

## Management of large ventral hernias with quilting sutures in a tertiary care hospital, South India- A clinical trial

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### Abstract

**Background:** Seroma formation, infection, delayed wound healing, flap necrosis and patient discomfort are the commonly encountered complications following large ventral hernia repairs and many techniques are used to address the same. This study tries to assess the variations in the outcomes in patients treated with open mesh repair with quilting sutures.

**Methodology:** This is a Randomized Control Trail conducted among patients with ventral hernias planned for Open Onlay Mesh Repair, in Rajiv Gandhi Government General Hospital, Chennai. 60 Patients were divided equally into two groups as Group1 (with quilting sutures) and Group 2 (control) based on randomization. Details of disease characteristics, type of intervention, outcomes reported were collected. All the patients studied had the standard operating procedures uniformly done. The collected data were analyzed with IBM SPSS Statistics for Windows and presented. **Results:** In the study, the age and gender were comparable among the groups. Wound infection was significantly lower in the patients with quilting sutures in comparison to those without non-quilting sutures. Similarly, the occurrence of seroma at Day 1, occurrence of total seroma, the wound score grading on Days 3, 7 and 14 were significantly lower in the quilting sutures group. And earlier drain removal and lesser hospital stay were observed in the test group. **Conclusion:** From this study, it is concluded that using quilting sutures in patients undergoing open meshplasty for large ventral hernias can lead to reduction of complications in wound healing and there by resulting in better and earlier recovery of the patient.

**Keywords:** Open meshplasty, Seroma, Wound Dehiscence, Quilting sutures, Wound healing

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### Introduction

Abdominal surgeries are among the highest rates of wound infection, as it is suggested that entering the abdominal cavity leads to contamination of the operative field with microorganisms thereby increasing the possibility of postoperative infective complications. Seroma formation and its sequelae including infection, delayed wound healing, flap necrosis and patient discomfort are some of the most commonly encountered complications following large ventral hernia repairs. Seroma formation anterior to the mesh has even been reported as 100% in few studies (1)(2). Seroma formation after flap

dissection in ventral hernia repair is a persistent problem both to the surgeon and the patient, in spite of advances in surgical techniques.

Seroma is formed by acute inflammatory exudates in response to the surgical procedure and acute phase of wound healing. The pathophysiology of seroma formation is not clear and widely discussed in literature. Seroma is due to large dissection areas and increased dead space under the skin flaps. Seroma accumulation elevates the flap thereby hampering their adherence to the tissue bed. This leads to delayed wound healing, wound infection, wound hematoma, wound dehiscence, delayed recovery and prolonged hospitalization.

Varied numbers of techniques have been used to prevent or reduce seroma formation among ventral hernia repair patients. However, Mechanical closure of dead space by simple flap fixation eliminates dead space after ventral hernia repair.

The objective of this study is to ascertain the effect of mechanical closure of dead space after ventral hernia mesh repair in prevention of seroma formation. It is a Randomized control trial to study the efficacy of quilting sutures in preventing the seroma formation and its complications in large ventral hernia surgeries. The study tries to assess the variations in the outcomes in patients presenting with large ventral hernias treated with open mesh repair with quilting sutures and without quilting sutures in terms of Seroma formation, Wound infection, Wound dehiscence, Day of Drain Tube (DT) removal and Day of discharge.

### **Materials And Methods**

This is a Randomized Control Trail conducted between the time period of November 2020 and October 2021 in the Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. Sample size is calculated using OpenEpi software version 3.0. and taking into consideration an estimated average standard deviation of drain volume in control group as 200ml and an estimated mean difference of drain volume between two groups as 150ml at 95% confidence interval with 80% power the sample size is calculated as 27.9. Adding a 10% non-response rate, the sample size required for each group is 30 and the total sample size is 60.

All patients presenting to general surgery department diagnosed with ventral hernias including Paraumbilical hernias and Incisional hernias and planned for Open Onlay Mesh Repair whose Age group between >18 and <70 years and where the Dissected flap more than 15x15 cm (>225cm square). Patients of extremes of age <18 and >70 years, those who are not satisfying inclusion criteria, Patients with immunocompromised status like HIV, renal failure, tuberculosis, patients on steroid therapy, post-transplant, patients on immunosuppressive drugs and those with Skin disease in operating area are excluded from being recruited as the study participants. Prior to study, approval was obtained from ethical and research committee of the institute, Madras Medical College.

Patients who were admitted in Rajiv Gandhi Government General hospital and who satisfy the inclusion and exclusion criteria were observed and data regarding Details of participants including disease characteristics, Details of type of intervention, Details of outcomes reported were collected.

Patients who underwent elective open meshplasty for large ventral hernias were divided into two groups as Group1 and Group 2 based on randomization. Patients in Group 1 had quilting sutures and Group 2 did not have quilting sutures.

A single dose of antibiotic was given at time of anesthesia induction and uniform postoperative antibiotics. Skin incisions were done using scalpel and subcutaneous plane were dissected using electrocautery. Wound were irrigated and thoroughly washed with normal saline prior to skin closure. Rectus muscle was closed with 1 prolene and skin with 3'0 ethilon. Suction drains of size 16 Fr was used. Drains were brought out through a

separate skin incision around 3-5cm from the lower end of incision. Drains were removed when there was less than 20 ml collection for 2 consecutive days. Pre-operative shaving of the operative site was done. All Patients were followed up to 30 days from the day of surgery. Seroma formation, Wound dehiscence, Wound infection (SSI) by Southampton Grading, Day of DT removal, Duration of hospital stay were studied in both groups.

The collected data were analyzed with IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp). To describe about the descriptive statistics frequency analysis was used and percentage analysis was used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups Unpaired sample t-test and the Mann-Whitney U test were used. To find the significance in categorical data, Chi-Square test and Fisher's Exact test were used. In all the above statistical tools the probability value .05 is considered as significant level.

### Results

The Age distribution of the participants in the study was seen as 13.3% in <40 years, 38.3% in 41-50 years of age group, 35% in the age group of 51-60 years, 13.3% in the group of 61-70 years. 91.7% of the study participants were Females and 8.3% were males.

**Table 1: Comparison Of Age Between Quilting And Non Quilting Groups**

			Quilting		Total	X <sup>2</sup> -value	p-value
			With	Without			
Age	Upto 40 Yrs	Count	5	3	8	0.591	0.898 #
		%	16.7 %	10.0%	13.3 %		
	41 – 50 Yrs	Count	11	12	23		
		%	36.7 %	40.0%	38.3 %		
	51 – 60 Yrs	Count	10	11	21		
		%	33.3 %	36.7%	35.0 %		
	61 – 70 Yrs	Count	4	4	8		
		%	13.3 %	13.3%	13.3 %		
Total	Count	30	30	60			
	%	100.0%	100.0%	100.0 %			

# No Statistical Significance at p > 0.05 level

**Table 2: Comparison of Gender Between Quilting and Non-Quilting groups**

			Quilting		Total	X <sup>2</sup> - value	p-value
			With	Without			
Gender	Female	Count	28	27	55	0.218	1.000 #
		%	93.3 %	90.0%	91.7%		
	Male	Count	2	3	5		
		%	6.7%	10.0%	8.3%		
Total	Count	30	30	60			
	%	100.0%	100.0%	100.0%			

# No Statistical Significance at $p > 0.05$ level
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In the study, comparative analysis by Pearson's Chi-Square test showed that the age distributions among the quilting sutures and non-quilting sutures groups were statistically similar. Similar statistically non-significant difference was seen in gender distribution as well as evident from the above tables 1 and 2.

On analysis, wound infection was found to be significantly lower in the patients who were given quilting sutures in comparison to those who were given non-quilting sutures (60% versus 86.7%). On performing Independent sample t-test, the occurrence of seroma at Day 1 was found to be statistically lower in those with quilting sutures (mean $\pm$ SD (ml) – 38.0  $\pm$  11.6) as opposed to those with non-quilting sutures (mean $\pm$ SD (ml) – 45.3  $\pm$  8.6). Similarly, the occurrence of total seroma was also found to be statistically lower in those with quilting sutures (mean $\pm$ SD (ml) – 315.0  $\pm$  98.5) as opposed to those with non-quilting sutures (mean $\pm$ SD (ml) – 428.3  $\pm$  111.2).

Also, On performing Independent sample t-test, it was found that the drain tube was removed earlier in those with quilting sutures (mean days of drain tube removal  $\pm$ SD – 7.5  $\pm$  1.7) on comparison to those with non-quilting sutures (mean days of drain tube removal  $\pm$ SD – 10.3  $\pm$  2.1). Similarly, hospital stay was found to be shorter in those with quilting sutures (mean days of hospital stay  $\pm$ SD – 8.9  $\pm$  1.9) in comparison to those with non-quilting sutures (mean days of hospital stay removal  $\pm$ SD – 14.3  $\pm$  5.9).

On performing Mann Whitney U test, the wound score grading was significantly lower on Days 3, 7 and 14 in the quilting suture group (mean score- 1.53 vs 2.47, 1.27 vs 2.87, 0.60 vs 1.63 respectively). However, both groups had wound score grading as 0 on day 1. This is depicted in the table below.

**Table 3: Comparison of Wound Score Grade Between Quilting and Non Quilting By Mann-Whitney U Test**

Wound Score Grade	Quilting	N	Mean	SD	Z-value	p-value
Day 1	With	30	0.00	0.00	0.000	1.000 #
	Without	30	0.00	0.00		
Day 3	With	30	1.53	1.41	2.421	0.015 *
	Without	30	2.47	1.14		
Day 7	With	30	1.27	1.14	4.569	0.0005 **
	Without	30	2.87	1.28		
Day 14	With	30	0.60	0.50	3.535	0.0005 **
	Without	30	1.63	1.50		
** Highly Statistical Significance at $p < 0.01$ ,* Significant at $p < 0.05$ and # No Statistical Significance at $p > 0.05$						

## Discussion

Seroma, wound dehiscence, and SSI are some of the most frequent postoperative wound complications. Despite developments in antimicrobial chemotherapy, innovations leading to the invention of many newer surgical modalities, improvements in imaging techniques, better anaesthesia, and careful post-operative supervision, severe complications, particularly SSI, continue to occur. The emergence of these problems has numerous negative consequences for both patients and the healthcare system as a whole. These factors may

increase morbidity, death, and financial costs for patients and the health-care business. These difficulties may need a return to the operating room, adding to the patients' mental and physical stress.

This may also predispose patients to inferior cosmetic outcomes and the risk of developing a recurrence in the long run. As with any surgical complication, it is preferable to avoid the issue than treat it once it has occurred. Numerous approaches are used and investigated to attain this goal, as well as various methods for diagnosing these issues early on and minimizing the damage.

As a result, there are certain lacunae in the search for an efficient, cost-effective method to avert these issues. The accumulation of fluid under the surgical wound during the postoperative healing phase is also thought to contribute to and predispose to the development of these surgical site problems. As a result, it's possible that some effective means of preventing this fluid could help to reduce these difficulties.

The quilting sutures used in our study is a simple, not-so time-consuming procedure of approximating the tissues and decreasing the dead space, thus preventing the accumulation of seroma and thereby decreasing the chances of other detrimental side effects. Taking into consideration all these reasoning and along with the ease of the procedure, using the quilting suture was the base of the study.

In this study, we had enrolled patients from the age group of more than 18 and less than 70 years, while maximum patients were between the age group of 41-60 years. Among the gender, there were more female patients in our study making up 91.7% of the entire study population. On comparing the age and gender between the two groups, no statistical difference was seen between the groups.

In this study we had a total of 28 patients who had a diagnosis of paraumbilical hernia and 32 patients had a diagnosis of incisional hernia and all the patients required open meshplasty with prolene mesh of size 15\*15 cms. Among the quilting group there were 15 paraumbilical hernia and 16 incisional hernia. Among the non-quilting group there were 16 paraumbilical hernia and 16 incisional hernia. Hence, there was no difference between the two groups.

Among the study population a total of 44 patients developed wound infection. Quilting group had 18 patients (60%) who developed wound infection. Non-quilting group had 26 patients (86.7%) who developed wound infection. On comparing the results of both the groups, it was concluded to be statistically significant that by using quilting sutures wound infection can be reduced in large ventral hernia surgeries.

Seroma is one of the major complications following ventral hernia surgeries. It is also the most common benign complication seen in the post operative wound. All the patients enrolled in the study developed seroma post-procedure. Among the quilting group the mean seroma on day 1 was 38.0 ml, whereas in non-quilting group it was 45.3 ml. On comparing the results of both the groups, it was concluded to be highly significant that use of quilting sutures can significantly decrease the day 1 seroma. Total seroma was calculated by adding the everyday seroma value until the day the DT was removed. Among the quilting group the mean of total seroma was found to be 315.0 ml. Among the non-quilting group, the mean of total seroma was found to be 428.3 ml. On comparing the results highly significant reduction of total seroma was interpreted with the quilting sutures.

Among the quilting group the day of DT removal was by a mean of 7.5 days, whereas among the non-quilting group the day of DT removal was by a mean of 10.3 days, which on comparing was found to be significantly faster in the quilting group and hence early recovery. Among the quilting group the duration of hospital stay was by a mean of 8.9 days. Among the non-quilting group, the duration of hospital stay was by a mean of 14.3 days. Comparing the results, it was highly significant that the duration of hospital stay was

reduced in the first group.

In our study the wound score was assessed on day 1, day 3, day 7 and day 14 by using Southampton wound score which is a clinical grading. On day 1 there was no statistical significance as both the groups did not have any wound infection. On day 3, the quilting group had a mean wound grade of 1.53 and non-quilting group had a mean wound grade of 2.47. On day 7, the quilting group had a mean wound grade of 1.27 and non-quilting group had a mean wound grade of 2.87. On day 14, the quilting group had a mean wound grade of 0.50 and non-quilting group had a mean wound grade of 1.50. Comparing the days 3, 7 and 14 values, it is evident the seroma was significantly higher in the non-quilting group in each instance. From above comparisons of the wound grading on day 1, day 3, day 7 and day 14 using Southampton wound grading it was clearly found the by using quilting sutures in managing large ventral hernias the wound healing is much better.

A larger sample size could have resulted in a stronger study, even though we were able to achieve the desired sample size of 60. Various comorbidities such as Diabetes Mellitus which is a major cause for seroma formation and wound healing could have been considered for risk factors. This could have provided us with more data and stronger study thus helping us in understanding the utilization of quilting sutures.

### Conclusion

From this study it can be concluded that using quilting sutures in patients undergoing open meshplasty for large ventral hernias can lead to reduction in Wound Infection, Seroma, Wound Dehiscence, and there by resulting in earlier removal of drain tube and decreased hospital stay of the patient. This all results in the better and earlier recovery of the patients. Thus, this type of sutures helps in the better cosmetic outcomes, more comfortable recovery to the normal routine, better satisfaction and peaceful experience for the patients. It also helps in the lessening the cost for the health care systems by lessening the hospital stay, alleviating the management of complications, decreasing the need for prolonged antibiotic treatment.

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