Total quilting suture at latissimus dorsi muscle donor site: Drain tube is no longer needed

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Purpose: The purpose of this study was to assess the effect of quilting suture extent on the latissimus dorsi myocutaneous flap (LDMCF) donor site and the necessity of drainage.

Methods: Clinical data of 136 breast cancer patients, who underwent breast reconstruction using LDMCF between May 2014 and December 2015, were retrospectively reviewed. Patients were divided into three groups. Group A: quilting sutures were performed on half of the LDMCF donor site and a closed suction drain was inserted. Group B: quilting sutures were performed for the entire LDMCF donor site and a closed suction drain was inserted. Group C: quilting sutures were performed for the entire LDMCF donor site and no drain was inserted. The duration of drainage, total drainage, length of hospital stay, number of postoperative aspirations for seroma removal, and total aspirated volume were compared.

Results: In the comparison of groups A and B, group B showed better results including the total amount of drained seroma, drain maintenance period, number of aspirations for seroma removal after drainage tube removal, total aspirated seroma, and hospitalization period with statistical significance ($P < 0.05$). In the comparison of groups B and C, group C without drain showed no difference in all other variables except mean total drained seroma volume. Therefore, group C was superior to group A and there was no difference compared to group B with drain, even though the drain was not inserted.

Conclusion: Total quilting suture at LDMCF donor site can reduce seroma formation and eliminate the need for a drain tube.

Keywords: Quilting suture, Latissimus dorsi myocutaneous flap, Seroma, Mammoplasty, Breast neoplasms

INTRODUCTION

Latissimus dorsi myocutaneous flap (LDMCF) is one of the most frequently used autologous tissue flaps for breast reconstruction after partial or total mastectomy in patients with breast cancer. The most common postoperative complication in reconstructive surgery using LDMCF is seroma formation at the donor site. The incidence of seroma formation at the LDMCF donor site has been reported as high as approximately 70% to 80% [1-3].

Postoperatively, a seroma can cause patient discomfort and a longer period for maintaining the drain tube, which can lead to longer hospitalization. In addition, frequent needle aspiration of a seroma or outpatient visit may be required. A seroma can be a substantial cause of a patient's discomfort, anxiety, infection, wound dehiscence, and consequently, flap necrosis, and scarring [4,5]. Consequently, postoperative adjuvant therapy including chemotherapy and radiation therapy may be delayed. Several studies have shown that use of the quilting suture technique at the LDMCF donor site helps reduce seroma formation and further complications after breast reconstruction surgery [6-12]. However, there has been no previous study about the effect regarding the extent of quilting suture at the LDMCF donor site. We investigated the degree of seroma formation and the need for a drainage tube according to the extent of quilting suturing at the LDMCF donor site.

METHODS

Ethical statement

The ethical committees of Pusan National University Hospital ap-

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proved the present study, and the need for informed consent was waived because of the retrospective nature of the study (IRB No. H-1908-023-082).

Study population

Clinical data of 136 patients with breast cancer who underwent partial or total mastectomy with immediate breast reconstruction using an LDMCF between May 2014 and December 2015 were retrospectively reviewed. By reviewing medical reports, we investigated patients' demographic characteristics and postoperative outcome.

Patients were divided into three groups according to the extent of the quilting suture and presence of drainage at the LDMCF donor site: A, B, and C. In group A (45 patients), quilting sutures were performed on half of the LDMCF donor site and a closed suction drain was inserted. In group B (45 patients), quilting sutures were performed for the entire LDMCF donor site and a closed suction drain was inserted. In group C (46 patients), quilting sutures were performed for the entire LDMCF donor site and no drain was inserted.

Quilting suture procedure

For the quilting suture procedure, the subcutaneous tissues were sutured to the underlying muscles with several interrupted sutures to reduce the dead space of the flap donor site (Fig. 1). Then, to avoid deformation, such as skin wrinkles and depressions, we ensured that there was no tension. To minimize skin deformation, the sutures proceeded from the side distal from the skin incision to the proximal side. Absorbable monofilament suture (Monosyn 3.0; Aesculap Inc., Center Valley, PA, USA) was used with a suture

Fig. 1. Quilting suture technique. Multiple rows of sutures are placed between the subcutaneous tissue and underlying chest wall muscle. Then, the dead space is obliterated.

Fig. 2. Group A (half quilting). (A) The latissimus dorsi myocutaneous flap is placed in the subcutaneous pocket (dotted circle) near the ipsilateral scapula, and quilting suturing is performed on the area indicated by the letter X. (B) After quilting suturing is completed on the distal region from the skin incision line, a closed suction drain tube is inserted, and skin closure is performed (the right side of the figure is the cranial direction, and the left side is the caudal direction).

interval of 3–4 cm. Overall, 15–25 sutures were used according to the extent of quilting suturing.

In group A, quilting suturing was performed in only the lower half of the LDMCF donor sites because the obtained LDMCF was placed in the pocket under the skin of the subaxillary region (Fig. 2). Next, a closed suction drain was inserted into the LDMCF donor site.

Conversely, in groups B and C, a new skin incision of about 3–4 cm long was made in the subaxillary region, and the obtained LDMCF was pulled out through the skin incision. Therefore, quilting suturing of the upper half region of the LDMCF donor site, which

could not be performed in group A, becomes possible. As a result, total quilting of the LDMCF donor site was performed in groups B and C (Fig. 3). Subsequently, a closed suction drain was inserted in group B but not in group C. After completing quilting suturing in groups A, B, and C, the skin incision of the back site was closed with subcuticular sutures and skin staples, and a dressing band was attached.

In groups B and C, the removed LDMCF was wrapped in an aseptic manner using a disposable drape. Next, we changed the patient's position from lateral decubitus to supine (Fig. 4). Then, partial or total mastectomy was performed to remove the tumor, and

Fig. 3. Groups B and C (total quilting). (A) The subaxillary skin incision is indicated by an arrow. (B) The procedure involving quilting with exteriorization of the latissimus dorsi myocutaneous flap through a subaxillary skin incision and completion of quilting sutures is indicated by the letter X (the right side of the figure is the cranial direction, and the left side is the caudal direction).

Fig. 4. In groups B and C, (A) after total quilting and skin closure, the removed latissimus dorsi myocutaneous flap (LDMCF) (arrow) is wrapped in an aseptic manner using a disposable drape. (B) Next, the patient's posture is changed from lateral decubitus to supine, and partial or total mastectomy with breast reconstruction using the LDMCF (arrow) is performed (the right side of the figure is the cranial direction, and the left side is the caudal direction).

breast reconstruction was completed using the obtained LDMCF.

Drains were removed when the amount of drainage was less than 50 mL per day or at no later than 14 days postoperatively. Patients were discharged after drain removal unless other complications occurred.

Follow-up

At outpatient visit, a physical examination and ultrasonography were used to confirm the presence of a seroma in the LDMCF donor site, and ultrasound-guided needle aspiration was performed in cases of seroma formation. The number of needle aspirations and amount of aspirated seroma were recorded.

Statistical analysis

Data are expressed as a mean and standard deviation. One-way analysis of variance or the Kruskal-Wallis test was used to analyze the mean difference among the three groups. Multiple comparisons were performed using the Bonferroni method (i.e., the post-hoc test). Statistical analysis was performed using SAS 9.3 (SAS Institute, Cary, NC, USA) and a 5-percent significance level.

RESULTS

The demographic characteristics of 136 patients are shown in Table 1. There was no statistically significant difference in age, body

mass index, and weight of resected breast tissue, mastectomy extent (partial/total), proportion of axillary node dissection among the three groups.

Postoperative outcomes according to the extent of quilting suture at the LDMCF donor site are shown in Table 2. The duration of drainage, total drainage, length of hospital stay, number of postoperative aspirations for seroma removal, and total aspirated volume were compared. In group A and B, drained volume means the sum of the amount drained from breast and LDMCF donor sites (drain tubes inserted at the breast and LDMCF donor site were gathered into the same drain bag). In group C, drained volume means the sum of the amount drained from the breast (drain tube was not inserted in LDMCF donor site).

When group A was compared with groups B and C, group A showed poor results in all variables, including the total amount of drained seroma, drain maintenance period, number of aspirations for seroma removal after drainage tube removal, total aspirated seroma, and hospitalization period.

In the comparison of groups B and C, there was no difference in the remaining variables, except for total drained seroma regardless of the drainage tube. Group B had a higher amount of total drained seroma than group C (1,013.3 mL vs. 703.8 mL), probably because the generated seroma is more easily drained through the tube.

Table 1. Demographic characteristics of 136 patients with breast cancer

Characteristic	Group A (n = 45)	Group B (n = 45)	Group C (n = 46)	P-value
Age (yr)	46.0 ± 7.6	48.6 ± 7.9	49.4 ± 7.5	0.12
BMI (kg/m ²)	22.8 ± 3.1	22.9 ± 2.9	23.6 ± 2.6	0.21
Weight of removed breast tissue (g)	224.1 ± 96.3	193.8 ± 97.2	183.9 ± 105.8	0.06
Mastectomy extent (partial/total)	37/8	31/14	35/11	0.34
Axillary node dissection	2 (4.4)	0	0	0.13

Values are presented as a mean ± standard deviation or number (%).

Group A (half quilting with suction drain), group B (total quilting with suction drain), and group C (total quilting without suction drain).

Table 2. Postoperative outcome according to the extent of quilting suture at the latissimus dorsi myocutaneous flap donor site

Postoperative outcome	Group			P-value (A vs. B)	P-value (A vs. C)	P-value (B vs. C)
	A (n = 45)	B (n = 45)	C (n = 46)			
Total volume of drained seroma (mL)	1,420.7 ± 498.5	1,013.3 ± 570.2	703.8 ± 497.0	< 0.0001	< 0.0001	0.0125
Drain maintenance period (day)	8.8 ± 2.0	6.8 ± 2.5	7.2 ± 2.9	< 0.0001	0.0002	1.0000
No. of aspirations for seroma removal after drainage tube removal	1.4 ± 1.7	0.7 ± 2.1	0.7 ± 1.2	0.0009	0.0146	0.3448
Total aspirated seroma volume after drainage tube removal (mL)	73.6 ± 106.8	58.2 ± 253.2	36.8 ± 71.4	0.0012	0.0295	0.9157
Hospital stay (day)	10.0 ± 2.6	8.1 ± 2.4	8.3 ± 3.0	< 0.0001	0.0002	1.0000

Values are presented as a mean ± standard deviation.

Group A (half quilting with suction drain), group B (total quilting with suction drain), and group C (total quilting without suction drain).

DISCUSSION

The causes of seroma formation after surgery vary and include various dissection sizes, shearing between the subcutaneous tissue and underlying muscle, dead space, leakage from disruption of the lymphatic and vascular channels, and inflammatory processes [13,14]. Preventive methods for postoperative seroma formation include quilting sutures, observation of progress, use of a compression garment, triamcinolone injections, and use of a fibrin sealant [2,9,10,15-20].

In a systematic literature review by Sajid et al. [21], the quilting technique reduced the frequency of seroma formation in the LDMCF donor region, decreased the average volume of the seroma, and reduced drainage of the seroma. In addition, quilting sutures did not increase the risk of postoperative complications. However, observation of progress can be delayed if the treatment period takes a long time, increases the number of outpatient visits, and requires additional treatment. Additionally, use of a compression garment is limited in effectiveness because of pressure from the abdomen and high patient discomfort. Other methods using drugs can cause side effects, such as infection and allergic reaction [12].

Recently, the effect of combining quilting sutures with a fibrin sealant for LDMCF donor sites has been studied. Dancey et al. [12] and Shin et al. [17] reported that the quilting maneuver is stronger than the use of a fibrin sealant in the reduction of seroma occurrence. Bailey et al. [2] showed that the combination of the two methods (quilting sutures and fibrin sealant) can significantly reduce the rates of seroma formation when compared with quilting sutures only. However, a large-scale randomized controlled study is required to achieve stronger, more reliable evidence before this combination of methods can be used routinely in clinical practice. Furthermore, fibrin sealant is costly, and therefore, can be used optionally.

In some cases, postoperative seroma formation at the LDMCF donor site is an inevitable problem. However, one of the easiest-to-apply methods is to perform quilting suturing at the LDMCF donor site. This method also requires no complicated technique and no additional cost. In several studies, it has been reported that reducing the dead space of the LDMCF donor site through use of quilting sutures can reduce postoperative seroma formation [6-12].

In our study, although there was no statistical significance ($P = 0.06$), the amount of resected breast tissue in group C tended to be relatively small compared to the other two groups (Table 1). The amount of resected breast tissue may affect the outcome of this study. However, results we consider to be more meaningful in

this study is as follows: In terms of “number of aspirations for seroma after removal of drain tube, total aspirated seroma volume after removal of drain tube,” group C with total quilting and no drain showed better results than group A with half quilting. Additionally, group C showed similar results to group B with total quilting and drain.

In conclusion, the greater the extent of the quilting sutures, the greater the reduction in dead space, and therefore, the greater effect of seroma reduction. In fact, in this study, the effect of total quilting on seroma reduction was better than half quilting, and a drain tube might not be needed.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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