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**Original Research Article**

# Onlay versus sublay mesh repair for ventral hernia

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## ABSTRACT

**Background:** Ventral hernia repair is one of the most common surgical operations performed all over the world. Onlay and sublay mesh repairs are the commonly performed techniques for the same. However, the debate still continues about the superiority of both techniques over each other. The aim of this study was to compare the outcome of the onlay versus sublay mesh repair for ventral hernia.
**Methods:** A total of 100 patients with paraumbilical, epigastric, supraumbilical and incisional hernias (with defect size ≤4 inches) were divided into main two groups; A: onlay mesh repair and B: sublay mesh repair. Patients with uncontrolled diabetes and recurrent ventral hernia were excluded. Randomization was done using computer generated software. Patients were evaluated for operating time, postoperative seroma formation, wound infection, drain duration, post-op hospital stay and recurrence of symptoms. Ethical approval for this study was granted by the ethical review committee of Mysore Medical College, Mysore, Karnataka, India.
**Results:** The incidence of post-operative seroma and wound infection was 6.52% and 4.35% in sublay group compared to 21.30% and 19.20% in onlay group which was statistically significant ($p<0.05$). Mean operating time was found to be more in sublay group than onlay group which was also statistically significant (72.3+9.23 vs. 65.25+10.58 minutes, $p<0.05$). Mean drainage duration (4.22+0.99 days vs. 5.97+1.24 days) and post-op hospital stay (4.8+1.51 days vs. 6.68+1.46 days) was low in sublay group compared to onlay group which was statistically significant ($p<0.05$). Recurrence in sublay group was 4.35% compared to 8.51% in onlay group which was not statistically significant ($p>0.05$).
**Conclusions:** Even though operating time is longer, placement of mesh in sublay position is a better option than onlay placement in open ventral hernia repair because of lower complication rate and post-op morbidity.

**Keywords:** Mesh repair, Onlay, Sublay, Ventral hernia

## INTRODUCTION

Ventral hernias are commonly encountered in surgical practice.[1] The estimated incidence of ventral hernias is 15-20%.[2] Despite the frequency of surgical repair, "Perfect results" continue to elude surgeons and the rate of surgical failure is humbling (10-30%).[3] True recurrence rates are probably underestimated.[4] For the foreseeable future, hernia surgery is a procedure likely to be delegated to junior staff and trainee surgeons.[5] Recurrence, the ultimate nightmare of a hernia surgeon, adds significantly to health care costs, and poses a further economic burden.[6] Confronted with the fact that onset of a ventral hernia is due to a biological problem of stable scar tissue formation, the mesh techniques today are the methods of choice for hernia repair.[7] To avoid recurrences, a variety of materials were tried to reinforce

the repair via fascial autografts, prosthetic materials, meshes of various types.[8] The techniques of placements include onlay, sublay, sandwich technique, etc.[9] But the best position for inserting the mesh has not been conclusively established till date as per literature.[10]

Although polypropylene mesh has long been regarded as the implant of choice for repairing abdominal wall defects, there is still controversy regarding the best site of its placement.[11] A prospective study was conducted to compare 'sublay' versus 'onlay' mesh plasty in influencing the final outcome in ventral hernia with regards to duration of

surgery, postoperative complications like seroma formation, wound infection, duration of drain placement, post-operative stay and recurrences, if any.

## METHODS

The prospective study was carried out on 100 patients of ventral hernias (excluding very large hernias with defect more than 4 inches) admitted in the Department of Surgery, KR Hospital, Mysore Medical College and Research Institute, Mysuru. All patients were grouped alternatively as.

- *Group A:* Onlay (mesh over the external oblique, 50 cases)
- *Group B:* Sublay (preperitoneal, 50 cases) mesh plasty

Observation in both the groups were made with regards to duration of surgery, postoperative complications like seroma formation, wound infection, duration of drain placement, post-operative stay and recurrences, if any.

All patients were given a Cefotaxime 1gm i.v. on induction. Thereafter iv antibiotics were continued for 2 days post-operative and changed to oral Cefixime 200mg twice daily for the next 5 days. Early mobility was strongly encouraged as cultural attitudes towards surgery in the setting are prohibitors to early ambulation for several days in postoperative period.

Follow up every three monthly for 24 months was done to see late wound complications like sinus, neuralgia and recurrence of hernia etc. Conclusions were drawn using unpaired student t-test.

## RESULTS

The male to female sex ratio was 6:100, showing that incidence of ventral hernia is more in females (Figure 1).

The mean total duration for surgery in sublay group was 72.3±9.23 minutes compared to 65.25±10.58 minutes in onlay group, which was statistically significant ($p<0.05$) (Figure 2).

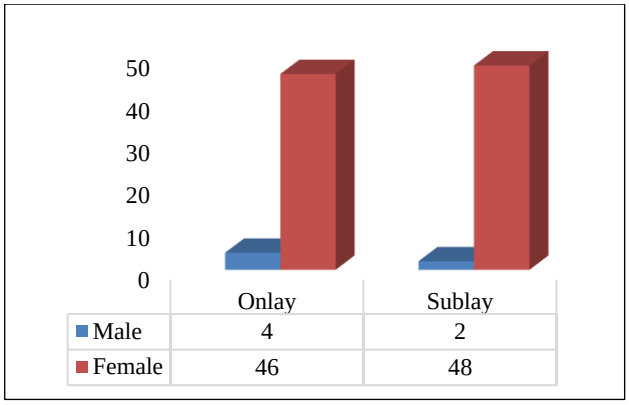


**Figure 1: Sex distribution.**

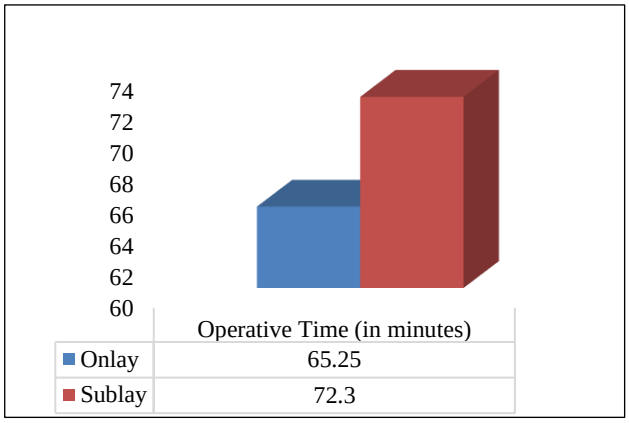


**Figure 2: Duration of surgery.**

Postoperative complications like seroma formation and wound infection were studied in both the groups. The incidence of post-operative seroma and wound infection was 6.52% and 4.35% in sublay group compared to 21.30% and 19.20% in onlay group which was statistically significant ($p<0.05$).

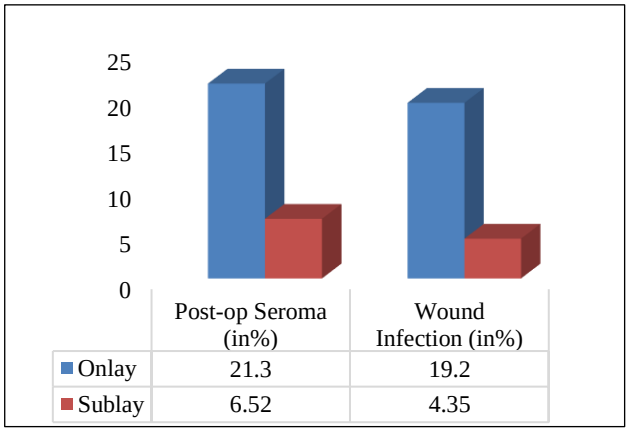


**Figure 3: Post operation complications.**

Suction drain was put in all cases. Mean drainage duration (4.22+0.99 days vs. 5.97+1.24 days) and was low in sublay group compared to onlay group which was statistically significant ($p<0.05$).

Mean duration of hospital stay post operatively in sublay group was 4.8±1.51 days, whereas it was 6.68±1.46 days in onlay group, which was statistically significant ($p<0.05$).

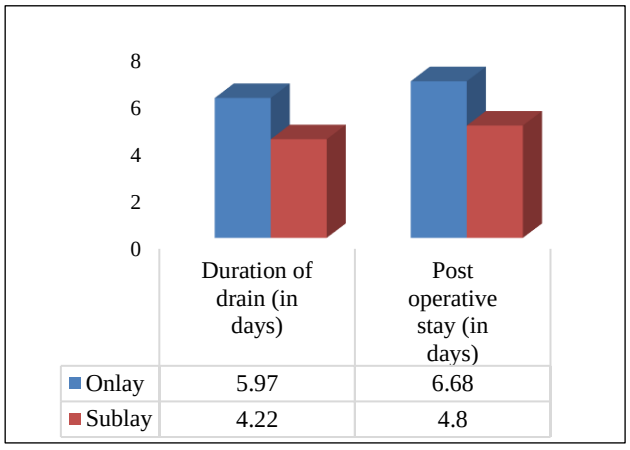


**Figure 4: Post operation stay and drain removal.**

The recurrence rate in sublay group was 4.35% compared to 8.51% in onlay group which was not statistically significant ($p>0.05$).

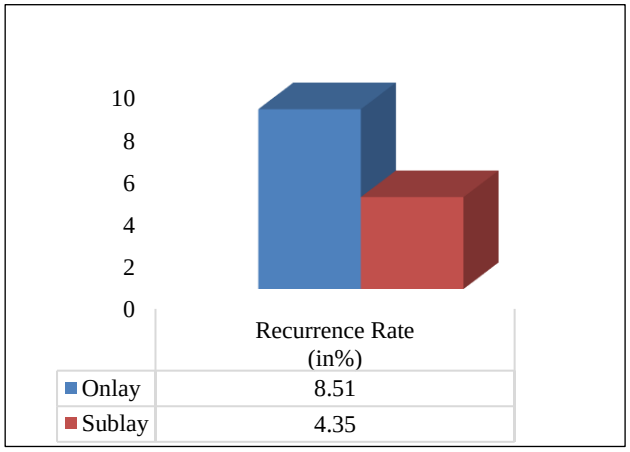


**Figure 5: Recurrence rate.**

## DISCUSSION

Ventral hernia in the anterior abdominal wall includes both spontaneous and, most commonly, incisional hernias after an abdominal operation.[1] It is estimated that 2 to 10% of all abdominal operations result in an incisional hernia.[2] Small hernias less than 2½cm in diameter are often successfully closed with primary tissue repairs.[3] However, larger ones (more than 2½cm) have a recurrence rate of up to 30-40% when a tissue repair alone is performed.[4] Hernia recurrence is distressing to the patient and embarrassing to surgeons. Nowadays tension free repair using prosthetic mesh has decreased recurrence to negligible rates.[5] Despite excellent results increased risk of infection with placement of a foreign body and cost factor still exists.[6] However, operating time and length of stay in the hospital are shortened. Primary tissue repair is associated with higher unacceptable recurrence rate. Nowadays, tension free mesh repair is the ideal hernia repair technique.[7]

The mean total time taken for the operation in 'sublay' group was 72.3±9.23 minutes, compared to 65.25±10.58 minutes in 'onlay' group; and was found to be statistically significant ($p<0.05$). The difference of time can be accounted due to more dissection time needed for creating preperitoneal space. Securing reasonable hemostasis is another burden on time. Ease of operation is largely subjective (surgeon factor being constant) and depends on individual surgeon's experience, exposure and planning, quality of assistance, conductive facilities like light, cautery, instruments quality and sutures etc.

Apart from recurrence, other postoperative complications like seroma formation and wound infection attributed largely to extensive dissection and tissue handling during hernia repair.[8] In present study, there was slightly more chance of seroma formation in onlay group, which may be due to extensive tissue dissection and increased blood loss. Duration of hospital stay give us an indirect indication of degree of morbidity in terms of postoperative complications. The mean duration in sublay group was 4.8 days, compared to 6.68 days in onlay group; and were found to be statistically significant ($p<0.05$). The information was obtained during follow up as how long it took each one of them to return to their routine activities. On two years follow up, recurrence rate was found to be 4.35% in sublay group, whereas it was found to be 8.51% in onlay group; similar results were also observed by others.[1]

Infact, as per literature, the best position for inserting the material has not been conclusively established; but limited studies have shown that meshes implanted on the abdominal aponeurotic layer showed better and early incorporation (higher collagen deposition, capillary density and cell accumulation) and increased tensile strength reflecting tighter anchorage to the abdominal wall.[9,10] One European study has shown that onlay technique had significantly more complications as compared to sublay technique.[11] Thus, it can be safely said that based on above parameters, sublay is a better technique than onlay in terms of placement and overall decreased complications and morbidity.[12] There is paucity of literature but an experimental study has also shown superiority of sublay technique, based on different parameters.[13] However in few studies it was found that ideal position for mesh repair appears to be retromuscular, where the force of abdominal pressure holds the mesh against deep surfaces of muscles.[14] Even after long term follow up, recurrence rates around 10% are possible.[15] This is all the more necessary as the world literature is scanty and there is great interest in hernia surgery using mesh these days.

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