

**INCISIONAL HERNIA-ONLAY VS SUBLAY MESH HERNIOPLASTY**

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**ABSTRACT: BACKGROUND:** Incisional hernia is a common surgical problem. Anatomical repair of hernia is now out of vogue. Polypropylene mesh repair has now become accepted. In open mesh repair of incisional hernia cases the site of placement of mesh is still debated. Some surgeons favour the onlay repair and others use sublay or retro-rectus plane for deployment of the mesh. **AIM:** The aim of the study is to examine the pros and cons of both the techniques and find the better one. **METHODS:** A prospective study was conducted of 37 cases of incisional hernia admitted in Govt. General Hospital Guntur from Jan 2012 to Dec 2013. 20 of the cases underwent open mesh repair by onlay method whereas 17 cases underwent open mesh repair by the sublay i.e. retrorectus placement of the mesh. Observations were made regarding time taken for both types of repairs, post-operative complications like flap necrosis, wound seroma, wound infection, postoperative ileus etc., after discharge from the hospital the cases were followed up in the OPD upto Dec. 2014 and any complications and recurrences were noted. **OBSERVATIONS AND RESULTS:** Most of the cases (75%) were female and the incisional hernias were in the lower abdomen. The time taken for the surgery is more in the sublay group and the postoperative pain score is also more in the sublay group. But the wound complications like wound infection and flap necrosis were more (25-30%) in the onlay group. Also one case (5%) developed recurrence. Though the time taken for the surgery and the skill needed is more for the sublay group the wound complications are acceptable in the sublay group. Also there are no recurrences observed in the sublay group. But no statistically significant difference ( $p < 0.7$ ) is detected when all the post-operative complications are taken together between the sublay and onlay repair techniques. **CONCLUSIONS:** Although it can be argued, theoretically and by the wound complication rate, in favour of sublay placement of the mesh, still the quest continues for the ideal technique of hernia repair in the Indian scenario. A well-constructed randomised clinical trial is needed to find the best method of incisional hernia repair.

**KEYWORDS:** Incisional hernia, onlay mesh repair, sublay mesh repair.

**INTRODUCTION:** Incisional hernia is defined as "any abdominal wall gap with or without a bulge in the area of a postoperative scar perceptible or palpable by clinical examination or imaging.<sup>[1]</sup> Incisional hernias develop in 2-11% of all laparotomies.<sup>[2]</sup> As they are an iatrogenic problem, with the increasing number of laparotomies the incisional hernias also increase. They add to the morbidity of the patient and increase the health care cost. Recurrence is a nightmare for the hernia surgeon which further adds to the health care costs.

There are various methods of repair of ventral hernia available at the surgeon's disposal starting from simple anatomical suture repair, mesh repair and laparoscopy methods. Suture repairs have become out of vogue as now the ventral hernia is thought to be due to a biological problem of stable scar tissue formation. Sutured repair results in recurrence rates of 2-3 times greater than mesh repair. Hence now mesh repair has now become standard.

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Although polypropylene mesh is regarded as the implant of choice for repairing incisional hernias, there is a controversy regarding the best site of its placement. A prospective study of cases of incisional hernia repairs done in Govt. General Hospital Guntur was done to find out what is the best site of placement of the mesh either onlay or sublay in open mesh repair techniques.

**MATERIAL AND METHODS:** A prospective study was conducted of all the cases of incisional hernia which were admitted in two units of Govt. General Hospital Guntur between Jan. 2012 and Dec. 2013. A total of 37 cases were treated in the two surgical units in that two year period. The defects of the incisional hernias, ranged from 2.5cm to 10cm. Giant hernias more than 10cm size and those with loss of domain were excluded from the study. Likewise umbilical and epigastric hernias were also excluded. The patients were investigated for fitness for surgery and for the presence of comorbid conditions like COPD, Diabetes, Anemia and hypoproteinemia and hypertension. If detected they were treated appropriately before taking up the cases for surgery.

Out of 37 patients, 17 patients underwent open ventral hernia repair by the sublay (Retro-muscular) technique in one unit. The other 20 patients underwent onlay mesh hernioplasty in another unit.

All the patients received one dose of antibiotic prophylaxis I. V cefotriaxone at induction and the same antibiotic was continued for 5 days post-operatively. Closed suction drains were removed when the drain output was <30ml/24hrs.

Observations were noted regarding duration and ease of operation in both the groups. Other parameters noted were duration of drainage wound complications like seroma formation, wound infection, flap necrosis etc., and recurrence. Early mobilisation was encouraged. After discharge from hospital the cases were followed up in the OPD noting any complications like sinus, pain, and recurrence etc., for a period of upto 1-2 years that is upto Dec. 2014. Observations were tabulated and Chi-square test was used to calculate the level of significance.

**RESULTS:** Thirty seven patients underwent incisional hernia repair during the 2 years period in the two surgical units. The youngest was 25yrs old and the oldest was 55yrs old. Twenty eight (75%) patients were female and nine were male. The majority of the hernias were lower midline or pfannenstiell incision scars which were the result of some obstetric or gynaecological surgeries.

The total time for surgery in sublay group was one hour to 3 hours with a mean of 90 minutes. Onlay repair took 40 min to one and half hour with a mean of 60 minutes.

The postoperative pain was calculated by using the visual analog scale (VAS) of 1-10 (Table 1). Postoperative pain was more in the the sublay group than in the onlay group.

Postoperative Pain (VAS) *	Sublay group n=17	Onlay group n=20
<5	8	11
>5	9	9

**Table 1: POST OPERATIVE PAIN SCORE**

\*visual analog score.

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Postoperatively the drainage lasted for 4-6 days in sublay group and 3-5 days in onlay group. The duration of hospital stay was the same in both groups that is for 9 days except when complication supervened.

Postoperative complications noted in the two groups are as noted below (Table 2).

	Sublay (n=17)	Onlay (n=20)
Flap necrosis	Nil	6(30%)
Wound seroma	3(17.6%)	2(10%)
Wound infection	1(5.8%)	5(25%)
Post-operative ileus	2(11.7%)	-
DVT	-	-
Enterocutaneous fistula	-	-
Chronic pain	2(11.7%)	-
Recurrence	Nil	1(5%)

**Table 2: Post-operative complications**

In the onlay group six patients developed flap necrosis and five cases developed superficial wound infection. The necrosed areas were excised and wound was dressed until wound contracture and closure. None of them required the mesh to be removed. The infection responded to wound debridement and wound dressings and antibiotics. Wound seroma was noticed in two of them which required only opening of one or two skin stitches for drainage. One patient landed with a small recurrence 10 months after the surgery.

In the sublay group there was no incidence of flap necrosis. Three patients developed wound seroma and superficial wound infection which was treated with drainage by opening one or two skin sutured and dressings.

Two patients in the sublay group developed abdominal distension and ileus in the postoperative period which responded to conservative management of nasogastric suction and I. V fluids. Two patients complained of chronic pain and discomfort in the abdominal wall which was treated with analgesics and reassurance. No patient in the sublay group suffered from recurrence during our follow up.

**DISCUSSION:** The majority of the patients 75% in this study were females and the hernias were in the lower abdomen. This may be because of the following reasons.

1. Lower abdominal hydrostatic pressure is higher in the lower abdomen than the intra-abdominal pressure in the upper abdomen.
2. Absence of posterior rectus sheath below the arcuate line.<sup>[3]</sup>
3. Pregnancy causes over stretching of the muscles of the lower abdomen.

Ellis et al reported an incidence of 64.6% female population in their study of 383 Patients.<sup>[4]</sup>

As to the technique of open mesh hernioplasty, the onlay technique was first reported by Chevrel. He achieved a low morbidity and a recurrence rate of 4.9%. Others have achieved similar results including patients with major hernias >10 cm transverse diameter.<sup>[5]</sup> Some studies show that meshes implanted on the abdominal aponeurotic layer showed better and early incorporation and increased tensile strength reflecting tighter anchorage to the abdominal wall.<sup>[6]</sup>

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Rives developed the sublay technique and reported good results with recurrence of 3.4% and acceptable morbidity. Schumpelick V et al also claim that the sublay technique is superior but did not provide evidence from a randomised control trial.<sup>[7]</sup> Devries Reilingh TS et al in a retrospective study comparing the three different techniques onlay, inlay and underlay concluded that underlay technique seems to be the better technique.<sup>[8]</sup> A chochrane review 2008 – six trials yielded insufficient evidence as to which type of mesh or which mesh position (onlay or sublay) should be used.<sup>[9]</sup>

The mean total time taken for the operation in our study was 90 min for sublay group and 60 min for the onlay group. This is due to more time needed to create a preperitoneal space. It is a little technically challenging for the creation of a large space behind the rectus muscle.

The postoperative pain was more in patients who underwent underlay repair compared to onlay ( $p < 0.5$ ) though statistically not significant. This can be explained by the fact that more dissection is involved in an underlay repair and also the method of fixation of mesh in a classical Rives-Stoppa retrorectus repair traversing all the abdominal muscle layers.

Wound seroma in the present study was 17.6% in the sublay group slightly more than in the onlay group (10%). This is because of the need for extensive dissection needed for the creation of the retrorectal plane.

Comparing all the postoperative complications in our study no statistically significant difference ( $p < 0.7$ ) between sublay and onlay groups was observed.

But the law of physics- Pascal's law- states that "pressure applied to a confined fluid at any point is transmitted undiminished throughout the fluid in all directions and acts upon every part of the confining vessel at right angles to its interior surfaces and equally upon equal areas". It finds its application in understanding which position of the mesh is best.<sup>[10]</sup> The ideal position for the mesh seems to be the retro-muscular underlay position in which the force of abdominal pressure holds the prosthesis tightly against the deep surface of the muscles.<sup>[7]</sup> Onlay mesh repair on the other hand, is likely to result in recurrence of hernia if excessive rise in abdominal pressure takes place.

In the sublay or retro-muscular technique skin necrosis is rare because large skin flaps are not created and careful attention is paid to preserving the perforating blood vessels that supply the remaining skin and subcutaneous tissues. In our study in the onlay group 6 cases (30%) suffered from post-operative flap necrosis and infection because of the large skin flaps that were created for placing the mesh which may have interfered with the perforators of the skin and subcutaneous tissues.

There were no recurrences in the present study in the sublay group and one recurrence (5%) in onlay group. This is due to the small size of the sample taken. Comparison of the results with other studies of open Rives- stoppa mesh repair is as follows.

	Seroma N (%)	Infection N (%)	Recurrence N (%)
Knight et al <sup>[11]</sup>	1(1.5)	2(3.1)	0
Bauer et al <sup>[12]</sup>	7(12.3)	2(3.5)	0
Toniato et al <sup>[13]</sup>	-	6(7.8)	2(2.6)
Luijendijk et al <sup>[14]</sup>	4(4.8)	3(4)	17(23)
Present study	3(17.6)	1(5.8)	0

**Table 3: Studies of the Rives-Stoppa open mesh repair**

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Chronic pain is reported by two of the patients in sublay group. Previous studies also reported chronic pain. McLanahan et al reported that 11% of patients had moderate to severe pain at 12 months after incisional hernia repair.<sup>[15]</sup> Schumpelick argued that mesh can limit range of motion and result in a stiff abdomen.<sup>[7]</sup> Pain may be because of entrapment of nerve fibres in mesh scar formation. Use of large pore light weight meshes may decrease the pain incidence.

**CONCLUSIONS:** Although there is no statistically significant difference in the outcome parameters of the two techniques that is sublay and onlay, theoretically the sublay technique appears to be a better procedure. Even though sublay technique takes longer time and requires some degree of experience and skill, it produces a cosmetically good scar with absence of the dreaded complication of skin flap necrosis that is sometimes observed with onlay repair.

To conclude the quest continues for the ideal technique of incisional hernia repair in the Indian scenario. To show a statistically significant advantage of the sublay mesh henioplasty over onlay repair we need a randomized control trial with large sample size and a long follow up.

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