

Comparative Study among Patients Undergoing Abdominal Wall Hernia Surgery with Sublay or Onlay Mesh in Al-Kadhimiya Teaching Hospital

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ABSTRACT:

Background: The frequency of ventral hernia procedures is estimated to be above 350,000 per year. While small defects may still be repaired with sutures alone, mesh support is needed primary ventral hernias with a defect larger than 2 cm and incisional hernias. The onlay and sublay techniques are the most popular among surgeons. The objective of this study is to compare between the two techniques regarding intraoperative and postoperative outcomes. **Methods:** This is a prospective cohort study that included 50 patients who underwent repair of ventral hernia using a sublay mesh technique and other 50 patients using the onlay technique. Both groups were compared regarding operative time and postoperative outcomes. **Results and Conclusion:** Based on the current study findings, sublay mesh is significantly superior to onlay mesh in terms of postoperative pain, seroma formation, and hospital stay. Although wound infection and recurrence rates were not significantly lower in the sublay group, further studies with higher sample size might be able to detect such statistical significance. However, this superiority of sublay mesh comes at the expense of increased operative time.

Keywords: *hernia, onlay, sublay, mesh*

INTRODUCTION:

A nonhiatal, non-inguinal defect in the abdominal wall fascia is referred to as a ventral hernia of the abdomen. There are over 350,000 ventral hernia procedures each year. Surgery is often advised for those with an acceptable operational risk, hernias that are symptomatic, or who are at a heightened risk of hernia-related complications. Ventral hernias can lead to life-quality impairment, hospitalizations, and, may result in death [1]. Risk factors include pregnancy, high BMI, and frequent increased intraabdominal pressure due to vomiting, coughing, heavy lifting, and bathroom straining. Incisional hernia is one of the common types of ventral hernia, which occurs at the site of previous abdominal surgery or may complicate wound infection of recent surgery [2]. There is a wide range of treatments for treating ventral hernias, from non-invasive measures to more invasive operations including the open, laparoscopic, and robotic procedures. Small defects may still be repaired with sutures alone, but incisional hernias and primary ventral hernias >2 cm in width without contamination should be repaired with mesh support [3].

Concerning mesh repair, the onlay and sublay techniques are the most popular among surgeons. The onlay technique involves placing the mesh directly on top of the anterior fascia. While the sublay method, involves applying the mesh in front of the posterior rectus sheath and behind the rectus muscle [4].

The objective of this study is to compare between the two techniques regarding intraoperative and postoperative outcomes.

METHODOLOGY:

This is a prospective cohort study that was conducted in Al-Kadhmiya Teaching Hospital. A total number 100 cases who underwent repair of ventral hernia were included (50 patients of the sublay group and 50 of the onlay group).

Inclusion criteria involved adult ASA 1-2 patients who presented with primary or secondary ventral hernia. Patients with the following conditions were excluded:

1. ASA class III or above.
2. Those who underwent emergent herniotomy (presented with obstruction or strangulation).

3. Class III obesity (BMI > 40kg/m²).
4. Ascites.
5. Benign prostatic hyperplasia (BPH).
6. Liver cirrhosis.
7. Malignancy.

Patient assessment was the following:

Preoperatively: Patients age and gender were recorded. The assessment of comorbidities relied upon the Charlson **Comorbidity index (CCI)**: Patients were examined to determine the type of hernia.

Intraoperatively: Operative duration was recorded.

Postoperatively: Pain was subjectively evaluated at days 2, 5, and 7 using the subjective VAS score. Postoperative

Outcomes included the presence or absence of **seroma, wound infection, and hospital stay**. The patients were followed for a period of 1 year for **recurrence**.

All patients underwent herniotomy under general anesthesia. The same type of mesh (Polypropylene) was used in all patients. Mesh repair techniques were as the following:

Sublay Mesh Repair:

Each rectus muscle's medial edge was palpated, and then the whole length of the rectus sheath was incised to get access to the submuscular space. Peritoneal closure was obtained using posterior rectus sheath above the arcuate line, the peritoneum itself, or excess sac below the arcuate line. The posterior rectus sheath along with the peritoneum is closed with zero proline sutures. Then mesh fashioned well beyond the around the defect (about at least 5 cm). Multiple stitches were used to secure the mesh to the posterior rectus sheath, starting at the mesh's center to prevent malposition. A covering of posterior rectus sheath and peritoneum were used to achieve isolation of abdominal organs; and thus, inhibition of viscus adhesion.

Onlay Mesh Repair:

The procedure started by incising the skin over the hernia, followed by identification of the hernial contents and rectus sheath. Following the restoration of the hernia contents to the abdominal cavity, the tear in the lines Alba was repaired using nonabsorbable suture, and a proline mesh of appropriate size was stitched onto the rectus sheath. Data entry was done using Microsoft Excel 2019. Analysis was done using statistical package for social sciences (SPSS version 26). Continuous variables were subjected to Mann Whitney U test. Fischer's exact test was used to examine for association between categorical variables. A two-tailed p value of less than or equal to 0.05 was assigned as a criterion for declaring statistical significance.

RESULTS:

There were no significant differences between the two study groups in terms of age, gender, and comorbidity score; as shown in table (1).

Table (1): Comparison of sociodemographic characteristics and comorbidity score between the two study groups.

Variable	Sublay group	Onlay group	P value
Age			
<40 years	3 (6%)	6 (12%)	0.948
40-59 years	37 (74%)	35 (70%)	
≥60	10 (20%)	9 (18%)	
Mean ± SD	49.8 ± 8.8	50.5 ± 9.7	
Gender			
Male	17 (34%)	16 (32%)	1.000
Female	33 (66%)	34 (68%)	
Comorbidities			
Yes	39 (78%)	33 (66%)	

No	11 (22%)	17 (34%)	0.292
Charlson comorbidity index	1.4 ± 1.3	1.1 ± 1.1	

In the sublay group; paraumbilical hernia was the most common type (44%), followed by epigastric hernia (22%), incisional hernia (18%), and umbilical hernia (16%). In the onlay group, paraumbilical hernia was the most common (42%), followed by incisional hernia (26%), epigastric hernia (18%), and umbilical hernia (14%); as shown in table (2). No difference in type of hernia was detected between both groups.

Table (2): Hernia type in both study groups.

Type of hernia	Sublay group	Onlay group	P value
Paraumbilical	22 (44%)	21 (42%)	0.819
Epigastric	11 (22%)	9 (18%)	
Incisional	9 (18%)	13 (26%)	
Umbilical	8 (16%)	7 (14%)	

Regarding operative time, the sublay group showed significantly lower pain scores at postoperative days 2, 5, and 7; as shown in table (3).

Table (3): Postoperative pain scores in both study groups.

Postoperative VAS score	Sublay group	Onlay group	P value
Day 2	8.2 ± 2.6	6.8 ± 1.1	<0.001
Day 5	6.26 ± 0.84	3.79 ± 1.52	<0.001
Day 7	2.8 ± 0.9	1.9 ± 0.6	<0.001

Concerning intraoperative parameters; the operative time in the onlay group ranged from 51 – 95 minutes with a mean of 78.8 ± 8.4 SD. While in the sublay group, the operative time ranged from 91 – 130 minutes with a mean of 108.4 ± 8.5; as shown in table (4).

Table (4): Comparison of intraoperative parameters in both study groups.

Intraoperative parameters	Sublay group	Onlay group	P value
Operative time	108.4 ± 8.5	78.8 ± 8.4	<0.001

Regarding postoperative outcomes, the incidence of seroma was significantly higher in the onlay group. While the rate difference in wound infection and recurrence was not significantly higher. The mean hospital stay in the onlay group was significantly longer than the sublay group; as shown in table (5).

Table (5): Comparison of postoperative outcomes between the two study groups.

Postoperative outcomes	Sublay group	Onlay group	P value
Seroma	2 (4%)	10 (20%)	0.028
Wound infection	1 (2%)	4 (8%)	0.362
Recurrence	0 (0%)	3 (6%)	0.242
Mean hospital stay (days)	2.4 ± 0.5	4.1 ± 0.7	<0.001

DISCUSSION:

The primary aim of hernia surgery is to obliterate the defect in the abdominal wall with a sound and tension-free repair to minimize the risk of recurrence. Small hernias (<2 cm) in diameter are often successfully closed with primary tissue repairs [5]. However, the risk of recurrence is up to 40% when larger hernias (>2cm) undergo tissue repair without mesh support.[6] The use of prosthetic mesh has superseded the traditional open suture method to reduce recurrence risk

Hernia recurrence is distressing to the patient and embarrassing to surgeons. Nowadays tension free repair using prosthetic mesh has decreased recurrence to negligible rates [7]. Despite excellent results increased risk of infection with placement of a foreign body and cost factor still exists [8].

Our study showed no significant difference between the two study groups regarding age, gender, and comorbidities (as measured by the Charlson comorbidity index), and the type of hernia. This excludes their role as confounding factors that may interfere with the study outcomes.

In the current study, Patients of the sublay groups experienced significantly less pain. Similar findings were stated by Bhellar et al. and Chitrambalam et al. [9][10] When performing onlay meshplasty, the mesh is positioned subcutaneously and anchored just above the anterior rectus sheath, an area rich in pain-inducing nerve fibers. However, other studies such as Deherkar et al. reported no significant difference in pain between the two groups [11].

The sublay group showed significantly higher operative time. Similar results were reported by Deherkar et al., Mustafa et al., and Shekhar et al., who reported sublay vs. onlay operative durations of (169.7 min. ± 59.7 vs. 120.7 min. ± 30.9), (111.9 min. ± 27.3 vs. 85.6 ± 6.4), and (55.28 min. ± 9.6 vs. 44.48 min. ± 3.84); respectively [11][12][13]. The additional time required for dissection to create preperitoneal space and to achieve adequate hemostasis explains the timing disparity. However, it is noteworthy to highlight that intraoperative duration is subjective and is dependent upon several factors; of which the most important are

surgeon experience, facilities, quality of assistance, and others. Concerning postoperative outcomes; seroma was the most common complication in both groups and showed an incidence that is significantly higher in the onlay group. The incidence of wound infection was also higher in the onlay group; although the difference did not reach statistical significance. Bhellar et al. reported significantly increased incidence of wound infection in the onlay group [9]. Raghuvver et al. and Mustafa et al. also reported increased rates of seroma and wound infection in the onlay group; However, the difference was not statistically significant [14][12].

When compared to sublay mesh repairs, where the mesh is placed in a pre-existing retromuscular plane that requires lesser dissection and less lymphatic compromise; onlay mesh repairs may contribute to increased seroma collection and the likelihood of increased wound infection due to the need for more extensive subcutaneous flaps dissection, the accidental transecting of blood vessels, and the existence of a foreign barrier between the deep parietal layers and the subcutaneous plane. In addition, seroma development might occur in the dead space left after dissection and plane elevation. This created space is much narrower in the sublay method.

Hernia recurrence is an important complication as it distresses the patient and embarrasses the surgeon. Recurrence was reported in 3 cases (6%) of the onlay group, while the sublay group showed no recurrence during the follow-up period. Similar results were reported by Alsoudani et al. [15] Since sublay mesh is placed under the abdominal wall, the intraabdominal pressure pushes the mesh against the intact abdominal wall. In this way, intra-abdominal pressure effectively holds the prosthetic mesh in place. The hernial sac is pushed against the prosthetic mesh due to the mechanical strength of the mesh, which inhibits protrusion of the peritoneal cavity through the hernia.

The mean hospital stay was significantly longer in the onlay group, which is in concordance with and Chitrambalam et al. Mustafa et al. [10][12] This can be attributed to the higher incidence of seroma, wound

infection, and higher postoperative pain that is associated with onlay mesh.

CONCLUSION:

Based on the current study findings, sublay mesh is significantly superior to onlay mesh in terms of postoperative pain, seroma formation, and hospital stay. Although wound infection and recurrence rates were not significantly lower in the sublay group, further studies with higher sample size might be able to detect such statistical significance. However, this superiority of sublay mesh comes at the expense of increased operative time.

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