IPOM, Mesh Hernioplasty, Umbilical Hernia, Incisional Hernia, Paraumbilical Hernia, Epigastric hernia, Laparoscopic IPOM

Introduction

Hernia by definition is protrusion of any organ or tissue as a whole or a part, out of its boundary through an anatomical or acquired weak spot.[1,2]

As an outcome of surgical innovations, the management of hernia has improved and evolved and has benefited significantly from technological advancements. The tension-free repair of hernia is one of the key concepts in revolutionizing hernia surgery. Prosthetic meshes like synthetic meshes have also decreased the recurrence rates of ventral hernias.[3]

The topic of open versus laparoscopic repair is controversial. Each method has its own pros and cons, even though data regarding recurrence, pre operative pain, and postoperative complications are comparable. Factors that favor open repair are that, returning the abdominal musculature to its normal position of continuity could be expected to restore optimal anatomic and physiologic functionality of the abdominal wall and it is more easily accomplished in an open procedure. Fascial apposition and a limited component separation can also be accomplished laparoscopically, but these are performed more efficiently and completely in an open procedure. Complex component separations like the rectus sheath rollover technique can be done only in the open technique. The first laparoscopic ventral hernia surgery by Le Blanc in 1993 showed a lot of promise in the treatment of ventral hernias, but, unlike inguinal hernia, ventral hernia laparoscopic surgery is still not the standard of treatment. The main reason for this is higher recurrence rates, intraperitoneal adhesions and duration of surgery. At present, with the advancement of technicality and better understanding of the laparoscopic anatomy, laparoscopic repair has emerged as a promising alternative to open repair. Several randomized controlled trials have started emerging from the late 90s, but the main drawback has been the lack of sufficient sample size and follow up, thus the need for this study.[4]

Methods

Between 1st November 2020 to 31st October 2021 , after approval by the Institutional Ethics Committee, RMCH, Bareilly, 88 adult patients (> 18 years) admitted with a diagnosis of primary ventral hernia- Umbilical hernia, Epigastric Hernia, Lumbar Hernia and Incisional hernia were included in the study. Data concerning patient

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demographics, comorbidities hernia size, duration of surgery, length of hospital stay and postoperative complications were recorded.

The patients were randomized into two groups, Group (A) 44 patient for open retromuscular sublay mesh repair, Group (B) 44 patient for laparoscopic intraperitoneal onlay mesh repair.

For SUBLAY repair (Figure 1), subcutaneous hernia sac were mobilized by dissecting around the sac in the entire circumference till the defect in anterior abdominal was reached. The hernial sac were opened and adherent bowel loops were lysed. After adhesiolysis, the rectal sheath was dissected and a retromuscular mesh space was created with an overlap of at least 5 cm in all directions. The peritoneum and the posterior rectus sheath were then closed and a standard polypropylene mesh was placed in the retromuscular plane and fixed with the use of polypropylene 2.0 suture to the posterior rectus sheath. Finally, The anterior rectus sheath was closed using continuous interlocking 1/0 vicryl sutures. Then skin was closed with interrupted sutures using nylon 2/0 suture. Drains were placed in retrorectus space above the mesh and in the subcutaneous space.[5]

For IPOM (Figure 2) repair, four trocars were used (one 10-mm and three 5-mm trocars). Adhesions to the ventral abdominal wall were carefully lysed using sharp dissection with minimal use of electrocautery to avoid bowel injury. After adhesiolysis, hernial sac was reduced into the peritoneal cavity and the fascial defect were closed by suture. We did closure of large defects with prolene suture, even if only a limited closure was possible.6 A sheet of 15cms x 15cms polypropylene mesh was chosen and was tailored to overlap defective edges by at least 5cm margin circumferentially. Mesh was transfixed with prolene number 1 sutures followed by placing tackers 1 cm apart circumferentially.[7]

Polypropylene mesh was used in our surgeries as it had no significant difference in terms of post operative adhesions when compared to composite mesh and mesh formation of adhesions were further decreased on providing omental covering over the bowel.[8,9]

Figure 1: Intraopertaive images of Sublay Repair

A: Mobilization of hernial sac by dissecting around it, B: Mobilization of retrorectus space, C: Reconstruction of continuity of posterior rectus fascia, D: Fixation of polypropylene mesh in retrorectus space

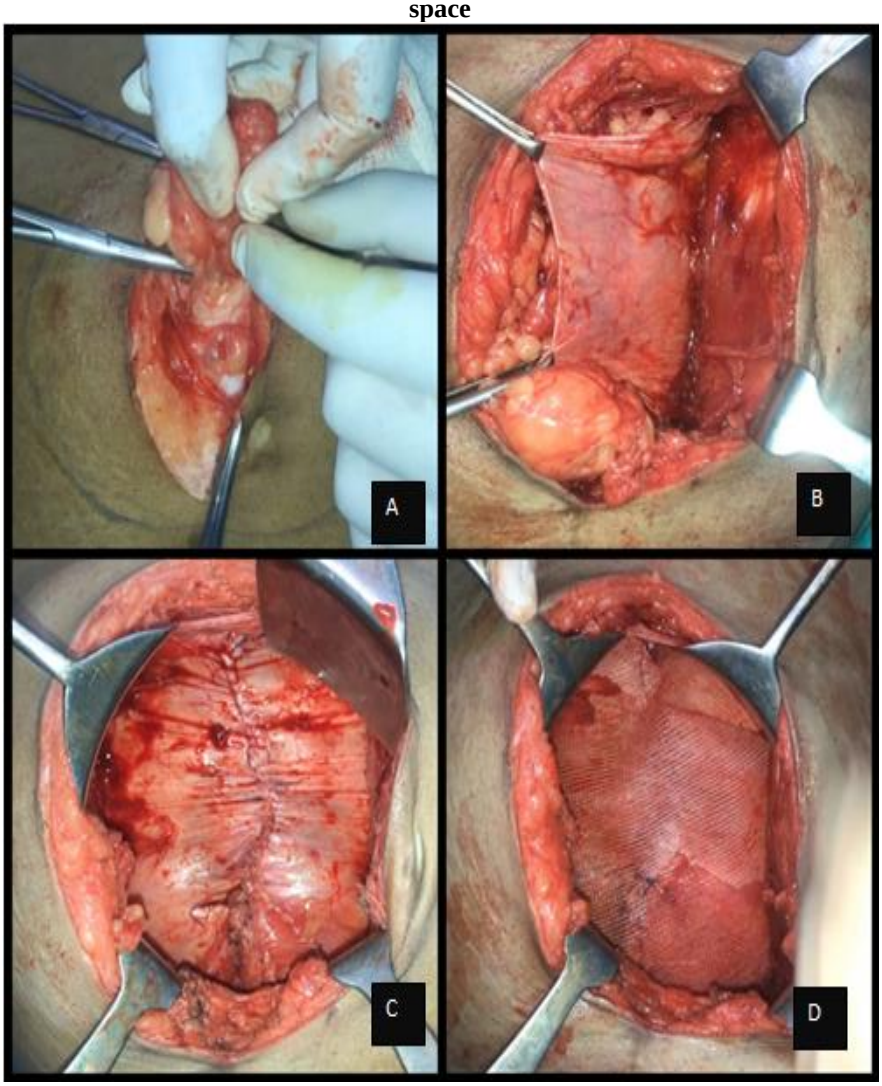

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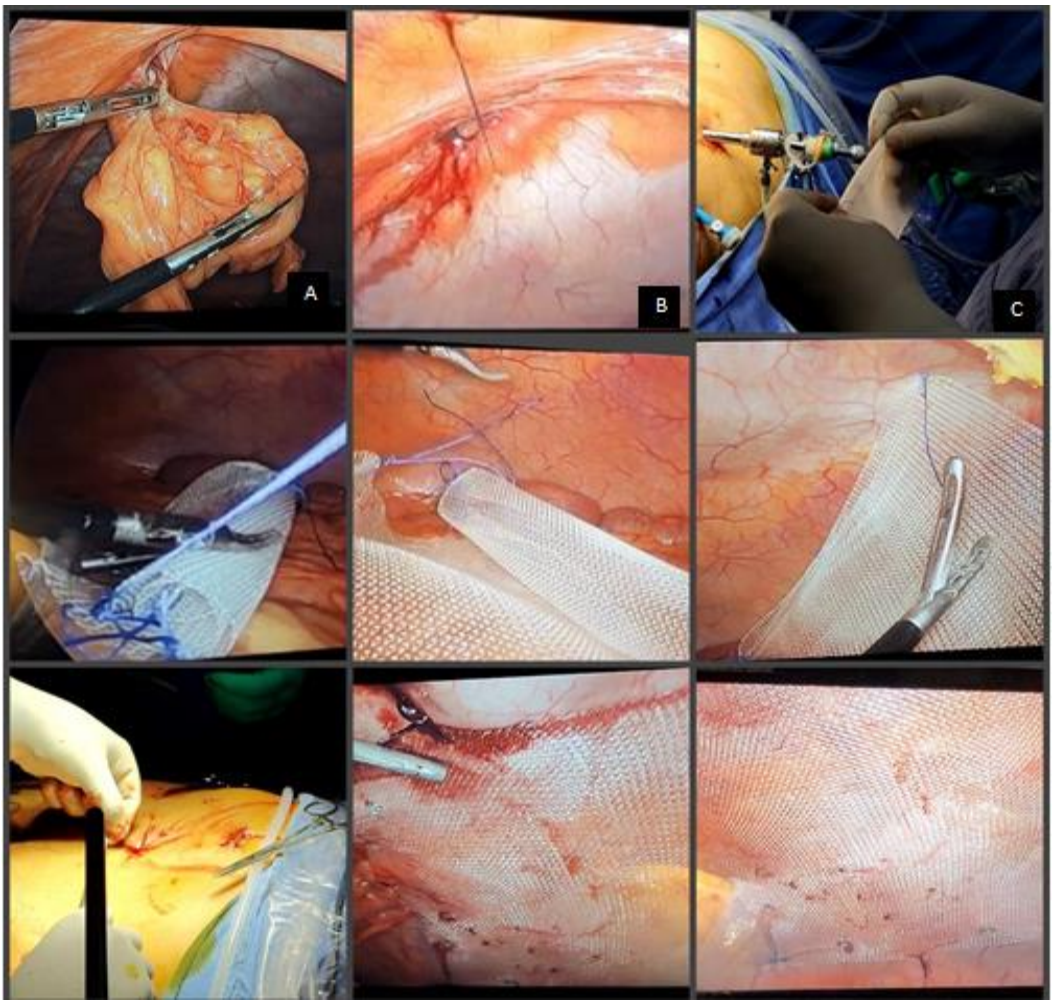
Figure 2: Intraoperative images of IPOM Repair
A,B: Reduction of hernial sac and its content, C: Rolling of mesh before insertion, D,E: Unfurling of mesh inside abdominal cavity, F,G: Transfascial fixation of mesh, H,I : double crown fixation of mesh with tackers



Results

Table 1: Demographic profile , comorbidities and contents of hernial sac

		Sublay Group n = 44		IPOM group n = 44	
		No.	%	No.	%
Gender	Male	15	34.09	20	45.45
	Female	29	64.91	24	54.55
Age	Age in years (Mean ± SD)	37.09±7.28		40.45±11.83	
Co morbidities	Obesity	3	6.8	3	6.8
	Hypertension	1	2.3	0	0
	Obesity with hypertension	1	2.3	0	0
	Obesity with Diabetes	0	0	1	2.3
	smoking	11	25.0	9	20.5
Presentation	Abdominal Lump	35	79.5	39	88.6
	Abdominal Lump with pain	9	20.5	5	11.4
Previous Surgery	Exploratory laparotomy	18	40.9	16	36.4
	LSCS	12	27.3	13	29.5
	None	14	31.8	15	34.1
Content of hernia sac	Omentum	8	18.2	11	25.0
	Preperitoneal fat	33	75.0	27	61.4
	Small bowel	3	6.8	5	11.4
	Large bowel	0	0	1	2.3

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Patients included in this study were between 18 years and 65 years of age. The mean age of patients in the sublay and IPOM group was 37.09±7.28 and 40.45±11.83 years respectively. Out of 88 patients 53 patients were female (60.3%) and 35 were male (39.7%). Incisional Hernia and Paraumbilical Hernia was more common in females (39 and 4 respectively) than males (19 and 1 respectively). Exploratory Laparotomy and Lower Segment Cesarean Section had were the commonest cause of ventral hernias. Co morbidities like hypertension alone or in association with obesity or diabetes mellitus showed a positive co relation with incidence of ventral hernias. Out of 88 patients, 74 patients presented with reducible lump and 14 presented with reducible lump along with pain. Preperitoneal Fat was most commonly found content in hernial sac of 60 patients (68.2%) followed by omentum which was found in 19 patients (21.6%) and small bowel in of 8(9.1%) patients and Only 1 patient(1.1%) had large bowel as content of its sac.

Table 2: Shows the comparison of diagnosis between the groups.

Type of Ventral Hernia	SUBLAY group n-44		IPOM group n-44	
	No	%	No	%
Epigastric Hernia (n= 16)	5	11.4	11	25.0
Incisional Hernia (n= 58)	35	79.5	23	52.3
Paraumbilical Hernia (n= 6)	1	2.3	5	11.4
Umbilical Hernia (n= 8)	3	0	5	11.4
Total (n= 88)	44	100	44	100

Out of 44 patients in sublay group, 5 presented with epigastric Hernia, 35 with incisional Hernia, 1 with paraumbilical Hernia, and 3 with umbilical Hernia. Out of 44 patients in the IPOM group, 11 presented with epigastric Hernia, 23 presented with incisional Hernia, 5 with paraumbilical Hernia, and 5 with umbilical Hernia.

Table 3: Intraoperative and Postoperative data

		Sublay Group n = 44		IPOM group n = 44		t- value	Unpaired t-test derived p value
		No.	%	No.	%		
Size of defect	**Length (Mean ± SD)**	7.89±1.24		4.86±0.88		13.173	<0.001
	Breadth (Mean ± SD)	4.86±0.88		4.86±0.88		3.566	<0.001
Duration of surgery (minutes)	**(Mean ± SD)**	55.66 ± 8.34		68.75±10.44		6.466	<0.001
VAS Score for pain	**(Mean ± SD)**	4.52 ± 0.66		2.36 ± 0.61		15.838	<0.001
Wound infection	**Present**	2	4.5	0	0	Chi-Square test derived p value	0.15
	Absent	42	95.5	44	100		
Seroma	**Present**	4	9.1	0	0		0.04
	Absent	40	90.9	44	100		
Cosmetic satisfaction	**Satisfied**	38	86.4	42	95.4		0.14
	Unsatisfied	6	13.6	2	4.6		
Duration of hospital stay	**(Mean ± SD)**	6.50 ± 1.68		3.61 ± 2.28		6.755	<0.001

Table 3 shows the duration of surgery was significantly (p-value<0.001, *significant) lower among patients of sublay (55.66±8.34 minutes) compared to IPOM group (68.75±10.44 minutes). Visual Analogue Scale (VAS) for pain was used to grade first 48 hours of post-operative pain with usual doses of analgesics. In this scale 0 stands for no pain and 10 stands for unbearable pain. The immediate post-operative pain was significantly (p=0.001) lower among patients of IPOM group (2.36±0.61) compared to sublay group (4.18±0.57) with usual doses of analgesics. Post operative complications was significantly(p=0.04) lower in patients of IPOM group compared to Sublay group(there was no incidence of wound infection or seroma formation in the IPOM group). The hospital stay was significantly (p=0.001) lower among patients of IPOM group (3.3±1.28 days) than sublay group (5.8±0.87 days).

Discussion

The mean age of patients of Sublay and IPOM group was 37.09±7.28 and 40.45±11.83 years respectively. There was no significant (p>0.05) difference in age between the groups showing comparability of the groups in terms of

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age. It was different from the findings reported by Alizai et al (2018) [10] in which the mean age of patients in group S (sublay) was 63.2 ± 12.3 years and in the IPOM group was 62.1 ± 13.9 years (p value 0.69). This could be due to large number of young post lower segment cesarean section females presenting with incisional hernia in our country.

This study showed that a total of 74 patients (84.1%) of both groups, sublay and IPOM presented with reducible swelling and 14 (15.9%) patients presented with reducible swelling associated with pain. This is in concordance with findings of Reinpold, et al (2018)[11] who reported that all 295 patients in IPOM group presented with a swelling, of which 138 presented with only swelling and 157 (53.22%) had complaints of pain associated with swelling, 328 patients in sublay group presented with swelling, of which 151 presented with only swelling and 177 (53.9%) had complain of pain associated with swelling.

In this study, incisional hernia was the most common diagnosis in both the groups (79% in sublay and 50% in IPOM) epigastric hernia was second most common in both groups (11.5% in sublay and 25% in IPOM).. There was no significant (p>0.05) difference in diagnosis between the groups. In the study by Alizai et al (2018)[10], primary incisional hernia was the most common diagnosis in 82 patients out of 102 patients (80.4%), (p value 0.258) . Previous history of abdominal operation (exploratory laparotomy and LSCS) was present in 59 patients (67.04%) . Results of this study were different to study conducted by Zolin S J et al(2019),[12] in which out of 186 patients only 43 patients (23.1%) had history of previous open abdominal surgeries which was found to be statistically insignificant(p>0.05) . This maybe due to a large number of cesarean section being performed with the classical midline incision and midline exploratory laparotomies for peritonitis being performed in our region. Our institution is a tertiary care Centre, most of the cases performed are referred here from peripheral hospitals. Pre peritoneal fat was the most common content (68%) for all types of hernia with omentum (21.5%)being the second .This study observed pre peritoneal fat as the hernial sac content in 54% patients from the IPOM group and 52.3% patients from the sublay group. Omentum as content was found in 45% patients of sublay and in 29.5% patients of the IPOM group.

Mean duration of surgery was significantly (<0.001) higher for Laparoscopic IPOM repair(68.75±10.44 minutes) as compared to open repair . Similar findings were reported by Jenny M Shao et al(2021)[13] in their study where mean operative time for Laparoscopic group (168.1±64.3 minutes) was significantly (p<0.05) higher than for Open group (186.7±67.2 minutes).

Wound infection and seroma in the early post-operative period was present among 4.5% (infection) patients and 9.1% patients (seroma) of the sublay group which improved with antibiotics and regular antiseptic dressings but was absent in the patients of IPOM group. There was significant (p>0.05) difference in wound infection between the groups. Alizai et al (2018)[10] found that wound infection rate was significantly lower in his sublay group patients. These occurred in 12.7% patients in sublay group and in 16.1% patients in the IPOM group (p-value 0.641). Köckerling et al (2018)[14] in his study stated that wound infection in open group was 1.34% and was significantly higher (p value <0.001) than the laparoscopic group at 0.30%

The post-operative pain(VAS score) was significantly (p=0.001) lower among patients of IPOM group (2.36±0.61) compared to sublay group (4.52±0.66) in this study. Schroeder et al (2012) in his study found that there was no significant difference in post operative pain between open sublay and laparoscopic IPOM group (12.5% vs. 13.0 %, P = 1.00). Reinpold et al (2018)[11] stated that postoperative pain on follow up was lower amongst patient of IPOM group (14%) but the difference was insignificant.

The hospital stay was significantly (p=0.001) lower amongst patients of IPOM group (3.61±2.28 days) than in the sublay group (6.50±1.68 days) in this study. Patients were discharged once they had adequate pain control, passed stool and resumed oral feeding. Köckerling et al (2018)[14] stated that hospital stay showed advantages for laparoscopic IPOM compared to open sublay with 4.35±3.32 days versus 6.14±5.29 days (p<0.001). Similar results were found by Lavanchy et al (2019) [15] where duration of hospital stay was significantly(p<0.05) lower in patients of IPOM group (4-7 days) compared to the open group (5-12 days) .

This study was limited by the time duration for follow up and to compare the recurrence rate in the two groups.

Conclusion

Our study concluded that laparoscopic IPOM repair is a better alternative to open sublay mesh repair for repair of ventral because it can be used for all sites of hernia and was found better than open retromuscular sublay repair with respect to, lower incidence of postoperative Pain and complications, early ambulation and discharge of patient from hospital and has better cosmetic outcome.

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