Evaluation of Sublay Mesh Repair in Comparison with Onlay Mesh Repair for Incisional Hernias

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ABSTRACT:

BACKGROUND:

Incisional hernia after abdominal surgery is a well-known complication and the incidence of incisional hernias continues to be 2-11% after laparotomy. The repair of incisional hernia has always been a challenge to the surgeon. Various operative techniques for the repair of incisional hernia are in practice; however, the management is not standardized. The sublay technique, popularized by Rives and Stoppa in Europe, has been reported to be quite effective, with low recurrence rates and minimal complications.

OBJECTIVE:

To study the advantage and complications of sublay mesh repair of incisional hernias in comparison to onlay mesh repair.

METHODS:

Record of 110 patients undergoing repair of incisional hernia from 1st Jun 2013 to 1st Jun 2015, excluding very large incisional hernia with defect more than 10 cm. 62 cases of incisional hernias were managed by onlay mesh repair and 48 cases of incisional hernia were managed by sublay mesh repair.

RESULTS:

Post-operative complications like seroma and wound infection were comparable in both groups. In sublay group, Seroma formation was 2 patients (4.3%) . wound infection was 2 patients (4.3%). No septic mesh was removed in the series. In onlay group seroma formation was in 12 patients (19.4%) most of seroma occur in large incisional hernias repair, wound infection was in 5 patients (8.1%) and 2 septic mesh was removed. In sublay, recurrence rate was one patient (2.1%), in onlay, recurrence rate was in 5 patients (8%).

CONCLUSION:

Sublay mesh although it is more time consuming and technically more difficult, however it carries low recurrence rate and few post-operative wound complication .

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

INTRODUCTION:

Incisional hernias are ventral hernias that occur through an operation scar and are a serious complication of abdominal surgery. Incisional hernias occur in 2-11% of laparotomies [1]

Incisional hernias are due to failure of fascial tissues to heal and close following laparotomy. Any condition that inhibits natural wound healing will make a patient susceptible to the development of an incisional hernia. Such conditions include: infection, obesity, smoking, medications such as immunosuppressive, excessive wound tension, malnutrition, fractured sutures, poor technique, and connective tissue disorders[2]. Emergency surgery increases the risk of incisional hernia formation. It is estimated that an incisional hernia develop in approximately 10 to 15 percent of abdominal incisions[2,3] and in up to 23 percent of patients who develop postoperative wound infection[4].

Such hernias can occur after any type of abdominal wall incision, although the highest incidence is seen with midline incisions, the most common incisions for many abdominal procedures[4]. Even the smallest incisional hernia has the potential for incarceration and, therefore, repair should be considered. Hernias that are less likely to incarcerate include upper abdominal hernias, hernias less than 1 cm in diameter, and unilocular diffuse hernias larger than 7 to 8 cm (where loops of bowel can move in and out of the hernia sac without restriction, and are therefore less likely to become Incarcerated[5].

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As a result of high recurrence rate in the repair of incisional hernia, various types of repairs have been used both anatomical and prosthetic. But the results have been disappointing with a high incidence of recurrence of about 30-50% after anatomical primary tissue repair and 1.5-10% following prosthetic mesh repairs .The introduction of prosthetics had been revolutionized hernia surgery with the concept of tension free repair.[5,6]

Although a wide variety of surgical procedures have been adopted for the repair of incisional hernia , but the implantation of prosthetic mesh remains the most efficient method of dealing with incisional hernia[7], and the advantage is to reduce recurrence rate in incisional hernia [8]. But it was associated with complications like infection ,seroma ,and variable recurrence rate , with limited use in contaminated hernia [9].

The prosthetic mesh can be placed in just outside of the muscle in the subcutaneous space (onlay); within the defect (inlay) – only applies to mesh plugs in small defect ; between fascial layers in the abdominal wall (intraparietal or sublay); immediately extraperitoneally , retro muscular against muscle or fascia (also sublay); intraperitoneally [9].

The sublay are preferable that it reduce the recurrence rate by allowing larger pieces of prosthetic material to be used and incorporating intra-abdominal pressure to aid in keeping the mesh in place [10]

The sublay mesh hernia repair was first described by Renestopa [11] Jean Rives [12] and George Wantz [13]. This technique is considered by many surgeons to be the gold standard for the open repair of abdominal incisional hernia [14,15,16,17] (sublay mesh repair).

This study was conducted in our center to evaluate applicability of sublay mesh repair and their outcome in comparison to traditional onlay mesh repair in patient with incisional hernia .

METHODS:

This prospective comparative study was carried out on 110 patients of incisional hernia admitted in General Surgical unit of Al–Imamain Alkadhmain Medical City from the 1st Jun 2013 to 1st Jun 2015, excluding very large incisional hernia with defect more than 10 cm and difficult achievement of sublay mesh repair in whom peritoneal layer was difficult to be kept or repaired below the mesh and those with emergency surgery and patients with no follow up.

In our study 48 cases of incisional hernias were managed by sublay mesh repair and 62 cases of incisional hernia were managed by onlay mesh repair. Observation in both groups were made with regards to duration and ease of operation, placement and duration of drainage, wound complications, hospital stay, and recurrence. The follow up extended over one year postoperatively with 2-3 months visit intervals.

Procedure (sublay repair) began with excision of the old scar the hernial sac was dissected to expose the edge of the defect. Here mesh (Polypropylene) was placed broadly under the defect in the retro muscular layer of the abdominal wall. The mesh extended well beyond the under edges of the defect (about at least 4-5 cm). The center of the mesh was marked by stitch to avoid mal alignment of the mesh and the mesh was fixed to the peritoneum by multiple stitches. Organs within the abdomen are protected from injury by the mesh by a peritoneum. Adhesions to intestine are there by avoided. The edge of sheath approximated over the mesh by non-absorbable nylon suture. Suction drains, were placed for all cases for 3-5 days.

In onlay repair the mesh was placed over the sheath of muscle after approximation the edges of sheath. Dissection of subcutaneous fat from fascia for about 4-5 cm around the defect. Mesh was fixed to the rectus sheath by multiple interrupted sutures and Redivec suction drains, were placed for all cases.

All operations were carried out under general anesthesia with using antibiotic prophylaxis of 3rd generation Cephalosporin Ceftriaxone, 1 grams daily for initial 2-3 days.

Data were analyzed using SPSS 18.0 software with, Fisher's exact test as appropriate; $p < 0.05$ was considered to be statistically significant.

RESULTS:

A total of 110 cases of incisional hernia were managed by sublay mesh and onlay mesh repair. Youngest patient was 21 year old and oldest patient was 69 year old, mean age of the patients was 46 year. Majority of patients were old age between (51_60) were 37 patients which represents 33.6 % of whole patients .

The majority of the patients were female 63 patients which represent 57.2 % and male patients were 47 patients which represent 42.8%.

Original operations for patients with incisional hernia was as shown in table (1).

Table 1: Original operations for 110 patients with incisional hernia.

Type of surgery	Number	Percent
Traumatic laparotomy	49	44.5%
Bowel related	32	29%
Hepatobiliary	9	8.1%
Gynecological	17	15.4%
Other	3	2.7%

The mean time for surgery in sublay group was 92 minutes (65 – 120) compared to 70 minutes (50 – 90) in onlay group for incisional hernias .

Suction drain was used in all cases of incisional hernias repair in sublay group drain was removed after 3-5 days of operation.

In onlay group drain was removed in 4-8 days' post operatively except one patient with large incisional hernia drain was removed in 14th day post operatively.

Regarding postoperative complications were comparable in both groups. In sublay group, Seroma formation was 2 patients (4.3%).

Wound infection was 2 patients (4.3%). No septic mesh was removed in the series. In onlay group seroma formation was 9 patients (21.42%) most of seroma occur in large incisional hernias repair, wound infection was 2 patients (4.76%) and in one patient partial disintegrated (septic) mesh was removed.

Regarding recurrence in one year follow up in sublay group was one patient (2.1%), in onlay group recurrence rate was 5 patients (8%).

Wound edge necrosis occur in 2 cases of onlay repair (3.2%) which was managed by excision of necrotic edge & primary suturing and no case of flap edge necrosis occur in sublay group. as shown in table (2).

Table 2: Post-operative complications.

Postoperative complication	Sublay group N=48	Onlay group N=62	P value
Seroma	2 (4.3%)	12 (19.4%)	0.021
Wound infection	2 (4.3%)	5 (8.1%)	0.4655
Mesh removal	0 (0%)	2 (3.2%)	0.5036
Recurrence	1 (2.1%)	5 (8%)	0.05
Flap necrosis	0 (0%)	2 (3.2%)	0.4655

The overall P value of complications = 0.3003

DISCUSSION:

Ventral hernia in the anterior abdominal wall includes both spontaneous and most commonly incisional hernias after an abdominal operation.

Hernia recurrence is distressing to patients and embarrassing to surgeons where incisional hernia has recurrence rate of up to 30 – 50 % [(18)].

Surgical techniques for the repair of incisional hernias continue to evolve with advances in prosthetic materials and primary tissue repair which associated with higher unacceptable recurrence rate. Nowadays tension free mesh repair is ideal hernia repair technique [(19)]. The main issue is increased risk of infection with the placement of a foreign body in the form of a mesh.

However, the optimal technique for mesh placement has not been established and remains controversial. The prosthetic mesh can be placed between the subcutaneous tissues of the abdominal wall and the anterior rectus sheath (onlay mesh repair) as well as in the preperitoneal (sublay mesh repair). The latter technique has several advantages one of being not transmitting the infection from subcutaneous tissues down to the mesh as it lies quite [(20)].

Increased intra-abdominal pressure acting anteriorly on the margins tends to oppose the mesh to the abdominal wall rather than distracting it.

The incidence of incisional hernia is highest in the 5th and 6 th decades of life with a female preponderance. The high female preponderance can be attributed to the majority of index operations being Gynecological operations with a Pfannenstiel incision and thin rectus sheath , which result in incisional hernia. This compares favorably with our results, where most of the patients were females.

In our settings there were clear differences in complications rate (table.2) between onlay versus sublay groups. There were significant statistical differences in seroma and recurrence rate while the other were not, however they are significant from practical point of view.

Some studies suggest that the use of the sublay technique as a treatment option for incisional hernia appears to be less complicated than the onlay technique. Kharde K et al[21]. in their study noted that the operative time for sublay mesh repair (77.8 min) was more than that required for onlay mesh repair (69.8 min). In Aly Saber et al[22]. study the operative time for sublay repair (100 min) where as in onlay repair was (67.5 min) . In our study, the mean operative time was higher in onlay (70 min) as compared to sublay (92 min).

Kharde K et al[21]. noted seroma in 16% of the cases managed by onlay mesh repair and 12% by sublay mesh repair. However, Aly Saber et al[22]. found 6% seroma rate for onlay and 2% for sublay mesh repair. In the present study, seroma was a complication that was noted in onlay had 19.4% and sublay had 4.3% incidence of seroma.

In our study, wound infection was noted in 5 cases of onlay , where the mesh got infected and had to be partly removed in 2 patients . In sublay , there were 2 cases of wound infections and no incidence of mesh getting infected. Aly Saber et al., in their study also found that rate of infection was 8% in patients treated with onlay mesh repair and those treated with sublay mesh repair was 4%. In Kharde K et al the incidence for wound infection was 4% and 0% for onlay and sublay repair respectively.

A recurrence rate of 8% was observed in onlay , whereas sublay showed 2.1% recurrence rate, Aly Saber , *et al.* found 8% recurrence rate for onlay and 3% for sublay mesh repair. in Kharde K et al his study noted 4% recurrence rate for onlay mesh repair of incisional hernias and 0% for sublay mesh repair.

Table 3: Comparison with other study.

	Kharde K		Aly Saber		Our study	
	Onlay	Sublay	Onlay	Sublay	Onlay	Sublay
No. of patient	25	25	100	100	62	48
Time of operation (min)	69.8	77.8	67.5	100	70	92
Seroma	16%	12%	6%	2%	19.4%	4.3%
Wound infection	4%	0%	8%	4%	8.1%	4.3%
Mesh removal	4%	0%	0%	0%	3.2%	0%
Recurrence	4%	0%	8%	3%	8%	2.1%

CONCLUSION:

Sublay meshes although it is more time consuming and technically more difficult, however it carries low recurrence rate and few post-operative wound complication.

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