

EFFECT OF QUILTING SUTURES IN THE PREVENTION OF SEROMA FOLLOWING VENTRAL HERNIA REPAIR

Suresh Kumar¹, Keerthana J², Anandi A³, Purshothaman⁴

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Corresponding Author:

Dr. Keerthana J

Email: jvkeerthana27@gmail.com

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¹Assistant Professor, Department of General Surgery, Govt Stanley Medical College, Chennai-1, Tamil Nadu, India

²Post-Graduate, Department of General Surgery, Govt Stanley Medical College, Chennai-1, Tamil Nadu, India

³Professor, Department of General Surgery, Govt Stanley Medical College, Chennai-1, Tamil Nadu, India

⁴Senior Resident, Department of General Surgery, Govt. Stanley Medical College, Chennai-1, Tamil Nadu, India

ABSTRACT

Background: Ventral hernia repair is one of the most commonly performed surgical procedures worldwide. A common complication of onlay mesh repair for ventral hernia is seroma formation. Quilting sutures is one of the effective techniques in minimizing seroma formation. This study aims to assess the effectiveness of quilting sutures in decreasing seroma formation in open ventral hernia repair. **Objective of the study:** To look for post-operative drain volume in day one in milliliters, duration of drain and seroma formation in patients who have undergone onlay mesh repair for ventral hernia. **Materials and methods:** This is a prospective randomized control trial done in the Department of General Surgery at Government Stanley Medical College and Hospital, Chennai from December 2022 to December 2023. The patients were divided into two groups: Group A patients underwent traditional closure of ventral hernia and Group B patients underwent closure with quilting method. **Results:** A total of 50 patients were operated in the study: 25 patients in Group A and 25 patients in Group B. The average day 1 drain output and average total drain output is lesser in Group B compared to Group A. The average day of drain removal is also less in Group B (4 to 5 days) compared to Group A (more than 6 days). There is no seroma formation in Group B, whereas in Group A 8 cases of seroma formation is reported. **Conclusion:** Quilting sutures demonstrate a clear benefit in reducing postoperative seroma formation, lowering drain volumes, and facilitating faster recovery in ventral hernia repair. By effectively minimizing dead space, this technique can potentially transform standard hernia repair protocols, especially in cases with high risk for fluid-related complications.

INTRODUCTION

Ventral hernia repair is one of the most commonly performed surgeries worldwide. The use of prosthetic mesh in ventral hernia repair leads to poor flap adherence and trigger inflammation which may increase the risk of seroma formation. Seroma is the collection of fluid containing serum and lymph that develops at surgical wound or dead space from surgery.^[1-3]

The pathophysiology of seroma formation is a complex process involving tissue disruption, inflammation, and impaired lymphatic drainage. The creation of dead space during surgery, coupled with an inflammatory response and compromised lymphatic function, are key factors in the development of seromas.^[4-6]

The key methods to reduce seroma formation includes meticulous surgical technique- minimizing tissue trauma, adequate haemostasis, appropriate use of drains, compression garments, sclerotherapy, tissue sealants and adhesives and optimizing patient factors.^[7-9]

Quilting sutures is one of the techniques to reduce seroma formation by suturing the underside of the skin flap to the underlying muscle fascia, which prevents fluid accumulation by eliminating the dead space where a seroma might form.^[10-12]

This study aims to assess the effectiveness of quilting sutures in decreasing seroma accumulation in patients subjected to open mesh repair for ventral hernia. The patients are evaluated by monitoring the drain volume in post-operative day one in millilitres, total drain volume in millilitres, date of drain removal

(drain volume less than 30ml for 2 consecutive days) and seroma formation (till the date of discharge).^[13]

MATERIALS AND METHODS

This study was conducted as a prospective randomized control trial in the Department of General Surgery at Government Stanley Medical College and Hospital, Chennai, over a period of 12 months from December 2022 to November 2023.

The study population includes 50 patients who were randomly allotted into two groups:

Group A (n=25): Traditional closure without quilting sutures

Group B (n=25): Closure with quilting sutures

Inclusion criteria

- All the patients admitted in general surgical ward, aged more than 18 years with ventral hernia undergoing onlay mesh repair.

Exclusion criteria:

- Patients aged <18yrs
- BMI >45
- Patients undergoing emergency surgery for strangulated hernia / obstructed hernia repair without mesh placement
- Patients with COPD- Emphysema and Chronic bronchitis

- Patients who had undergone previous surgical intervention for abdominal wall hernias

Operative technique: All patients underwent onlay mesh repair under general or spinal anesthesia. The technique includes closure of the hernial defect with non-absorbable sutures followed by placement of prolene mesh over the defect with 3 to 5 cm overlap. The differences between the two groups are as follows:

Group A: Closure done after placement of closed suction drain without quilting.

Group B: Closure done after placement of closed suction drain with quilting sutures. Quilting sutures was performed by application of multiple interrupted sutures using 2-0 vicryl between the subcutaneous tissue on one side and the underlying sheath and fixed mesh on the other side. Each suture is taken at a distance of 5cm until the dead space is completely occluded.

RESULTS

The study was conducted among 50 patients with ventral hernia. They have undergone closure through two techniques - traditional closure without quilting and closure by quilting method. The results are depicted below.

Table 1: Sociodemographic characteristics of the study population

Characteristics	Category	Traditional closure	Closure by Quilting	p value
Age	Mean (SD)	42.4 years (7.6 years)	42.6 years (7.2 years)	0.95 (I)
Gender	Male	9 (36%)	13 (52%)	0.25 (C)
	Female	16 (64%)	12 (48%)	
BMI	Mean (SD)	25.9 (4.3)	26.9 (4.2)	0.41 (I)

p >0.05 – There is no statistically significant difference in characteristics between the two groups. I – Independent t test, C – Chi square test.

This table shows the sociodemographic characteristics of the study population. There is no

statistically significant difference in age, gender and BMI between the two groups.

Table 2: Distribution of hernia types

Characteristics	Category	Traditional closure	Closure by Quilting	p value
Hernia type	Epigastric	2 (8%)	2 (8%)	1.00 (F)
	Incisional <5cm	8 (32%)	8 (32%)	
	Incisional >5cm	5 (20%)	5 (20%)	
	Umbilical	10 (40%)	10 (40%)	
Defect size	Mean (SD)	2.6cm (2cm)	2.7cm (2cm)	0.88 (I)

This table shows the that distribution of ventral hernia- epigastric, incisional and umbilical hernias

between the two study groups were similar, thereby ensuring comparability between them.

Table 3: Comparison of seroma formation in two groups.

Seroma	Category	Traditional closure	Closure by Quilting	p value
Seroma formation	Yes	8 (32%)	0 (0%)	0.004 (F)
	No	17 (68%)	25 (100%)	

p <0.05 – There is a statistically significant difference in seroma formation between the two groups. F – Fisher exact test

In traditional closure group without quilting, 32% had seroma formation and in closure by quilting group, none had seroma formation. There is a

statistically significant difference in seroma formation between the two groups.

Table 4: Comparison of drain usage characteristics in two groups.

Characteristics	Category	Traditional closure	Closure by Quilting	p value
Day 1 drain volume	Mean (SD)	69.2ml (24.5)	56.0ml (17.4)	0.033 (I)

Total drain volume	Mean (SD)	223.8ml (149.3)	131.8ml (64.6)	0.007 (I)
Drain removal day	Mean (SD)	5.4 days (2)	3.9 days (1.2)	0.003 (I)
p <0.05 – There is a statistically significant difference in drain usage characteristics between the two groups. I – Independent t test				

On comparison between the two groups, it is clearly evident that day one drain volume, total drain volume was significantly lower in patients who underwent closure by quilting technique when compared with

patients who underwent closure by traditional techniques. Thereby leading to early drain removal in patients who underwent closure with quilting sutures.

Table 5: Comparison of drain usage characteristics and seroma formation.

Characteristics	Category	Seroma	No seroma	p value
Day 1 drain volume	Mean (SD)	93.7ml (20.6)	56.6ml (16.8)	<0.001 (I)
Total drain volume	Mean (SD)	380ml (167.5)	139.2ml (61.5)	<0.001 (I)
Drain removal day	Mean (SD)	7.6 days (1.9)	4.1 days (1.1)	<0.001 (I)
p <0.05 – There is a statistically significant difference in drain usage characteristics between the two groups. I – Independent t test				

The drain volume was higher in patients with seroma and drain removal took longer in patients with seroma. There is a statistically significant difference in day 1 drain volume, total drain volume and drain removal day between those with seroma and those without seroma.

DISCUSSION

On analysing the study, we find that the Group B who have undergone closure of ventral hernia via quilting suture method had average day 1 output and average total drain output lesser than the Group A that underwent closure by traditional closure without quilting. The average day of drain removal is also less in Group B compared to Group A. There is no seroma formation in Group B, whereas in Group A 8 cases of seroma formation is reported.^[14]

The study shows that quilting techniques are effective in seroma reduction and dead space elimination. Quilting sutures work by securely approximating tissue layers and closing off potential spaces where serous fluid might accumulate, effectively reducing the likelihood of seroma formation. This aligns with previous researches showing that reducing dead space is vital for minimizing seroma in surgical patients.^[15]

Quilting sutures have proven to decrease the drain volume in post-operative day 1 and total drain output thereby facilitating earlier drain removal, reduced patient discomfort, lower infection rates, faster recovery times, reducing the hospital stay and improved recovery trajectories. This aspect is particularly significant as prolonged drain use can increase the risk of secondary infections, particularly when synthetic mesh is present, which requires careful postoperative management.

The promising outcomes observed in this study support further exploration into the use of quilting sutures beyond ventral hernia repair. Other abdominal and reconstructive surgeries that involve significant tissue dissection and risk of seroma may benefit from similar techniques. Future research could focus on larger, multicentric trials to confirm these findings and assess long-term outcomes, such as hernia recurrence rates and patient-reported quality of life.

CONCLUSION

In conclusion, quilting sutures shows a clear benefit in reducing postoperative seroma formation, lowering drain volumes, and facilitating faster recovery in patients undergoing open mesh repair for ventral hernia. By effectively minimizing dead space, this technique can potentially transform standard hernia repair protocols, especially in cases with high risk for fluid-related complications. Further research is warranted to validate these findings, optimize patient selection, and explore broader applications for this technique in surgical practice.

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