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**Original Research Article**

# Comparative evaluation of sublay versus onlay meshplasty in incisional and ventral hernias

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## ABSTRACT

**Background:** • Hernia derived from the Latin word, is a protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity. Objectives of present study were to evaluate sublay Vs onlay meshplasty in incisional and ventral hernia and to compare and determine duration of operation and hospital stay, post-operative complications and recurrences.
**Methods:** The study was conducted at Dr. D. Y. Patil Medical College and Hospital, DPU University, for a period of 2 years (from July 2015 - September 2017) and is a prospective and comparative randomized type of study using 100 cases (Group A Onlay and Group B Sublay - 50 each). The study was approved by the Institute's Ethics Committee.
**Results:** 100 patients were operated in our study. In group B, the mean operative time [70.72±18.56], and in group A mean operative time (50.96±12.61). The duration of hospital stay was an of average 7.62±1.78 days in group B, and an average hospital stay of 8.84±1.89 in group A. Suture site infection was18%. group A (26%) and group B (12%). Seroma was seen in 5 patients, group A (8 %) and in group B (2%). Flap necrosis was 8% in group A and in 6% in group B. 10 patients had wound dehiscence, group A (14%) and group B (6%). 4 patients were reported with mesh infection (6%) in group A and (2%) in group B. Recurrence was 1% group A.
**Conclusions:** • Sublay meshplasty is good alternative to onlay meshplasty that may be applicable to all forms of ventral and incisional hernias. The mesh related complication rate and recurrence was found to be minimal.

**Keywords:** Meshplasty, Onlay, Sublay

## INTRODUCTION

Hernia derived from the Latin word, is a protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity. Despite the frequency of this procedure, no surgeon has ideal results, complications, infection and recurrence continue challenge surgeons.

Abdominal wall hernias occur only at sites where aponeurosis and fascia are not covered by striated muscles i.e. inguinal, femoral, umbilical area, linea alba, lower portion of semilunar line, and sites of previous incisions.[1]

Umbilical hernias are congenital in origin and occur when the umbilical scar closes incompletely in the child or fails and stretches in later years in adult patients. In adults the cause is usually acquired rather that congenital and female to male ratio being 3:1.[2]

Epigastric and hypogastric hernias occur in the linea alba above and below the umbilicus, respectively. First described by Leville in 1812. Overall incidence being 3-5

% and is more common in males by a ratio of 3:1 and is commonly diagnosed in middle age.

Paraumbilical hernias are five times more frequent in females than males and usually occurs through the linea alba either above or below the umbilicus and not through the umbilical scar.

Incisional hernia occurs because of failure of facial tissues to heal and close following laparotomy, mostly encountered with midline vertical and transverse incision, incidence of hernia being 2-11%.[3]

In developing countries such hernias are not treated on priority basis because of their benign nature in general and due to economic reasons. Among the common ventral hernias, incisional and para-umbilical hernias constituting about 85% of the overall ventral abdominal hernias.[4]

In present study a prospective study will be conducted to compare "sublay" versus "onlay" meshplasty in incisional and ventral hernia and regarding the duration of surgery, post-operative complications and recurrences, if any.

## METHODS

The study was conducted at Dr. D. Y. Patil Medical College and Hospital, DPU University, for a period of 2 years (from July 2015-September 2017) and is a prospective and comparative type of study using 100 cases (Group A Onlay and Group B Sublay - 50 each). The study was approved by the Institute's Ethics Committee.

### *Selection criteria*

Patients of both sexes with age more than 18 years and with any of the following will be included in the study:

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

### *Method of collection of data*

A detailed history of each patient will be obtained starting with history of presenting complaint.A thorough general physical examination will be done. All routine laboratory tests will be done which are as follows:

### *Plan of study*

All cases will undergo elective surgery. All procedures will be done under General /Spinal anaesthesia.

### *Preoperative preparations*

Informed and written consent will be obtained. Shaving of parts on the morning of surgery with clipper will be done. Patient will be kept nil by mouth after 10 pm on previous night of surgery. Xylocaine sensitivity test will be done.

### *Peri-operative preparation*

All cases will be operated under General or Spinal anaesthesia. Injection Cefotaxime 1gm iv given during induction of anaesthesia. Cleaning and painting is done by 10% povidine iodine solution. Draping is done using sterile linen drapes.

### *Intraoperatively*

Abdominal incision is taken according to the site and type of hernial defect. Skin and subcutaneous layers will be incised. Hernial Sac will be identified, and dissection done using fine scissors and cautery. The sac is opened and all adhesions wherever present will be released. Further dissection will be done in the rectorectus space. Large sacs will be excised and will be approximated using absorbable sutures.

Then appropriate size polypropylene mesh is placed in the rectorectus space (sublay) or above the musculoaponeurotic layer (onlay) and fixed with prolene 2 0 sutures. Once haemostasis is achieved closure will be done in layers after putting a suction drain of size 14 in the subcutaneous plane.

### *Postoperatively*

- Patients will be kept NBM for 24 hrs.
- Oral liquids will be started after 24 hrs.
- Injection Cefotaxime 1 gm IV 12 hourly for 2 days.
- Injection Diclofenac Sodium 75 mg IV according to the complaints of patient.
- Tab. Cefixime 200mg BID started on 3rd post-operative day for next 3 days.
- Tab. Diclofenac 50 mg BID will be given according to pain.
- Drain will be removed after 48 to 72 hrs when drain is less than 10 ml.
- Wounds will be checked for infection on 2nd post-operative day in all patients and dressing will be done.

- Surgical Site infection if present will be treated with antibiotics according to the culture and sensitivity reports
- Patient will be discharged as per response to the procedure with suture removed on 14th post-operative day.

***Follow up***

Patient will be followed up on the 1st month, 3rd month and the 6th month. Detailed clinical and radiological examination will be done to look for any recurrences if present.

## RESULTS

A total of 100 patients was operated in present study in which there was were 55 men and 45 women.

The mean age of our study was 49.46±11.66 years (range 22-74).

In group B (Sublay), the operative time ranged from 40 to 120 minutes with a mean operative time of 70.72±18.56 minutes, while in group A (Onlay) the operative time ranged from 28 to 80 minutes with a mean operative time of 50.96 ±12.61 minutes. (p<0.001).

**Table 1: Age and type of hernia wise distribution of cases.**

| Age (Yrs) | Umbilical | Para umbilical | Incisional | Epigastric | Total |
|---|---|---|---|---|---|
| ≤ 20 | 0 | 0 | 0 | 0 | 0 |
| 21-30 | 2 | 2 | 0 | 1 | 5 |
| 31-40 | 10 | 3 | 9 | 0 | 22 |
| 41-50 | 12 | 4 | 15 | 1 | 32 |
| 51-60 | 8 | 4 | 13 | 2 | 27 |
| 61-70 | 1 | 2 | 3 | 6 | 12 |
| 71-80 | 0 | 0 | 2 | 0 | 2 |
| Total | 33 | 15 | 42 | 10 | 100 |

**Table 2: Group wise distribution of Post- operative complications.**

| Complications | Group A (Onlay) | Group B (Sublay) | Statistical significance |
|---|---|---|---|
| Suture site infection | 13 (26%) | 5 (12%) | 0.074 |
| Seroma | 4 (8%) | 1 (2%) | 0.169 |
| Flap necrosis | 4 (8%) | 3 (6%) | 0.695 |
| Wound dehiscence | 7 (14%) | 3 (6%) | 0.182 |
| Mesh infection | 3 (6%) | 1 (2%) | 0.307 |
| Recurrence | 1 (1%) | 0 (0%) | 0.500 |

The duration of hospital stays ranged from 5 to 12 days with an average duration of 7.62±1.78 days in group B (Sublay), while in group A (Onlay) duration of hospital stay ranged from 6 to 13 days with average hospital stay of 8.84±1.89 (p<0.001).

The overall incidence of suture site infection in our study was 18.0%. The incidence of suture site infection was seen more in group A (Onlay) (26%) when compared to group B (Sublay) (12%).

The number of patients who developed post-operative seroma was 5 out of which 2 % were seen in group B (Sublay) and 8 % were seen in group A (Onlay).

**Table 3: Comparison between mean duration of hospital stay and mean operative time between the two groups.**

| | Group A Onlay | Group B Sublay | Statistical significance |
|---|---|---|---|
| Mean duration of stay in hospital(days) | 8.84±1.89 | 7.62±1.78 | 0.000 |
| Mean operative time (mins) | 50.96±12.61 | 70.72±18.56 | 0.001 |

Flap necrosis was reported in 4 (8%) patients in group A (Onlay) and in 3 (6%) in group B (Sublay).

10 patients were reported to have wound dehiscence, out of which 7 (14%) belonged to group A (Onlay) and 3 (6%) belonged to group B (Sublay).

Total of 4 patients were reported with mesh infection in our study out of which 3 (6%) were in group A (Onlay) and 1 (2%) was in group B (Sublay).

Recurrence in present study was 1% with recurrence seen in only in 1 patient of group A (Onlay) and none in group B (Sublay).

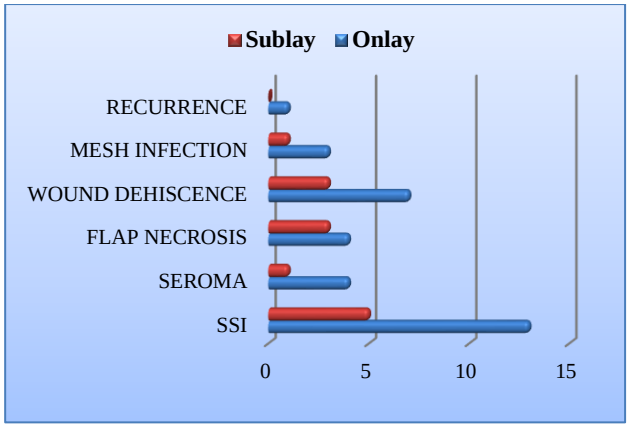


**Figure 1: The distribution of complications between the two groups.**

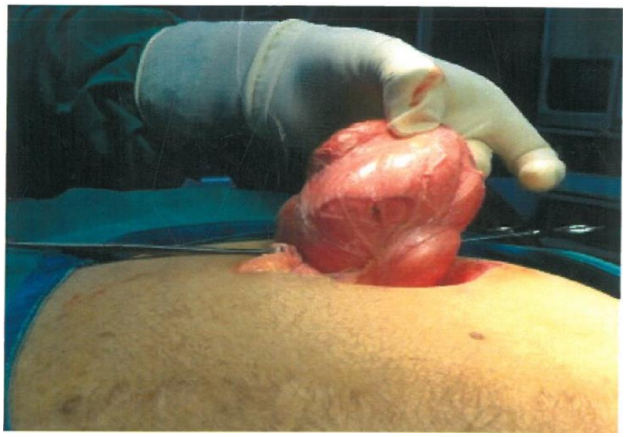

**Figure 2: Intraoperative.**

## DISCUSSION

Ventral hernia repair is among the most common surgical operations performed worldwide and the two operative techniques most frequently used in case of ventral hernia are the onlay and sublay repair. However, it remains unclear which technique is superior.

Repair of ventral hernia is an ongoing challenge in surgical practice and a wide spectrum of surgical techniques have been developed ranging from direct suture techniques to the use of various types of mesh to close the defect and strengthen the musculofascial tissues to avoid recurrence.[5] Mesh placement in the preperitoneal, retro muscular sublay position with overlapping the hernia defect in all directions was introduced in the late 1980s.[6] The refinement of sublay technique decreased the recurrence rates and gave better outcome making it to be declared the standard of care of ventral hernias.[6,7]

Study conducted by Godara R et al, came to the conclusion that the mean total time for surgery in sublay group was 63.15±15.0 (36-96) minutes compared to 49.35±8.29 (30-90) in onlay group (p<0.001) and the hospital stay in sublay was 6.8±1.50 days whereas it was 4.6±1.30 in onlay group (P<0.001).[8]

Study by Saber A et al found that the mean operative time for onlay repair was 67.04±13.19 minutes ranged from 45 to 90 minutes while in sublay group was 93.26±24.94 minutes ranged from 60 to140 minutes (P≤0.0001).[9]

In previous studies, the mean operative time was longer in sublay than onlay techniques due to the time consumed to create the preperitoneal tunnel.[6,7,10] Our data came in agreement with these reported studies as the operative time in sublay group patients was much longer in the onlay technique.

Onlay technique is associated with a higher rate of wound infection that remains one of the most common complications of this technique with reported incidence rate ranging between 6-12%.[10-13] In the present study, we reported lower incidence of wound infection in sublay group patients when compared with onlay group but still with insignificant distribution. Milad and his colleagues reported that the retromuscular plane is highly vascular and helps preventing infection, and if any infection occurs in the subcutaneous plane, it will not affect the mesh, as the mesh is retromuscular in a deeper plane.[14]

Seroma formation is a common complication after repair of abdominal wall hernia, which can lead to significant morbidity.[15] In previous studies, the rate of seroma formation in sublay repair is much less than in onlay repair with statistical significant distribution.[10,11,16-18]

Present data came in concordance with those reported according to the previous studies. The incidence of seroma formation is highest following onlay procedures as during an onlay procedure, not only are many blood vessels transected during the required wide mobilization of subcutaneous tissue flaps, but also the insertion of foreign material temporarily establishes an effective barrier between the circulatory system of the subcutaneous tissues and that of the deeper parietal layers.[19]

In sublay repair, the retromuscular space is an already existing anatomical plane, requiring no dissection, and the bare posterior surface of the of the rectus muscles is rich in lymphatic is capable to absorb any collecting seroma.[12]

Hernia recurrence is a distressing event to patient and embarrassing to surgeons and tension free mesh repair is an ideal technique which has decreased the incidence of recurrence.[22] The location of the reinforcement appears to influence outcomes.

Underlay or retrorectus mesh placement is associated with lower recurrence rates (20). The high incidence of recurrence of about 30-50% after anatomical repair and

1.5-10% following prosthetic mesh repairs was reported in literatures.[10,21,22] Many studies of same interest compared the recurrence rate in onlay versus sublay repair and found higher incidence in case of onlay maneuver.[23,10,22] In the present study reported incidence of recurrence in both techniques comparable with those concluded in the previous works.

Study by Saber A et al recurrence was observed in 8 (8%) and 3 (3%) patients of group A (onlay) and B (Sublay) respectively all over the follow up period with insignificant distribution; (P≥0.05).

Placement of the mesh in the retromuscular plain seems to be a reasonable alternative. First, this plane is highly vascular, hence, it prevents infection, and if any infection occurs in the subcutaneous plane, it will not affect the mesh, as the mesh is retromuscular in a deeper plane. Second, the prosthesis in this plane cannot be dislodged or ruptured by intra-abdominal pressure, but instead is held in place by the same force that caused the hernia. Third, the prosthesis adheres early to the posterior rectus sheath and renders it inextensible, permitting no further herniation. Finally, the retromuscular space is an already existing anatomical plane, requiring no dissection, and the bare posterior surface of the of the rectus muscles is rich in lymphatics capable to absorb any collecting seroma.[24]

## CONCLUSION

The incidence of ventral hernias in decreasing frequency is incisonal, umbilical, paraumbilical and epigastric.

Most of the patients presented between the 3rd and 6th decade of life with a male dominance

Authors observed in present study that the operative time of the onlay method was less when compared to sublay method and was the statistically significantly.

The duration of stay was less for patients who underwent sublay meshplasty when compared to onlay meshplasty and was also statistically significant.

Post-operative complications like suture site infection, seroma, flap necrosis, wound dehiscence and mesh infection was less in the sublay group when compared to the onlay group but were found to be statistically insignificant in present study.

Recurrence was only seen in only one patient who underwent onlay meshplasty on the 6th month of follow up and sublay group had zero recurrence.

Sublay mesh repair is a good alternative to onlay mesh repair that may be applicable to all forms of ventral and incisional hernias. The mesh related overall complication rate and recurrence was found to be minimal.

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