Section: General Surgery

Original Research Article

A COMPARATIVE STUDY BETWEEN ONLAY AND SUBLAY MESH REPAIR IN THE TREATMENT OF VENTRAL HERNIAS

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Received : 14/03/2025
Received in revised form : 21/04/2025
Accepted : 08/05/2025

Keywords:
Ventral Hernia, Onlay, Sublay, Mesh, seroma, Flapnecrosis, Recurrence, infection.

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DOI: 10.47009/jamp.2025.7.3.149

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (3); 768-772

ABSTRACT

Background: This study aims to compare the two common options of mesh placement in open ventral hernia repairs, The ONLAY meshplasty - Over the anterior rectus sheath andThe SUBLAY meshplasty - Between the recuts muscle and posterior rectus sheath. **Materials and Methods**: Thisisdone in the Department of General Surgery at Government dharmapuri Medical College and Hospital, all subjects undergoing onlay and sublay mesh repair for ventral hernias will be evaluated for duration of surgery and for complications like surgical site infections, seroma formation, flap necrosis, duration of hospital stay and recurrence. Randomised Control Study on a total of25 cases ONLAY meshplasty and 25 cases SUBLAY meshplasty were studied from September 2023to April 2025(18 Months). The data were skewed, as indicated by the Shapiro-test Wilk's for normality, so the Kruskal-Wallis test was employed in multivariate analysis before the Mann-Whitney U test. The Chi-Square test was applied to categorical data to determine significance. In each of the statistical techniques mentioned above, a probability value of 0.05 is regarded as significant. **Result**: Mean age of patient among SUBLAY group is 46.12 And ONLAY group is46.24 years. The mean of duration of surgery in SUBLAY group is 118.44min and in the ONLAY group. 81.16min.The incidence of Seroma among SUBLAY group is 4% and in ONLAY group is 24%. One in SUBLAY group and the Four in ONLAY group developed surgical site infection. All were superficial infection, settled with antibiotics. Three (6%) patients developed flap necrosis. All belong to ONLAY group. In the SUBLAY group duration of hospital stay is 4.76 days and in the ONLAY group duration of hospital stay is 8.92 days. No recurrence were recorded in both the SUBLAY and ONLAY groups for 6months. **Conclusion**: In comparison to onlay meshplasty, sublay mesh repair has less mesh-related complications overall, such as seroma, surgical site infections, flap necrosis, and hospital stays. This makes it an excellent solution for treating all types of ventral hernias. Sublay mesh repair requires more time in the operating room than onlay mesh repair, but there are less problems and morbidities as a result of the procedure. As a result, sublay mesh repair can be employed as the therapy of choice for ventral Hernias.

INTRODUCTION

With more than 200,000 operations per year, ventral (abdominal) hernia repair is one of the most frequent procedures carried out by general surgeons. Despite the widespread use of this treatment, there is little agreement on the causes for repair, the best approach, or the ideal placement of the prosthetic mesh. No one method will probably be sufficient to repair all abdominal wall abnormalities due to the large range of patient and hernia characteristics. An open or laparoscopic repair is an option. There are numerous ways to carry out the open repair. Because recurrence rates are cut in half, most surgeons concur that all incisional hernias should be treated using prosthetic (synthetic or biologic) mesh. As an inlay (sewn to the fascial edge), an onlay (stitched above the fascia), or

ISSN (O): 2687-5365; ISSN (P): 2753-6556

a sublay, prosthetic mesh can be applied (underneath the fascia). High recurrence rates have led to a large-scale abandonment of the inlay method.

One time, it was believed that the Mayo repair, or "vest over pants," was a significant advancement in the treatment of incisional hernias. Normal fascia layers are overlapped, then secured with a double row of mattress sutures. Long-term research indicates that this is a poor repair, nevertheless. There have been reports of recurrence rates as high as 54% at 10 years, which are comparable to those of a typical simple fascial reapproximation. The Mayo repair is not successful in all hernia repairs due to the challenge to align strong fascia without using excessive tension. Luijendijk et al. conducted a prospective randomised experiment contrasting suture repair with mesh repair for incisional hernias to ascertain the effectiveness of prosthetic mesh for ventral hernia repair. Suture repair had a cumulative 3-year rate of recurrence of 43%, while mesh repair had a rate of 24% (P = 0.02). The greater than anticipated recurrence rate in the mesh group may be related to the fact that the mesh in this study was routinely secured with 2 to 4 cm of overlap. The recurrence rate was higher than 40% even when minor hernias under 10 cm were fixed with suture; in comparison, the recurrence rate was just 6% when repaired with mesh. Large hernias must have mesh implanted for an adequate repair, which is a given. However, it seems that using a prosthetic may be equally crucial for minor flaws. The 10-year cumulative recurrence rate demonstrates once more that using a prosthesis reduces hernia recurrence by 50%.

The probability of recurrence for suture repair was 85% higher than for mesh repair, according to a recent Cochrane assessment of the available randomised studies. The correction of open ventral hernias is one of the most frequently performed surgical procedures worldwide. The onlay and sublay repairs are the two surgical methods that are most frequently employed in cases with ventral hernia. Which approach is more effective is still up for debate.

Therefore, the primary goal of this study is to contrast the results of ventral hernia repair using ONLAY and SUBLAY Mesh.

MATERIALS AND METHODS

This study was done in the Department of General Surgery at Government Dharmapuri Medical College and Hospital, Dharmapuri. Written informed consent will be obtained from all study subjects before enrolment in the study. All subjects undergoing onlay and sublay mesh repair for ventral hernias will be evaluated intraoperatively for duration of surgery and postoperatively for complications like surgical site infections, seroma formation, flap necrosis, duration of hospital stay and recurrence.

Aim of Study: This study aims to compare the two common options of mesh placement in open ventral hernia repairs.

The ONLAY meshplasty - Over the anterior rectus sheath., The SUBLAY meshplasty - Between the recuts muscle and posterior rectus sheath.

Objectives

- To compare duration of surgery
- To compare early post-operative complications like Seroma Surgical site infection Flap necrosis
- To compare duration of hospital stay, Incidence of recurrence over a period of 6 months.

Sample Size: 25 cases – ONLAY and 25 cases - SUBLAY meshplasty

Study Duration: September 2023 to April 2025 (18 Months)

Study Centre: Government Dharmapuri Medical College Hospital

Inclusion Criteria

Patients of both sexes with age more than 18 years and less than 70 years. Primary hernia (umbilical, paraumbilical and epigastric).

All incisional hernias regardless of size.

Exclusion Criteria

Patients Under the age of 18.

Obstructed or Strangulated hernia.

HIV, HBsAG, HCV and Immunocompromised patients.

Uncontrolled Diabetic patients.

Pre-existing skin infection at the site of hernia with local signs of inflammation. Pregnancy.

Collagen Disorders.

Type of Study: Randomised Control study

Statistical Analysis

The tabulation of observations follows a pre-established proforma, the acquired data were analysed. For categorical variables, frequency analysis, percentage analysis, and mean & standard deviation were used to describe the data, respectively. The data were skewed, as indicated by the Shapiro-test Wilk's for normality, so the Kruskal-Wallis test was employed in multivariate analysis before the Mann-Whitney U test. The Chi-Square test was applied to categorical data to determine significance. In each of the statistical techniques mentioned above, a probability value of 0.05 is regarded as significant.

RESULTS

This study was conducted in the Department of General Surgery, Govt. Dharmapuri Medical College & Hospital, Dharmapuri .Patients who fulfilled above mentioned inclusion and exclusion criteria were enrolled in this study, after obtaining an informed consent from patients.Total Number patients enrolled in study –50.Group A (Onlay meshplasty) – 25,Group B(Sublay meshplasty) - 25The duration of surgery and early postoperative complications like Surgical site infections , flap necrosis , seroma , duration of hospital stay and recurrence in the both groups were evaluated and compared

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TABLE 1-AGE DISTRIBUTION

In our study, out of total 50 patients,20 patients (9-SUBLAY, 11-ONLAY) were less than 40years of age, 10
patients (5-SUBLAY, 5-ONLAY) were 41-50years of age,15 patients (10-SUBLAY, 5-ONLAY) were 52-
60years of age,05 patients (1-SUBLAY, 4-ONLAY) were more than 61 years of age.

Mean age of patient among SUBLAY group is 46.12 with SD 9.86 and mean age of patients in
ONLAY group is 46.24 with SD 11.85.

TABLE 2-DURATION OF HOSPITAL STAY

In the SUBLAY group duration of hospital stay is 4.76 days with SD of 0.93 In the ONLAY
group duration of hospital stay is 8.92 days with SD of 4.02. The calculated P-value is
<0.0001 which is highly significant.

TABLE 3-GENDER DISTRIBUTION

Among the 50 patients enrolled in study 34 were females and 16 were male. In the 34 female patients ,15 underwent SUBLAY mesh repair, 19 underwent ONLAY mesh repair. In the 16 male patients, 10 underwent SUBLAY mesh repair, 6 underwent ONLAY mesh repair.

TABLE 4- DIAGNOSIS, SURGICAL SITE INFECTION, FLAP NECROSIS & SEROMA

25 cases were Paraumbilical Hernia, in this 13 cases underwent SUBLAY mesh repair and 12 cases underwent ONLAY mesh repair.25 cases were Incisional Hernia, in this 12 underwent SUBLAY mesh repair and 13 underwent ONLAY mesh Repair.

In this study 5 (10%) patients developed surgical site infection. All were superficial infection,
settled with antibiotics. Out of the 5 patients who developed SSI, 1 belong to SUBLAY group
and the remaining 4 belong to ONLAY group. The incidence SSI in SUBLAY group is 4%. The incidence of SSI in ONLAY group is 16%.

In this study 3 (6%) patients developed flap necrosis. All the 3 patients who developed flap necrosis belong to ONLAY group The incidence of flap necrosis in ONLAY group in this study is 12% In this study 7 patients (14%) developed Seroma. Among the 7 patients,1 patient belong to SUBLAY group and the other 6 patients belong to ONLAY group. The incidence of Seroma among SUBLAY group is 4%. The incidence of Seroma among ONLAY group is 24%. The calculated P-value is 0.042 which is significant.

TABLE 5-DURATION OF SURGERY

The mean of duration of surgery in SUBLAY group is 118.44min with SD 12.31 and in the ONLAY group is 81.16min with SD 8.26.

TABLE 6-RECURRENCE

Patients in both SUBLAY and ONLAY groups were followed for a period of 6 months. No recurrence were recorded in both the SUBLAY and ONLAY groups.

Table 1: Age Distribution

			GROUP		TOTAL
			SUBLAY	ONLAY	
AGE GROUP	<40	COUNT	9	11	20
		% Within GROUP	36.0%	44.0%	40.0%
	41-50	COUNT	5	5	10
		% Within GROUP	20.0%	20.0%	20.0%
	51-60	COUNT	10	5	15
		% Within GROUP	40.0%	20.0%	30.0%
	>61	COUNT	1	4	5
		% Within GROUP	4.0%	16.0%	10.0%
TOTAL		COUNT	25	25	50
		% Within GROUP	100.0%	100.0%	100.0%

Table 2: Age & Duration of Hospital Stay

GROUP		MEAN	STD.DEVIATION	P VALUE
AGE	SUBLAY	46.12	9.86	0.969
	ONLAY	46.24	11.85	
DURATION OF HOSPITAL STAY	SUBLAY	4.76	0.93	<0.0001
	ONLAY	8.92	4.02	

Table 3: Gender Distribution

			GROUP		TOTAL
			SUBLAY	ONLAY	
SEX	F	COUNT	15	19	34
		% Within GROUP	60.0%	76.0%	68.0%
	M	COUNT	10	6	16
		% Within GROUP	40.0%	24.0%	32.0%
TOTAL		COUNT	25	25	50
		% Within GROUP	100.0%	100.0%	100.0%

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 4: Diagnosis, SSI, FLAP Necrosis and Seroma

			GROUP		TOTAL	P VALUE
			SUBLAY	ONLAY		
DIAGNOSIS	INCISIONAL HERNIA	COUNT	13	12	25	0.77
		% Within GROUP	52.0%	48.0%	50.0%	
	PARAUMBLICAL HERNIA	COUNT	12	13	25	
		% Within GROUP	48.0%	52.0%	50.0%	
TOTAL		COUNT	25	25	50	
		% Within GROUP	100.0%	100.0%	100.0%	
SURGICAL SITE INFECTION	NO	COUNT	24	21	45	0.042
		% Within GROUP	96.0%	84.0%	90.0%	
	YES	COUNT	1	4	5	
		% Within GROUP	4.0%	16.0%	10.0%	
TOTAL		COUNT	25	25	50	
		% Within GROUP	100.0%	100.0%	100.0%	
FLAP NECROSIS	NO	COUNT	25	22	47	0.074
		% Within GROUP	100.0%	88.0%	94.0%	
	YES	COUNT	0	3	3	
		% Within GROUP	0.0%	12.0%	6.0%	
TOTAL		COUNT	25	25	50	
		% Within GROUP	100.0%	100.0%	100.0%	
SEROMA	NO	COUNT	24	19	43	0.042
		% Within GROUP	96.0%	76.0%	86.0%	
	YES	COUNT	1	6	7	
		% Within GROUP	4.0%	24.0%	14.0%	
TOTAL		COUNT	25	25	50	
		% Within GROUP	100.0%	100.0%	100.0%	

Table 5: Duration of Surgery

GROUP		MEAN	STD.DEVIATION
DURATION OF SURGERY(MIN)	SUBLAY	118.44	12.31
	ONLAY	81.66	8.26

Table 6: Reccurence

			GROUP		TOTAL
			SUBLAY	ONLAY	
RECURRENCE	NO	COUNT	25	25	50
		% Within GROUP	100.0%	100.0%	100.0%
	TOTAL	COUNT	25	25	50
		% Within GROUP	100.0%	100.0%	100.0%

DISCUSSION

There are several features to take into account while choosing the optimal spot to install mesh. First off, wound problems like infections, flap necrosis, and surgical site infections can be avoided by using procedures that avoid the devascularization of flaps. Second, the surgeon's choice may be influenced by the procedure's technical simplicity and length. The anterior myo-fascial complex and the posterior rectus sheath are two load- bearing tissues that can be integrated during sublay repair. Additionally, sublay mesh placement shields the mesh from infection, intraabdominal adhesions, and problems from

ISSN (O): 2687-5365; ISSN (P): 2753-6556

superficial wounds. Devascularizing skin flap formation is prevented. Onlay permits two-directional tissue growth; the skin flaps are not load-bearing. The vulnerability of mesh in the onlay placement forces the surgeon to make devascularizing skin flaps and leaves the mesh subject to problems from superficial wounds.

DURATION OF SURGERY

In our study, the average length of surgery for patients who received onlay mesh plasty was 81.16 minutes, while the average length of surgery for patients who got pre-peritoneal mesh repair was 118.44 minutes. The difference could be explained by the longer dissection time needed to create pre-peritoneal space. Operation ease is partly based on the surgeons' training, exposure, level of support, and conductive facilities. Godara et al. found a mean onlay duration of 49.35 min and a mean pre-peritoneal mesh repair duration of 63.15 min (P 0.0001), whereas the mean onlay and pre-peritoneal mesh repair durations in the Gleysteen,[23] series were 42 and 70.5 min, respectively.

SEROMA

Seroma was the most typical consequence seen in 7 patients. One (4%) of the patients were preperitoneal, and six (24%) were in the group receiving onlay mesh repair. Seroma drainage was used to treat this problem. Onlay technique had a higher rate of seroma formation because it necessitates extensive subcutaneous dissection to place the mesh, which can result in devitalized tissue. In a study of 100 patients, Liaqat Ali Zia et al. reported 14% in the onlay group and 4% in the sublay group.[40] According to Julie L. Holihan, the percentages for the onlay and sublay groups were 18 and 4, respectively.

Surgical Site Infection

The mesh is also susceptible to infection if there is a shallow wound infection because of its superficial position. Five instances had wound infections. 4 (16%) were onlays, and 1 (4%) belonged to the pre-peritoneal group. In a study involving 60 patients, Bantu Rajsiddharth et al. discovered surgical site infection in 6 cases (10%). Out of these, 4 (13.33%) and 2 (6.66%) belonged to the pre-peritoneal group. This is comparable to our research. These patients received standard dressing and the proper antibiotics as treatment. Due to the superficial nature of the infection and the positive response to antibiotics, no patient needed to have their mesh removed.

Flap Necrosis

Three (6%) patients had it in its entirety. With no occurrence in the sublay group, al,[13] were seen in the onlay group. This research is comparable to one by Julie L. Holihan. 1 • Duyen H. Nguy found that 8 (or 16%) of 100 patients who underwent. onlay meshplasty experienced skin discoloration; this frequency was nonexistent in the sublay group. For flap necrosis, all patients received conservative care.

Duration of Hospital Stay

The duration of post-operative hospital stay is an indirect indication of the degree of morbidity in terms of postoperative complications. Average post-operative hospital stay period for onlay mesh repair was 8.92 days, as compared to 4.76 days for pre-peritoneal mesh repair (P < 0.0001), which were comparable to series published by de Vries Reilingh et al,[24] and Gleysteen.[23]

RECURRENCE

Zero early recurrence recorded in both groups over a period of 6 months follow u.

CONCLUSION

In comparison to onlay meshplasty, sublay mesh repair has less mesh-related complications overall, such as seroma, surgical site infections, flap necrosis, and hospital stays. This makes it an excellent solution for treating all types of ventral hernias. Sublay mesh repair requires more time in the operating room than onlay mesh repair, but there are less problems and morbidities as a result of the procedure. As a result, sublay mesh repair can be employed as the therapy of choice for ventral hernias.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556