ORIGINAL RESEARCH PAPER

General Surgery

A STUDY OF COMPARISON BETWEEN ONLAY VERSUS SUBLAY MESHPLASTY IN CASES OF VENTRAL HERNIA (UMBILICAL AND PARAUMBILICAL) AMONG ADULTS: AN ANALYTICAL STUDY CONDUCTED AT ONE OF THE TERTIARY CARE CENTRES OF NORTHERN PROVINCE IN INDIA

KEY WORDS: Paraumbilical hernia, mesh repair, onlay, sublay.

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ABSTRACT

Back ground: Hernia is the protrusion of whole or a part of a viscus through the wall that contains it. It can occur anywhere in the body, but more commonly occurs in the inguinal region and umbilicus. Umbilical hernias protrude directly through the umbilical tube, while paraumbilical hernias occur just adjacent to the umbilical tube. Repair of umbilical and paraumbilical hernias follow the same principle. Apart from the basic protocol of repairing the fascial defect and reinforcing the fascia with a mesh, the placement of the mesh also plays a crucial role in determining the outcome of the surgery and long term complications. Sublay versus onlay mesh placement is well debated. In this study we attempted to compare both the procedures in terms of operative difficulty, post-operative complications, drain out time, long term recurrence rates etc. in the last few decades mesh repair of hernia became the standard treatment in all types of hernia including para umbilical hernia (PUH), position of mesh placement either onlay or sublay still an issue of debate, in this study we trying to address advantages and disadvantages of each position. **Materials and Methodology:** in this study we recruited 30 patients with paraumbilical hernia, patients were randomly allocated according to mesh placement position into sublay group 15 patients and onlay group 15 patients, preoperative, operative and follow up data of all participants were properly presented and analyzed using the suitable statistical tests. **Results:** The mean operative time in the sublay group was 110.3 minutes, while in the onlay group it was 84.3 minutes respectively. Hospital stay in the onlay group was significantly longer compared to the onlay group (p=0.001). Duration for drain removal was significantly shorter in sub lay group. post-operative complications in the form of superficial wound infection occured in 4 patients of the onlay group and only 2 cases of the sublay group, seroma formation occured in 2 patients of the onlay group & 1 patient of the sublay group, While post-operative chest infection was encountered in 1 patient of the sublay group, No incidence of recurrence was recorded from both groups during the 6 month follow up. **Conclusions:** Both sublay and onlay mesh placement techniques are safe, both produced acceptable results, and are associated with comparable complications and recurrence rates.

Introduction:

The term "hernia," which originates from the Greek language, may be translated as a protrusion, and the word"rupture" comes from the Latin. Hernia is condition that occurs when a visceral organ or tissue protrudes through the wall of the cavity enclosing it into another anatomical space. Due to their lower prevalence and fewer signs, symptoms, and problems than inguinal hernias, umbilical and paraumbilical hernias have fewer historical reports than inguinal hernias.[1-2]

An increased number of abdominal surgeries have been performed ever since the invention of anaesthesia and asepsis in the 12th century. This has resulted in an increased incidence of incisional hernias, which in turn has caused surgeons to examine this issue with a little bit more caution.[3] Repair of umbilical and paraumbilical hernias account for 15-18 percent of the surgeries performed, and an often occurring long-term consequence is an incisional hernia. It is estimated that between three and thirteen percent of individuals who have undergone a laparotomy will develop an incisional hernia, with the likelihood increasing to twenty-three percent.[4-7]

The surgical correction of ventral hernias has seen significant development throughout the course of time. Tension free meshplasty has replaced primary suture repair of the fascial defect as the gold standard treatment for umbilical and paraumbilical hernias due to the considerable recurrence rates of this procedure. General surgeons currently favour the onlay approach, which places the mesh over the anterior rectus sheath, and the sublay technique, which places the mesh over the posterior rectus sheath, to correct ventral hernias.[8-9]

Sublay meshplasty is a more effective alternative in relation to post-operative discomfort, chances of mesh getting infected, and length of stay in the hospital, despite the fact that it takes longer to execute.[10] In all cases of ventral and incisional hernias, sublay meshplasty is preferable to onlay meshplasty because of the low rate of complications and recurrence associated with the mesh.[11,12]

Materials and Methodology:

This comparative study was carried out in General Surgery Department, Career Institute of Medical sciences, Lucknow, Ram Manohar lohiya University, from April 2021to April 2022. A total of 30 patients with para umbilical hernia (PUH) were inclcluded. We included Patients of both genders above 16 years of age with uncomplicated Paraumbilical hernia, "American Society of Anesthesiologists" ASA class 1 or 2.

We excluded complicated Paraumbilical hernia Patients (peritonitis, Inflamed, obstructed or strangulated hernia , ASA class 3 or 4, Patients with known bleeding disorders, renal failure , collagen vascular disorders, and COPD.All patients signed a written consent prior to participation in the study, the study ran in accordance with CONSORT guidelines, it was approved by institutional ethical committee.

Patients were randomly divided into two equal groups (group A and B) each one 15 patients. Group-A patients underwent mesh repair of Paraumbilical hernia by onlay technique while group-B patients underwent mesh repair of Paraumbilical hernia by sublay technique. In group A, the mesh was placed above the rectus sheath. The defect was closed primarily by prolene 1/0 suture followed by placement of prolene mesh. The mesh was extended 3-4 cm beyond the edges of the defect and is not merely sewn to the hernia edges. (Figure 1) In group B, mesh was placed broadly under the defect in the retro muscular space of abdominal wall posterior to the rectus muscles and anterior to the posterior rectus sheath. The mesh was placed such that it extended over the entire posterior rectus sheath. The contact between intestines and mesh is avoided by the posterior rectus sheath and the layer of peritoneum that lies under the mesh. (Figure 2) All the operations were carried out under general anesthesia and prophylactic antibiotic (Amoxicillin/Clavulanic Acid) 1.2 grams was given IV at the time of induction of anesthesia.

Suction drain was placed in all patients after the surgery. Patients were discharged on 2nd postoperative day, the drain was removed if the output was less than 30 ml in 24 hours. Operation time was measured in minutes from time of incision till the application of last stitch at the end of operation. All patients follow up data were obtained during return visits at 2 weeks, 1 & 6 months after the operation, or when the patient had a complaint. Statistical analysis; data were expressed as mean ± SD for quantitative variable, number and percentage for descriptive variables. Chi-squared (X2) test, or fisher exact test and t test were used when appropriate. $P < 0.05$ was statistically significant.

Results:

Demographic data of the two study groups were comparable in regards to age, gender distribution, as the sublay group composed of 9 males (60%) & 6 (40%) females, with age ranging from 24 to 61 years old, while the onlay group composed of 5males (33.3%) & 11 females (66.6%), with age ranging from 22 to 57 years old.as presented in (table 1). The two study groups were comparable as regards complaint and duration, with no significant difference in the position of hernia or duration of complaint. Table 2 Also co morbidities shows non-significant differences between both groups (table 3) Operative time was significantly longer in the sublay group compared to the onlay group, the operative time in the sublay group ranged from 71 to 158 minutes, with a mean of 110.3 minutes, while the onlay group ranged from 74 to 93 minutes with mean of 84.3.

Table (1) Demographic data

Variables	Sublay N=15	Onlay N=15	T test	P value
Age (Years)			0.6	
Mean± SD	48.9 ± 12.6	43.3 ± 10.7		0.54
Range	24-61	22-57		
Gender			0.25	
Male	9 (60%)	5 (33.3%)		0.65
Female	6 (40%)	11 (66.6%)		

Table (2) Complaint and its duration

	Sublay		Onlay		X2 test P value
	N	%	N	%	
Swelling & Pain	0.59		0.74		
Supra-umbilical	4	26.6%	5	33.3%	
Infra-umbilical	5	33. 3%4	26.6%	Non-significant	
Para-umbilical	6	40.0%	6	40.0%	
Median Duration				T	P
(Months)	8	12		1.47	0.15
Mean ± SD	11.7 ± 12	18.7 ± 13.3		Non-Significant	
Range	1 - 36	3 – 48			

Table (3) Associated Co-morbidities

	Sublay		Onlay		X^2	P value
	N	%	N	%		
D.M	2	12.5	3	18.75	0.0	1.0
HTN	3	18.7	3	18.75	0.0	1.0
IHD	0	0.0	1	6.3	0.0	1.0
Chronic Chest disease	1	6.3	2	12.5	0.0	1.0
Liver Cirrhosis	5	31.25	4	25	0.0	1.0

Table (4) Operative data

	Sublay	Onlay	T test	P value
Operative time (minuits)			3.73	<0.001
X ± SD	110.3± 27.3	84.3 ± 6.4		
Range	71- 158	74 – 93		
Blood loss	78.34 ± 29.92	102.0±37.4	-1.837	0.074

Table (5) Post-Operative follow up

	Sublay	Onlay	T test	P value
Hospital stay (hours) X ± SD	24 ± 0		2.23	0.001
Range		30 ± 10.7 24 – 48		
Drain removal (Days) X ± SD			3.5	0.002
Range	4.15 ± 1.4 2- 6	6.65 ± 1.8 4 - 8		

Table (6) Post-Operative Complication

	Sublay		Onlay		X^2	P value
	N	%	N	%		
Superficial wound infection	1	6.6	3	20	0.21	0.6
Seroma	2	13.3	4	26.6	0.0	1.0
Chest infection	1	6.6	0	0.0	0.0	1.0
Recurrence	0	0	0	0.0	0.0	1.0

The median operative time was statistically different between both groups ($p<0.001$). intaraoperative blood loss was slightly higher in the onlay group (78.34±29.92 ml) than in the sublay group (102.0±37.4 ml) without statistical significance (table 4) Hospital stay in the onlay group was significantly longer compared to the sublay group ($p=0.001$).The post-operative hospital stay was limited to only 24 hours in all patients of the sublay group & 13patients of the onlay group, while the remaining 2 patients extended their stay to 48 hours due to the observed continuingly collected blood in the suction drain in the first 24 hours before the amount rate subsided.Duration for drain removal was significantly shorter in sublay group compared to onlay group.

The time required to remove the suction drain in onlay group ranged from 4 to 8 days with significantly larger median of 6.65 days compared to the sublay group which ranged from 2 to 6 days with a median of 4.15, $P=0.002$.(table 5) Post-operative complications were minimally encountered in both groups, in the form of superficial wound infection in 3 patients from the onlay group and only 1 from the sublay group, and significant seroma formation in 4 patients from the onlay group & 2 patients from the sublay group. While post-operative chest infection was encountered in 1 patient from the sublay group this patient was known COPD patients. No incidence of recurrence was recorded from both groups during the 6 month follow up. (table 6)

Discussion:

Although polypropylene mesh has long been regarded as the implant of choice for repairing abdominal wall defects, there is still controversy regarding the best site of its placement [11,12,13]

The number of males was notably higher than males in sublay group and results were contrast for the Onlay group for the same this counter confirms to the previously documented fact of high female to male ratio.We recorded the duration of surgery in patients treated with sublay mesh repair (Group B) that ranged from 71-158 minutes (median 110.3) Post-operative hospital stay in the onlay group was significantly longer compared to the onlay group (p=0.001).The post-operative hospital stay was limited to only 24 hours in the whole the sublay group & 13 patients of the onlay group, while the remaining 2 patients extended their stay to 48h due to the observed continuingly collected blood in the suction drain in the first 24 hours before the amount rate subsided. Duration for drain removal was significantly shorter in sublay group compared to onlay group.

The time required to remove the suction drain in the sublay group ranged from 2 to 6 days with significantly lower median of 4.15 days in the sublay group compared to the onlay group, in which the duration ranged from 4 to 8 days with a median of 6.65 days. These findings was coincide with that of Hameed et al and Baracs et al [11,12]

In this study superficial wound infection was encountered in 3 patients (20%) from the onlay group, While only 1 cases (6.66%) in the sublay group developed wound infection. seroma formation following removal of suction drain was recorded in 4 patients (26.6%) from the onlay group, While in the sublay group, 2 cases developed wound seroma (13.3%). One case of post-operative chest infection were encountered in patients from the sublay group with known pre-operative history of chest problems, and resolved with proper treatment.

The difference in post-operative complications was not statistically different (P>0.05). No incidence of recurrence was recorded in either group, which can be attributed to the relatively small number of cases included, and the relatively short period of follow up. Most of the studies[10,13,14] had a recurrence rate more than ours may be due to short follow up in our study

REFERENCES:

1. Aslani N, Brown CJ. Does mesh offer an advantage over tissue in the open repair of umbilical hernias?A systematic review and meta-analysis. Hernia. 2010;14(5):455-462.
2. Miller HJ, Novitsky YW. Ventral Hernia and Abdominal Release Procedures. In: Shackelford's Surgery of the Alimentary Tract, 2 Volume Set. Elsevier; 2019:571-589.
3. Conze J, Prescher A, Schlächter M, Schumacher O. The umbilical hernia. In: Recurrent Hernia. Springer; 2007:359-364.
4. Rodriguez JA, Hinder RA. Surgical management of umbilical hernia. Oper Tech Gen Surg. 2004;3(6):156-164.
5. Bilezikian JA, Tenzel PL, Eckhauser FE, Hope WW. Primary non-complicated midline ventral hernia: overview of approaches and controversies. Hernia. 2019;23(5):885-890.
6. Oviedo RJ, Robertson JC, Desai AS. Robotic ventral hernia repair and endoscopic component separation: outcomes. JSLS J Soc Laparoendosc Surg. 2017;21(3).
7. Gonzalez A, Escobar E, Romero R, et al. Robotic-assisted ventral hernia repair: a multicenter evaluation of clinical outcomes. Surg Endosc. 2017;31(3):1342-1349.
8. Chen YJ, Huynh D, Nguyen S, Chin E, Divino C, Zhang L. Outcomes of robot-assisted versus laparoscopic repair of small-sized ventral hernias. Surg Endosc. 2017;31(3):1275-1279.
9. Petro CC, Posielski NM, Raigani S, Criss CN, Orenstein SB, Novitsky YW. Risk factors for wound morbidity after open retromuscular (sublay) hernia repair. Surgery. 2015;158(6):1658-1668.
10. Raghuveer MN, Muralidhar S, Shetty H, Veena V. Onlay versus sublay mesh repair for ventral hernia. Int Surg J. 2018;5(3):823-826.
11. Hameed F, Ahmed B, Ahmed A, Dab RH. Incisional hernia repair by preperitoneal (sublay) mesh implantation. Ann Punjab Med Coll. 2009;3(1):27-31.
12. Baracs J, Sajjadi GS, Kelemen D, Horvath OP, Vereczkei A, Vereczkei A. Open treatment of abdominal wall hernias: mesh repair is superior to suture repair and onlay mesh is better than sublay mesh-five-year multicentric, prospective, randomised clinical trial. Surg Curr Res. 2016;6(270):2161-2176.
13. Rajsiddharth B, Venkanna M, Kumar GA, Patlolla SR, Sriramoju S, Reddy BS. Comparative study of onlay and pre-peritoneal mesh repair in the management of ventral hernias. Int J Sci Stud. 2015;3(7):121-128.
14. Chitrambalam TG, Anguraj P, Sundaraj J, Pethuraj M. A comparative study between onlay and sublay meshplasty in ventral hernias: a randomized controlled trial. Int Surg J. 2019;6(4):1264-1268.