

# Onlay versus sublay mesh hernioplasty for paraumbilical hernia repair

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## ABSTRACT

**Background:** Abdominal wall hernia surgeries are the most common procedures performed by general surgeons. Onlay and sublay mesh hernioplasty are the most popular techniques for these hernias. However, the discussion remains about the superiority of one technique over the other. This study was conducted to evaluate the outcomes of onlay and sublay mesh hernioplasty for primary paraumbilical hernia.

**Patients and methods:** Total of 100 patients with paraumbilical hernia were randomly allocated into two groups. Onlay mesh hernioplasty was performed in one group (A) and the sublay hernioplasty was done in the other group (B). Postoperative outcomes including hospital stay, infection and recurrence of hernia, were analyzed by chi square and student t-test.

**Results:** The mean age of the patients was 43.15 years. There were 77 females and 23 males. Mean BMI was 34.4 for Group A and 35.8 kg/m<sup>2</sup> for Group B. Mean defect size of hernia in Group A was 4.34 cm whereas in Group B it was 4.76 cm (p=0.188). Mean duration of surgery was 40.18 minutes in Group A while it was 72.54 minutes in Group B (p<0.05). The mean hospital stay for Group A was 3.2 days and for Group B 5.2 days (p<0.05). Wound site infection in Group A was 10% and 8% in Group B (p=0.727). Recurrent after 15 months was observed in 1.5% patients in Group A whereas no recurrence was observed in Group B (p=0.079).

**Conclusion:** Onlay mesh hernioplasty has shorter duration of operation and length of hospital stay. There is no significant variation in wound infection and recurrence rate as compared to sublay mesh hernioplasty.

### Keywords:

Paraumbilical hernia, Onlay, Sublay, Mesh, Hernioplasty

## INTRODUCTION

Ventral hernias surgeries are the most common procedures performed by general surgeons.<sup>1</sup> Ventral hernia can be classified into primary hernias (paraumbilical or epigastric hernias) or incisional hernias. Among primary ventral hernias, paraumbilical hernia is the commonest variety.<sup>2</sup> There is a bulge in abdomen around the umbilicus, the defect is rounded with well-defined fibrous margin. In adults, the defect in median raphe is immediately adjacent to (mostly above) the true umbilicus, although this becomes indistinguishable on operation.<sup>3</sup> Paraumbilical hernias are repaired either by primary repair or by mesh hernioplasty. However, mesh hernioplasty provides a durable repair and lessens the chances of recurrence of hernia.<sup>4</sup> Mesh repair for hernia can be performed by open or laparoscopic technique. There is no difference

in hernia recurrence or hospital stay in both the techniques. Laparoscopic approach has slightly lower rate of wound infection, seroma formation and postoperative pain, however long-term outcomes are comparable for both techniques.<sup>5,6</sup>

The most widely employed techniques for open mesh hernioplasty are onlay and sublay repairs. In onlay mesh hernioplasty, the mesh is anchored to the anterior rectus sheath after fascial closure. In sublay mesh hernioplasty, the mesh is positioned in the retromuscular compartment posterior to the rectus abdominus muscles.<sup>7,8</sup> The placement of mesh in specific anatomical space (onlay or sublay) has impact on foreign body reaction, mesh migration, strength of repair and incidence of infection. These factors also play pivotal role in hernia recurrence and post-surgical complications.<sup>9,10</sup>

There is no consensus among experts regarding preference of a specific technique in routine hernia repairs. The objective of this trial was to analyze and

Competing interest: The authors have declared no competing interests exist.  
Citation: Ahmad QA, Changazi SH, Hussain A, Sarwar MZ, Afzal MN, Fatimah N, et al. Onlay versus sublay mesh hernioplasty for paraumbilical hernia repair. J Fatima Jinnah Med Univ. 2019; 13(1): 03-06.

compare the onlay and inlay mesh hernioplasty in terms of postoperative outcomes including hospital stay, wound infection and recurrence rate.

## PATIENTS AND METHODS

This was a randomized clinical trial conducted from 1<sup>st</sup> December 2015 till 30<sup>th</sup> November 2018 in Surgical Department of Tertiary Care Hospital, Lahore. Total of 100 adult patients with paraumbilical hernia, diagnosed by clinical examination and supported by relevant investigations, where necessary, were included. Both male and female patients of more than 15 years of age with paraumbilical hernia having one or more defects of 3 to 8 cm size were recruited for the study. Patients with irreducible, obstructed or strangulated hernia and immunocompromised patients or with uncontrolled diabetes mellitus were excluded from the study. Ethical approval was taken from ethical committee. A detailed consent was taken from all of the patients before including them in the study. The study was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) with an ID number of "NCT03766061". After an initial diagnosis, patients were randomly allocated equally to either "Group A" (onlay mesh hernioplasty) or "Group B" (Sublay Hernioplasty). In Group A (n=50), Onlay mesh hernioplasty technique included; excision of hernial sac, closure of fascial defect using No. 1 Polypropylene (Prolene™) suture, placement of a non-absorbable Polypropylene (Prolene™) mesh over the defect providing 4-5cm overlap and anchored to the anterior rectus sheath with 2/0 Polypropylene sutures. In Group B (n=50) sublay mesh hernioplasty technique employed dissection and excision of the sac, creation of a retro muscular space posterior to the rectus muscle, placement of a Polypropylene (Prolene™) mesh in this space and anchoring the mesh to muscle and fascia. Anterior rectus sheath was then repaired with No. 1 Prolene™. Two separate closed system drains were placed; one over the mesh and the other in subcutaneous space. All the operations were done by a senior surgeon, at least at the level of senior registrar.

Patients were discharged after removing the drain and were assessed at 10-12<sup>th</sup> postoperative day for wound infection and removal of stitches. The patients were initially followed monthly for 6 months for any complications and then every 6 months up to 2 years for any late complication and recurrence. The data was collected on proformas and was analyzed using SPSS version 21 with relevant statistical tests. Frequency and percentages were calculated for quantitative data

analysis, chi square test and t-tests were used to compare the outcomes between the two procedures.

## RESULTS

A total of 100 patients were enrolled in the study; 50 each in Group A (onlay mesh) and B (sublay mesh). The mean age of the patients was 43.15±7.20 years. There were 23 male and 77 female patients. Mean BMI of patients in Group A was 34.4±4.7 Kg/m<sup>2</sup> and 35.8±3.9 kg/m<sup>2</sup> in Group B (p=0.391). Mean defect size of hernia in Group A was 4.34±1.45 cm as compared to 4.76±1.71 in Group B (p=0.188). The mean duration of surgery in Group A was 40.18±5.59 minutes and 72.54±20.60 minutes in Group B (p<0.001). The mean hospital stay in Group A was 3.2±1.05 days and 5.2±1.13 days in Group B (p<0.001). Regarding wound infection; five patients (10%) in group A developed infection, four of them were treated conservatively with broad spectrum antibiotics while one was treated with open drainage and partial removal of mesh. In group B 4 (8%) patients developed wound site infection and all of them were treated successfully with broad spectrum antibiotics (p=0.727). Mean follow up of 15 months is available. Three patients (6%) in Group A presented with recurrence while no recurrence was observed following sublay mesh hernioplasty in group B (p=0.079). Table 1 summarizes the postoperative course.

## DISCUSSION

Ventral hernia is primarily a defect in abdominal wall musculature. Paraumbilical hernia is the frequent type of primary ventral hernias. Paraumbilical hernia can be repaired either by primary suturing or by mesh. However, larger ones (more than 2.5cm) have high risk of recurrence rate (up to 40%) after primary repair.<sup>11,12</sup> As hernia recurrence is annoying to the patient and embarrassing for the surgeons, tension free repair using prosthetic mesh is used that has decreased the recurrence to negligible rates and hence is recommended hernia repair technique for comparatively larger defect size of 2.5cm or more.<sup>13,14</sup> Sublay and onlay mesh hernioplasty are the two most extensively used techniques for open ventral hernia surgery. Both procedures have their benefits and drawbacks. This study evaluated postoperative outcomes for both methods.

In this study, the operating time in onlay mesh hernioplasty was significantly shorter than sublay mesh hernioplasty. This variation of time duration can be attributed to more extensive dissection in sublay

Table 1: Postoperative outcomes in the both treatment arms

Characteristics		Onlay mesh hernioplasty (group A)	Sublay mesh hernioplasty (group B)	p-value*
Mean hospital stay (days)		3.2	5.2	<0.001
Wound infection	Yes	5	4	0.727
	No	45	46	
Recurrence	Yes	3	0	0.079
	No	47	50	

\*Chi-square was used to find statistical significance. A p-value  $\leq 0.05$  was taken as significant.

approach and closure of fascial layers in two separate layers with mesh sandwiched between them as compared to onlay technique where there is minimal dissection required and fascia is repaired in single layer with mesh anchored over the anterior rectus sheath. The results in the study are in accordance with other studies.<sup>15,16</sup> However, some authors have reported no statistical difference in operative time between both surgical techniques.<sup>17</sup>

Wound complications (seroma formation and wound infection) are the frequent problem encountered after mesh hernioplasty.<sup>18</sup> In this study, though wound infections were slightly higher in onlay mesh hernioplasty but result was not statistically different ( $p > 0.05$ ). There was no troublesome seroma formation in either technique. Some authors have reported higher wound complications in onlay mesh hernioplasty.<sup>19</sup> However, other studies found no statistical difference in wound complications between the two procedures.<sup>17,20,21</sup> In this study, it was observed that in patients with wound infection in onlay mesh group, there was excessive dissection to clear rectus sheath for placement of mesh. This inadvertently led to ligation/ cautery of rectus abdominus perforators, so it points towards a probable relationship of wound edge ischemia and wound infection. This observation is in accordance with a study where the authors concluded that preservation of the periumbilical rectus abdominus perforators reduces the prevalence of major postoperative superficial wound complications significantly in separation of parts hernia repairs. However, it prolongs the operative time.<sup>22,23</sup>

Previous studies indicated, sublay technique to be a good alternative to onlay repair for treatment of ventral hernia.<sup>25-28</sup> Sublay technique is effective, with minimal complications and low recurrence rate.<sup>26-28</sup> Recurrence of the hernia is the most feared outcome for the surgeon and is associated with augmented healthcare costs and increased burden on economy. Which technique is superior in terms of hernia recurrence is still under debate? In this study recurrence

is more with on lay mesh hernioplasty but the results are not statistically significant. Previous studies have demonstrated similar results with no significance difference of recurrence between the procedures.<sup>23</sup> However, Weber and group evinced that there was lower incidence of hernia recurrence after onlay method as opposed to sublay method.<sup>17</sup> In contrast, other researchers illustrated decreased incidence of recurrence after sublay repair.<sup>20,24</sup> This study could not find statistically significant advantage of employing sublay technique in terms of postoperative complications.

## CONCLUSION

There is no significant difference between onlay and sublay techniques in terms of wound complications and recurrence rate. Onlay mesh hernioplasty had shorter duration of operation and length of hospital stay.

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