

Original Research Article


# A comparative study between onlay and subway mesh repair in the treatment of ventral hernia

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## Abstract

**Background:** More than 1 million ventral hernia surgeries are done annually in India. Suture repair techniques have dominated ventral and incisional hernia repair over a century. The most popular of these techniques was the Mayo duplication. In larger hernias, suture repair requires the application of tension to the fascia in order to close the orifice.

**The aim of the study:** This study aimed to compare the duration of surgery and postoperative complications of subway and only meshplasty in the treatment of ventral hernias.

**Materials and methods:** This study was conducted in the Department of General Surgery, Government Stanley Medical College, Chennai in 2018. Totally 50 cases were included in the study. Group A (25 Cases- Onlay meshplasty) Group B (25 cases - Subway meshplasty). All subjects undergoing onlay and subway mesh repair for ventral hernias were evaluated intraoperatively for the duration of surgery and postoperatively for complications like surgical site infections, seroma formation, flap necrosis and duration of hospital stay.

**Results:** The most common complication observed was seroma in 6 patients. 1(4%) were in pre-peritoneal and 4(20%) in the onlay mesh repair group. This complication was managed with seroma drainage. The only technique had more of seroma formation, due to the fact that onlay techniques require significant subcutaneous dissection to place the mesh, which can lead to devitalized tissue with seroma formation or infection. The superficial location of the mesh also puts it in danger of becoming infected if there is superficial wound infection. Wound infection was found in 5 cases. Out of these, 1(4%) were in a pre-peritoneal group and 4(16%) were in onlay group. These patients were

treated with appropriate antibiotics and regular dressing. No patient required removal of mesh because the infection was superficial and responded well to antibiotics.

**Conclusion:** Sublay mesh repair is a good alternative to onlay mesh repair that may be applicable to all forms of ventral hernia as the mesh related overall complication rate like a seroma, surgical site infections, flap necrosis, and hospital stay are less compared to onlay mesh plasty.

## Key words

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Onlay Mesh, Sublay Mesh, Ventral Hernia, Seroma.

## Introduction

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More than 1 million ventral hernia surgeries are done annually in India. Suture repair techniques have dominated ventral and incisional hernia repair over a century. The most popular of these techniques was the Mayo duplication [1]. In larger hernias, suture repair requires the application of tension to the fascia in order to close the orifice. Therefore, many suture repairs failed mechanically, and recurrence rates were found to be as high as 54% [2]. The choice of a type of open operative repair is controversial; the technique of hernia repair is often based on tradition rather than evidence. According to databases and reviews there is a good evidence that open mesh repair is superior to suture repair in terms of recurrences and an insufficient evidence as to which type of mesh or which mesh position (on- or subway) should be used [3]. 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 subway repair. However, it remains unclear which technique is superior [4]. Many studies demonstrate an increased risk for wound complications with mesh placement including surgical site infections, seroma, and flap necrosis. The risks of these complications are affected by where the mesh is placed. For example, mesh exposed to intra-abdominal contents potentially increases the risks of adhesions, bowel obstruction, and fistula formation [5]. While repair of ventral hernias with mesh is considered routine, there is no consensus on the best location to place the mesh. Hence, this study aims to compare the outcome

of the onlay versus sub lay mesh repair for treatment of ventral hernias [6].

## Materials and methods

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This study was conducted in the Department of General Surgery, Government Stanley Medical College, Chennai in 2018. Totally 50 cases were included in the study. Group A (25 Cases- Onlay mesh plasty) Group B (25 cases - Sublay mesh plasty). All subjects undergoing onlay and sublay mesh repair for ventral hernias were evaluated intraoperatively for the duration of surgery and postoperatively for complications like surgical site infections, seroma formation, flap necrosis and duration of hospital stay.

**Inclusion criteria:** All Patients undergoing onlay and sub lay mesh repair for ventral hernias including incisional hernia, supraumbilical and epigastric hernias.

**Exclusion criteria:** Below 18 and above 70 years, Infraumbilical hernias, Planned other gastrointestinal surgery, Immunosuppressive disorders like diabetes, HIV and Hepatitis Severe renal or hepatic failure, Advanced stage of tumors or currently treated malignancies, Recurrent Hernias.

**Statically Analysis:** Observations were tabulated according to the pre-designed proforma. The collected data were analyzed with IBM. SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis was used for categorical variables and the mean and S.D were used for continuous variables. The Shapiro Wilk's test for normality shows the data was skewed hence to find the significant difference in

the multivariate analysis the Kruskal Walli's test was and followed by the Mann-Whitney U test was used. To find the significance in categorical data Chi-Square test was used. In all the above statistical tools the probability value .05 was considered as significant level.

dissection to place the mesh, which can lead to devitalized tissue with seroma formation or infection. The superficial location of the mesh also puts it in danger of becoming infected if there is superficial wound infection (**Graph – 1**).

**Results**

Gender distribution was as per **Table – 1**. Diagnosis was as per **Table – 2**. The most common complication observed was seroma in 6 patients. 1 (4%) were in pre-peritoneal and 4 (20%) in onlay mesh repair group. This complication was managed with seroma drainage. The only technique had more of seroma formation, due to the fact that onlay techniques require significant subcutaneous

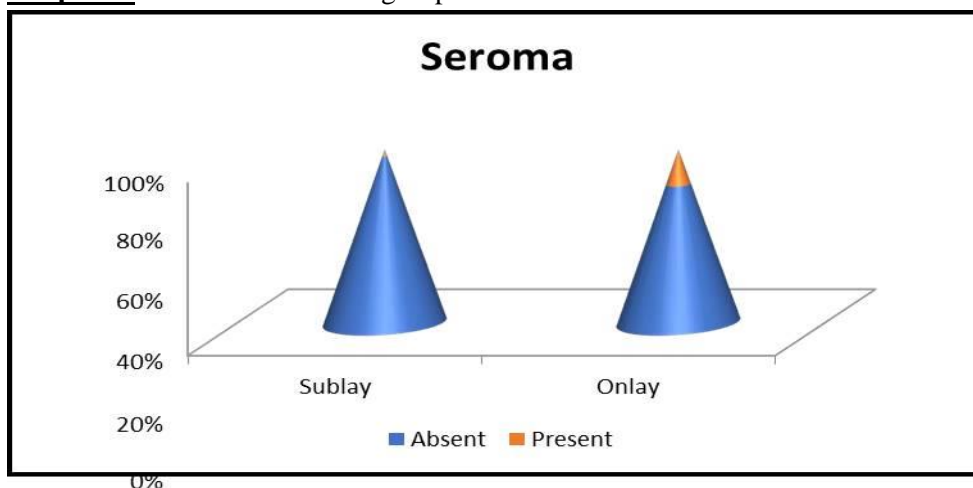
**Table – 1:** Gender distribution.

Gender	Frequency	%
Male	29	58
Female	21	42
Total	50	100

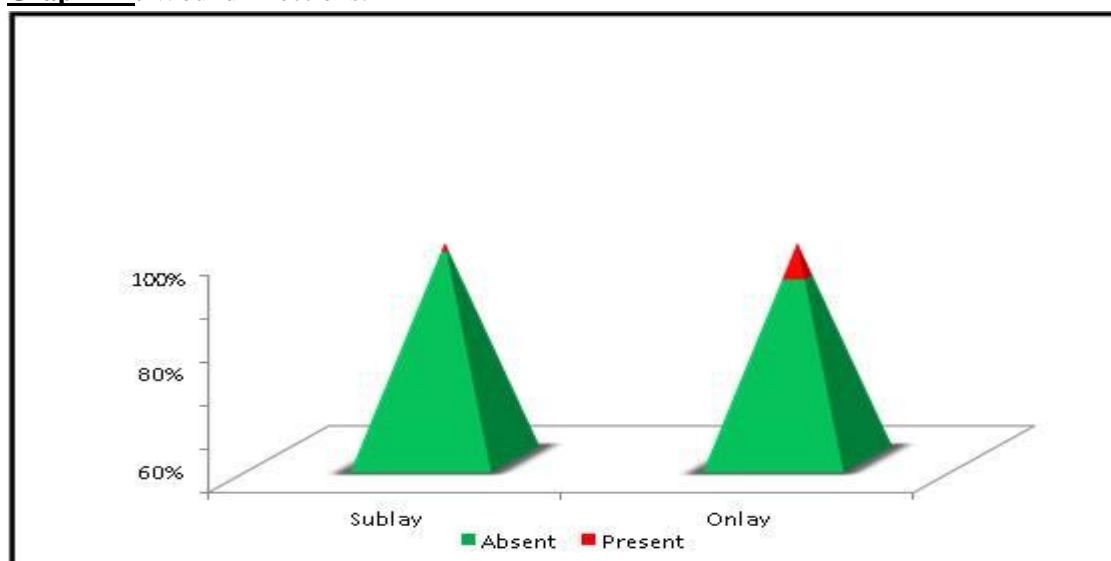
**Table – 2:** Diagnosis.

Diagnosis	Frequency	%
Epigastric	1	2
Incisional	23	46
Supraumbilical	26	52
Total	50	100

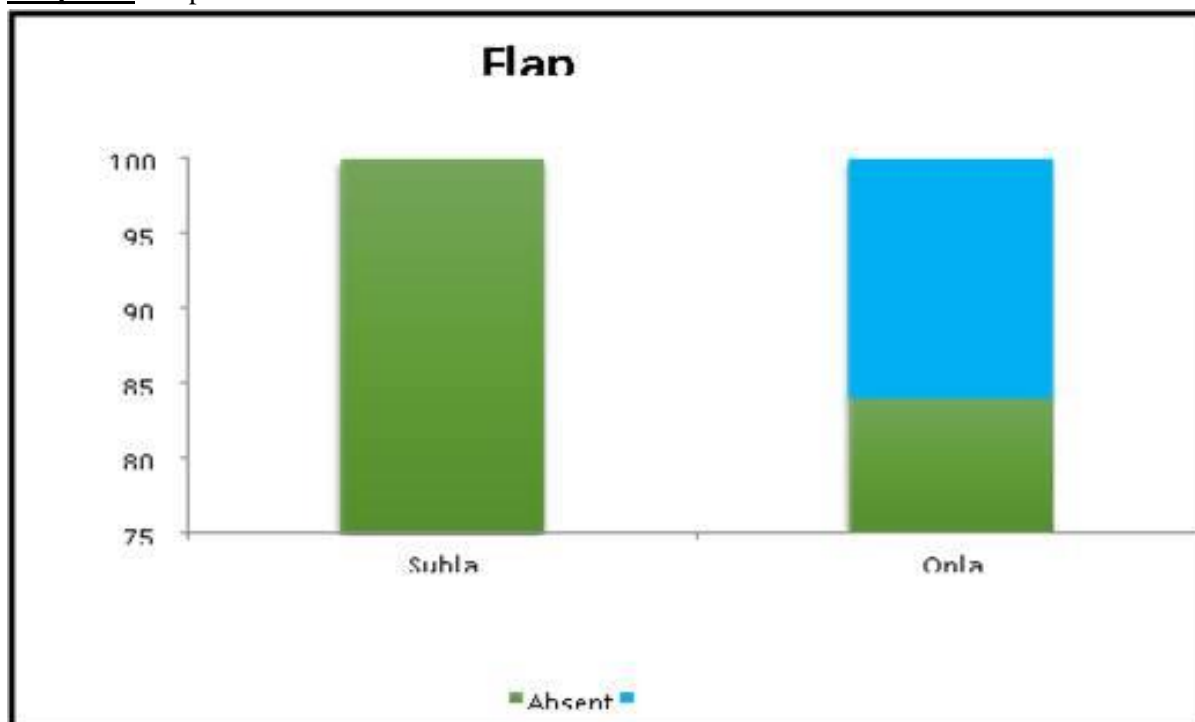
**Graph – 1:** Seroma in both the groups.



**Graph – 2:** Wound infections.



**Graph – 3:** Flap necrosis.



Wound infection was found in 5 cases. Out of these, 1 (4%) were in a pre-peritoneal group and 4 (16%) were in onlay group. These patients were treated with appropriate antibiotics and regular dressing. No patient required removal of mesh because the infection was superficial and responded well to antibiotics (**Graph – 2**).

Among 25 patients who underwent onlay meshplasty, flap necrosis was reported in 4 patients (16), compared to nil incidence in sublay mesh repair (**Graph – 3**).

## Discussion

When considering the best location for the placement of mesh, a number of features are to be considered. Firstly, techniques that avoid the devascularisation of flaps will prevent wound complications like infections, flap necrosis, and surgical site infections. Secondly, technical ease and duration of surgery may affect the surgeon's choice [7].

Sublay repair allows tissue integration from two load-bearing tissues from both sides: posterior rectus sheath and the anterior myofascial

complex. In addition, sublay mesh placement protects the mesh from exposure from superficial wound complications, intra-abdominal adhesions, and contamination [8]. Creation of devascularizing skin flaps is avoided. Onlay allows for tissue ingrowth from two directions, the skin flaps are not load bearing. Mesh placed in the onlay location is vulnerable forcing the surgeon to create devascularizing skin flaps and leaving the mesh susceptible to superficial wound complications [9]. Mean duration of surgery in our study, in cases that underwent onlay mesh plasty is 95min and in pre-peritoneal Mesh repair it took more time and the average duration of surgery was 102 min ( $P < 0.0001$ ). The difference could be accounted to more time required for dissection for creating pre-peritoneal space. Ease of operation was largely subjective and depends on surgeons' experience, exposure, quality of assistance, and conducive facilities [10]. Miller K, et al., reported a mean duration of 49.35 min for onlay and a mean duration of 63.15 min for pre-peritoneal mesh repair ( $P < 0.0001$ ), while in Gleysteen 23 series the mean duration for onlay and pre-peritoneal mesh repair were 42 and 70.5 min, respectively. Out of patients, 1 (4%) were in preperitoneal and 5

(20%) in onlay mesh repair group. This complication was managed with seroma drainage. Onlay technique had more seroma formation, due to the fact that onlay technique requires significant subcutaneous dissection to place the mesh, which can lead to devitalized tissue [11]. Cuccurullo D, et al. in a study of 100 patients reported 14 percent in onlay group and 4% in sub lay group [12]. Silecchia G reported 18 and 4 percentage in onlay sublayer group respectively, which is similar with our study. The superficial location of the mesh also puts it in danger of becoming infected if there is superficial wound infection. Wound infection was found in 5 cases [13]. Out of these, 1 (4%) were in a pre-peritoneal group and 4 (16%) were in onlay group. Moher D, et al. in a study of 60 patients found surgical site infection in 6 cases (10%). Out of these, 2 (6.66%) were in a pre-peritoneal group and 4 (13.33%). This is similar to our study. These patients were treated with appropriate antibiotics and regular dressing. No patient required removal of mesh because the infection was superficial and responded well to antibiotics [14]. It was seen totally in 4(16%) patients. All 4(16%) were seen in onlay group with a nil occurrence in sub lay group [15].

### **Conclusion**

Sublay mesh repair is a good alternative to onlay mesh repair that may be applicable to all forms of ventral hernia as the mesh related overall complication rate like a seroma, surgical site infections, flap necrosis, and hospital stay are less compared to onlay meshplasty. Although time taken for surgery in sub lay mesh repair is significantly higher compared to onlay mesh repair, complications and morbidity associated with it are significantly lower than onlay repair. Hence, sub lay mesh repair can be used as the preferred method of choice for the treatment of ventral hernias.

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