Research Article

Role of Quilting Sutures in Reducing Seroma Formation in Latissimus Dorsi Flap Donor Site: A Randomized Controlled Trial

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Abstract |

Background: The Latissimus Dorsi Flap is a commonly used flap for breast and upper limb reconstruction. One drawback of this flap is donor site seroma formation. The objective of this study is to evaluate the role of quilting sutures in prevention of seroma formation over donor area after latissimus dorsi flap.

Methodology: This is a randomized controlled trial conducted at Jinnah burn and reconstructive surgery Centre, Lahore over a duration of 4 years from June 2016 to June 2020. The sample size was 78 patients who were all planned to undergo free latissimus dorsi flap reconstruction. The patients were randomized by the lottery method into two groups of 39 patients each: group A (quilting) patients had their donor sites closed with quilting sutures, whereas and group B (control) patients had their donor sites closed without quilting sutures. Drains were placed in all patients and output was monitored until removal. Results were evaluated by comparing seroma formation, drain output in 48 hours, and drain removal time.

Results: Overall 19 patients (24.3%) developed seroma. Quilting technique reduced the incidence as only 2 patients (2.5%) developed seroma, in comparison with non-quilting group in which 17 patients (21.7 %) developed this complication. Quilting group was also associated with decreased total drain output and early drain removal.

Conclusion: As compared to traditional method of primary closure of latissimus dorsi flap donor area, quilting suture technique proved to be more effective in preventing post-operative seroma formation.

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Introduction

The latissimus dorsi myocutaneous flap (LD flap) is one of the most common flaps used surgical for breast and upper limb reconstruction.[1] The LD flap has many benefits including an easy approach, predictable blood supply and adequate size.[2] One drawback of this flap is donor site seroma formation, the incidence of which is reported from 29% to 71%. .This increases patient discomfort and prolongs hospital stay. The aetiology of seroma formation is complicated and multifactorial. Dead space formation during respiration, excessive use of coagulation, release of inflammatory mediators while dissection and disruption of lymphatics are prominent causes of seroma formation.[4,5]

Preventive measures and treatment protocols for this particular problem have been documented in multiple times in the literature. Established seromas are usually treated with repeated aspirations, steroid injections, or placement of drainage tubes.[6] Traditionally to counter this problem drains are placed in donor area, but it increases patient discomfort and its prolonged use provides a source for secondary infection which increases overall morbidity.[7] Some newer intraoperative methods

to prevent seroma formation includeendoscopic harvest, fibrin glue, and placement of quilting sutures.[6]

Quilting is a mechanical method of dead space closure which has recently emerged as an effective means of preventing seroma. In this technique, chest wall is approximated with skin flap by means of multiple lines of sutures which ultimately leads to reduction in dead space. Although it is time consuming, it has shown decreased seroma formation in latissimus dorsi surgery, abdominoplasty and breast reconstruction.[8-11] The aim of this study was to evaluate the role of quilting sutures in alleviating seroma formation.

Methodology

This was a randomized controlled trial, conducted at Jinnah Burn and Reconstructive Surgical Centre, Lahore from June 2016 to June 2020. A sample size of 78 subject (39 in each group) was calculated from win-pepi ver: 11.15 with 95 % confidence interval, 80% power of study, ratio of sample size B:A of 1, assu-ming overall incidence of seroma in Group A (Quilting) of .76 and in group B (Control) of .49 to detect a difference of 200 (from study of Shin et al).[11]

Inclusion criteria were patients aged 15 years or older, of either gender requiring reconstruction with latissimus dorsi flap without skin paddle. Patients with septic wounds, uncontrolled diabetes mellitus, or history of bleeding disorder were excluded. Informed consent was taken from patient after explanation of procedure and study objectives. All patients and hospital staff were blinded for the study duration.

Randomization was done by using the lottery method. The operating surgeon was blinded preoperatively, but un-blinded intraoperatively. Before skin closure, the attending surgeon was provided an envelope containing a number corresponding to one of the two arms of the trial. In Group A (quilting) patients, donor site closure was done with quilting sutures. Horizontal rows of vicryl were positioned 4-5 cm apart, reducing dead space between skin flap and chest wall. Two redivac drains were placed and primary skin closure was done as shown in Figure 1. The control group had their donor site incision closed primarily in two layers using sutures (2-0 vicryl, Prolene 3-0).

Outcome measures were as follows:

1) Seroma formation: demonstrable fluid collection at donor site, clinically examined by a doctor, and confirmed with drainage using aseptic technique
2) Daily and total drain output in first 72 hours
3) Day or removal of last drain: defined as the day of removal of second drain. Criterion for removal was output less than 300ml/24 hours

Data was entered and analysed in SPSS ver: 21.0. Frequency and percentages were calculated for nominal variables like gender, complications. Mean and standard deviation were calculated for numerical variables like age, drain output and drain removal time. Complication rate among groups was also assessed and recorded on subsequent visit or admission.

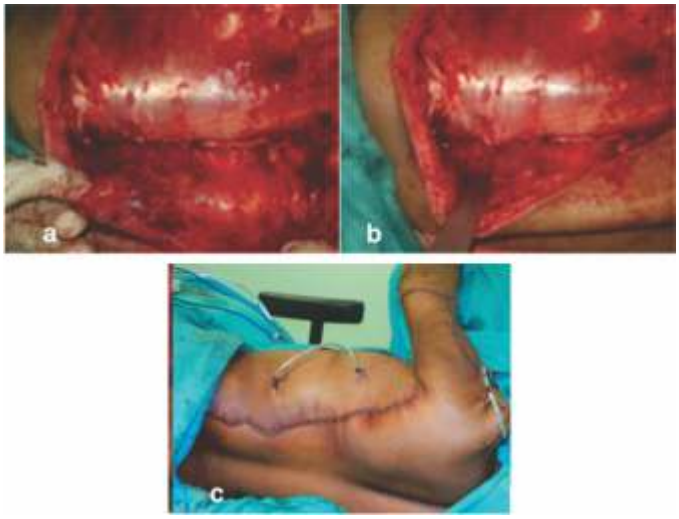

Figure 1. *(a).(b)Donor site showing quilting sutures. (c). Closure of donor site with drains in-placed*

Results

Mean age of the patients was 38.5 years. Majority of the patients were males. Details of the demographic and clinical characteristics of the patients is shown in table 1. There were no significant diffe-rences between the two groups in this regard.

Table 1: *Comparison of demographic data and clinical characteristics between the two groups*

	Overall	Group A (Quilting)	Group B (Control)	P-value
Mean age (years)	38.5	36.7	40.5	0.118
Gender (n/%)				
Male	60(80.8%)	31	29	0.389
Female	18(19.2%)	08	10	
Flap area (cm^2)				
Maximum	200	200	194	0.072
Minimum	105	109	105	0.182
Etiology (n/%)				
Trauma	58(74.3)	28(71.7)	30(76.9)	
Burn	08(10.2)	03(7.6)	05(12.8)	0.228
cancer	12(15.3)	08(20.5)	04(10.2)	

Total incidence of seromawas 24.3% (19 patients). Out of these, 17 patients (89%) belonged to non-quilting group. The mean day of drain removal was less in quilting group (2.7 days) as compared to control group (4.0 days). The total drain output in first 72 hours was significantly lower in quilting group (143 ml) as compared to non-quilting/control group (240 ml). All of the above differences in the two groups were statistically significant. The findings regarding outcome measures are detailed in table 2. A total of 5 patients (6.4 %) needed hospital admission due to complications (Table 3). There was

Table 2: *Comparison of outcome measures between the two groups*

Outcome	Group A (Quilting)	Group B (Control)	P-value
Seroma (n/%)	2 (5.1)	17 (43.6)	<0.001
Drain output (ml)			
Day 1	82	107	
Day 2	43	82	<0.05
Day3	17	51	
72-hour Total	143	240	
Day of removal of all drains (mean)	2.7	4.0	<0.05

Table 3: *Comparison of complications between the two groups*

Complications	Group A (Quilting)	Group B (Control)	P value
Haematoma	1 (2.5%)	2(5.1%)	0.32
Flap Necrosis	2 (5.1%)	2 (5.1%)	1.00
Readmission	2 (5.1%)	3 (7.6%)	0.81
Infection	1 (2.5%)	1 (2.5%)	1.00

no significant difference in complication rates between the two groups.

Discussion

Although not a life threatening condition, seroma remains the most common impediment regarding donor site. Multiple modalities have been developed to counter this problem. This randomized controlled study evaluated the role of quilting in prevention of seroma. Quilting sutures over flap divides the dead space in multiple pockets reducing the overall drain output and seroma risk as evident by our study. Many studies have also shown same results, as reported by Sajid et al[9] on 440 participants, and by Daltrey et al.[8] However in both case series, there was an overall high seroma incidence which the authors attributed to the fact that extended latissimus dorsi flap was harvested in all cases instead of traditional one. In these studies, there was no co-relation between complication rate and use of quilting sutures, as we also determined in the present study.

Lee and Mun,[13] conducted a study in which they used fibrin sealant in combination with quilting sutures to close donor site and reported overall decrease incidence of seroma formation. Another study reported by Shin et al. showed, incidence of seroma of 42.9 percent in group which combined quilting technique with fibrin sealant and 76.0 percent in group which only used fibrin sealant.[11] Again, incidence of seroma reported in this study is quite higher than those recorded here, but at the same time combining techniques got better results. The combination has a dual effect, with closure provided by quilting technique and fibrin sealant addressing the production of serous fluid.

Another study emphasized the use of biodegradable polymers, polyglycolic acid (PGA) and concluded its usefulness in decreasing donor site seroma ($p<0.01$)[16]. The use of sclerosing agent abnobaviscum for treatment of refractory seromas has also been documented[17].

As far as complications are concerned, after seroma formation, an uncommon complication is ischemic necrosis. Due to the reliable vascular thoracodorsal pedicle and straightforward dissection, chances of flap necrosis are low even in diabetics or smokers[18]. We found hematoma in 2.5% cases followed by flap necrosis in 5.1% cases, which is similar to what is described in the literature.[19,20]

Conclusion

The use of quilting sutures considerably reduces the incidence of seroma production. In future, further studies should be considered regarding combinations of various modalities to reduce the risk of seroma formation.

Conflict of Interest *None*

Funding Source *None*

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