ORIGINAL ARTICLE

EFFECT OF QUILTING SUTURE INTERVAL ON DONOR SITE SEROMA AFTER LATISSIMUS DORSI MUSCLE FLAP

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Background: Among many post-operative complications of Latissimus Dorsi flap, seroma is the most difficult and debilitating complication. Many methods were implemented but quilting sutures remains the excellent option to counter this issue. But distance between quilting sutures still remain under debate, so to address this issue current study was devised to analyse and gather date regarding post-operative seroma rates at different intervals of quilting sutures. **Methods:** This study was done in Jinnah burn and reconstructive centre, Lahore from January 2016 to September 2017.In accordance to quilting distance, all patients were assigned randomly into three groups: 6-cm quilting (n=12), and 3-cm quilting (n=12), non- quilting (n=10). Primary outcome measures were the drainage volume, removal time, seroma formation, frequency of aspiration and recovery time. **Results:** No significant difference were found in quilting group. Drain removal time is shorter in the 6-cm quilting and 3-cm quilting groups as compared to non-quilting as well as drain output which was significantly decreased in quilting group. The rate of seroma formation and frequency of aspiration was much higher in non-quilting group as compared to 6-cm quilting and 3-cm quilting groups. **Conclusion**: Quilting is a reliable way in prevention of seroma formation and reducing its volume. Our findings indicate the 6-cm suture interval is enough to avoid these complications.

Keywords: Seroma; Latissimus dorsi flap; Quilting sutures

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INTRODUCTION

Latissimus dorsi flap is the multipurpose flap used as first option in many reconstructive scenarios. The advantages like reliable vascular supply, wide arc of rotation, large volume make this a workhorse flap to be used in reconstructive surgery of head & neck,[1–6] breast,[7–10] extremities[11–16] and thoracic region[17–23]. However, the main drawbacks include donor area complications like prolong drainage from surgical site, and in many cases followed by seroma formation.[24–27] Seroma is the major complication and it is reported to be ranging from 29–71%.[28,29]

Large seromas increases patient discomfort, increases the hospital visits due to repeated aspirations and also been reported to exaggerate the risk of infections, wound dehiscence, and ultimately flap necrosis.[30,31] The main causative factors include dead space formation during respiration, large volume of flap, obesity, use of anti-depressants etc.[32–37] To counter this complication, many techniques has be devised i.e. closed suction drainage, subsequent rows of quilting sutures, and use of fibrin glue products.[27,34,38-41] From all of these techniques , quilting sutures is proved to be most successful in reducing the risk of seroma formation leading to early recovery. In this study, we evaluated the role of quilting at different intervals by measuring outcomes in terms of drainage volume, removal time, seroma formation and of frequency of aspiration.

MATERIAL AND METHODS

The study is approved by our institutional review board and ethical committee. From January 2016 to September 2017, total of 34 patients with mean age of 32 years were included according to criteria in table-1. After explaining the procedure, detailed consent was taken from patients. All patients underwent reconstructive surgeries with latissimus dorsi flap without skin peddle with mean flap size of 8.5×17.5 cm. Data was entered and analysed in SPSS. Mean and Standard deviation was calculated for numerical variables like age, drainage volume, removal time and number of drainage procedure, frequency and percentages were calculated for nominal variables like seroma formation. ANOVA test was to compare the means between three groups and chi-square test was applied for seroma formation with *p*-value of .05 as statistically significant.

All participants including patient, surgeon and staff were blinded before operation. Randomization is done by using computer generated random numbers corresponding to one of the three limbs of trail. These were sealed in envelopes and opened by nurse in charge before skin closure. Final

analysis includes 12 patients each in 6-cm and 3-cm quilting distance group and 10 in control non-quilting group. After harvesting of latissimus dorsi muscle, cavity was washed with 1-2 L of warm saline. Drains were placed at different areas and secured. In non-quilting group, closure was done in 2 layers with vicryl 2/0 and prolene 3/0. In quilting group, horizontal layers of suturing were done 3 cm and 6 cm apart with vicrly 3/0 as shown in Figure-1 & 2 respectively. The sutures were set between underlying skin flap and chest wall fascia and appropriately tensioned to reduce the risk of wound dehiscence.

Drainage volume was monitored daily and emptied at the end of the day. When drain output is <30 ml/d, drain was removed. Definition of seroma is defined as a palpable fluid collection at the flap donor site assessed by the primary surgeon, by the physician's assistant, radiologist or by patient-reported symptoms. Patients who developed seroma were evaluated in outpatient facility and examined by radiologist. Seroma was aspirated with ultrasound-guided 20-ml syringe when its volume is >30 ml or when patient reported inconvenience.

RESULTS

Out of 34 patients, 10 were in non-quilting sutures group and 12 patients each in 6-cm and 3-cm groups. As shown in table-2, there is a significant difference in drain removal time between quilting (mean=5.1 days) and non-quilting groups but no significant difference between both quilting groups (6-cm mean=2.6 days, 3-cm mean=2.4 days). The total mean drain volume in quilting group is 621 mL, in 6-cm group is 237mL and in 3-cm group is 167 mL. The total and daily drain volume is much higher in non-quilting group but a little difference between other two groups.

The rate of seroma complication is 40% in non-quilting group as compared to 6-cm (16%) and 3-cm (8.3%) quilting groups. The total aspirated seroma volume is not that significant among groups but frequency of visits is much higher in non-quilting group. Two patients undergone 3-cm quilting, developed skin dimpling after surgery but resolved after many months without any active management.

Table-1: Inclusion and exclusion criteria

Inclusion Criteria
Age: 15–50 years
Patients needing latissimus dorsi flap without skin paddle
Exclusion Criteria
Diabetic.
Patients underwent axillary dissection.
Previous radiation

Table-2: Comparison of drainage volume and seroma aspiration rate

	Non-quilting (n=10)	6-cm (n=12)	3-cm (n=12)
Time of drain removal (days)	5.1	2.6	2.4
Total mean drains volume (mL)	621	237	167
Daily mean drains volume (mL/d)	124.1	74	66.5
Frequency of aspiration	4	2	1
Total mean aspirated seroma per visit (mL)	58	51.2	50

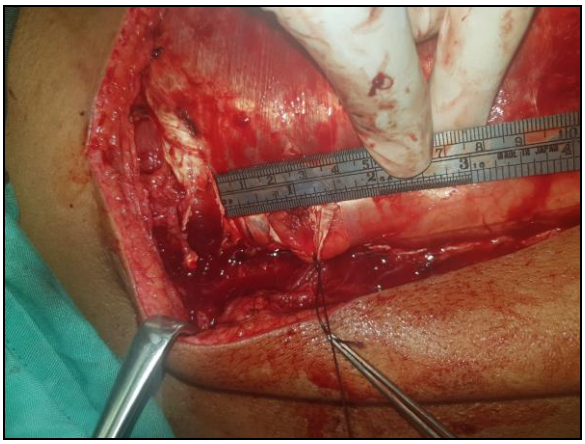

Figure-1: Quilting done at 3-cm distance

Figure-2: Quilting done at 6-cm distance

DISCUSSION

Seroma formation increases the patient discomfort as well as increases recovery time. Despite being the major complication, most of seromas resolve spontaneously.[34,39,46,48] Many modalities including suction drainage, fibrin glue, quilting have been tried and reported to counteract seroma complication.[49,50] The modern training of extensive use of electrocautery dissection, with other factors may contribute or even fails to prevent this complication.[24] The aim of quilting is to divide the large single cavity into smaller ones and along with the suction drain helps to decrease drain output as well as seroma incident.[24,27,32-41] This trail

evaluated the role of quilting sutures at 6-cm and 3-cm distances. As evident by our study, quilting shows decrease of drain output as well as fewer seroma complication as compared to quilting group.

A randomized control trail done by Daltrey *et al*[32] including 108 women reported on suture interval of 3-4 cm and another study by Mannu *et al*[42] done study using 5-cm interval. Because quilting divided the cavity into smaller unit and with the synergistic effect of closed suction drain, leads to early recovery, fewer seroma incidents. In this study, 6-cm and 3-cm intervals results in less drain output, reduced seromas and early recovery.

With all these benefits, there are some complications too. Excessive use of quilting over little distance with absorbable suture can lead to increase incidence of infection. Also, there is a risk of skin dimpling, which is due to thin flap or when quilting is done superficially. Our study shows that between 6-cm and 3-cm quilting distance, there is no significant differences found in terms of drain output, drain removal and seroma volume. Thus, concluded that 6-cm distance between quilting sutures is enough to prevent and reduce seroma volume, also less time consuming then 3-cm quilting. Intervals greater then 6-cm will fail to divide large cavity to avoid seroma formation and distances less the 6-cm are time consuming and increase the risk of infection, inflammation and skin dimpling.

Commonly the accumulation of lymphatic leakage and serum is termed as Seromas.[43,44] The main reason of seroma formation is inflammatory process caused by release of various types of cytokines, WBCs, chemokines and growth factors but an exclusive prophylactic or curative method is still deficit.[45,56] Due to these various seroma promoting factors, only procedure to decrease the seroma incidence is by reducing the cavity size. As evident in our study showing decrease incidence of seroma in quilting group but factor of seroma is present in all 3 groups. Thus, deducing that volume of seroma is not subjective to inflammatory mediators but on the size of cavity created at donor site.

The limitations of this study are that it is performed on a small group, further research is needed on a bigger population for accurate theory establishment and enhanced results.

CONCLUSION

The use of quilting in closure of latissimus dorsi flap donor site is helpful in reducing seroma volume as well as recovery time. There is no need to apply compact quilting sutures, 6-cm distance is enough to reduce the risk of increase drain output, seroma volume and long recovery time.

AUTHORS' CONTRIBUTION

ARG: Data collection, Analysis, Biostatics, Surgical assistance, Tables & charts. MSR: Surgical contribution, Data analysis, Final corrections, photographs

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