

Effects of Quilting Suture Interval on Donor Site Seromas After Breast Reconstruction With Latissimus Dorsi Muscle Flap: A Randomized Trial

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Abstract

We evaluated the effects of different intervals of quilting sutures on the postoperative drainage volume and components of seroma fluid. Performing quilting sutures on latissimus dorsi flap donor sites is effective in reducing postoperative seromas. The results of the present study showed the 6-cm suture interval to be appropriate.

Background: Although breast reconstruction using a deep inferior artery perforator flap has been increasing, using a latissimus dorsi (LD) muscle flap is still the favored method for Asian female patients with breast cancer. However, because the incidence of donor site seromas has been relatively high, a quilting method on the donor cavity or insertion of drainage tube has been used to reduce the incidence and/or severity of postoperative seroma. We evaluated the effects of different intervals of quilting sutures on the postoperative drainage volume and components of seroma fluid. **Patients and Methods:** A total of 36 patients with breast cancer underwent partial or total mastectomy with LD flap reconstruction. They were randomized into 3 groups according to the interval of quilting sutures: non-quilting (n = 10), 6-cm quilting (n = 14), and 3-cm quilting (n = 12). The clinicopathologic factors and time to drain removal, drainage volume, frequency of aspiration, and serous fluid components were investigated. **Results:** No statistically significant differences were found in the clinicopathologic factors among the 3 groups. The time to drain removal was significantly shorter in the 6-cm quilting and 3-cm quilting groups than in the nonquilting group ($P = .039$ and $P = .041$, respectively). The total volume of drainage from the donor site was also decreased in the quilting groups (6-cm group, $P = .046$; 3-cm group, $P = .021$). The seroma components were not different among the 3 groups.

Conclusion: Performing quilting sutures on LD flap donor sites is an effective method to reduce the volume of postoperative seroma. The present findings showed that a 6-cm suture interval is appropriate.

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Introduction

Breast reconstruction using autologous tissue flaps has strong advantages compared with implant reconstruction. Among the

various autologous flaps available, a latissimus dorsi (LD) myocutaneous flap is one of the most popular flaps for immediate or delayed breast reconstruction after partial or total mastectomy.¹ Although breast reconstruction using the deep inferior epigastric artery perforator (DIEP) flap has been increasing, the DIEP flap has several limitations for Asian women because of their relatively low body mass index (BMI) and low incidence of obesity. Therefore, we have preferred performing breast reconstruction using an LD flap in Asian female patients with breast cancer. It is also generally an easy technique to perform and requires a shorter operative time than the DIEP flap, because only a few large vessels are present between the posterior chest wall and the muscle.²

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Interval of Quilting Sutures for LD Flap

However, the most common disadvantage of the LD flap is seroma formation at the donor site.³ When the seroma remains after removal of the drainage tube, it can result in infection, leading to a delay in adjuvant treatment, including chemotherapy and radiotherapy. It also requires frequent patient visits to the clinic for invasive needle aspiration.

Donor site seroma has been reported in 70% to 80% of autologous LD flap reconstructions.⁴⁻⁶ The major contributing factors include the volume of the harvested flap, leakage of the lymphatic vessels, a greater BMI, and the use of selective serotonin reuptake inhibitors.^{1,7} To prevent donor site seroma, the dead space can be managed with closed suction drainage, fixation with quilting sutures, and fibrin glue products.^{3,8-12} Of these options, the quilting suture is the most effective technique for reducing donor site seroma and enables faster recovery.

We investigated the effects of different quilting suture intervals on the drainage volume and recovery time.

Patients and Methods

From January 2013 to June 2015, 635 patients had undergone breast surgery at both our centers. Of these patients, only 36 consecutive patients with breast cancer who had undergone partial or total mastectomy with LD flap reconstruction were enrolled in the present study. Patients with comorbidities were excluded from the present study, and the surgeon chose the LD flap when the tumor-to-breast ratio was > 0.4 and more than one half of the breast was expected to be removed. The patients were randomized into 3 different suture groups: nonquilting ($n = 10$), 6-cm quilting interval ($n = 14$), and 3-cm quilting interval ($n = 12$). The samples were randomized using the extraction method according to a statistician's advice. The ethical committees of our institutions approved the present study.

All clinical data were collected and analyzed prospectively and included the clinicopathologic factors, time to drain removal, drainage volume, and analysis of the serous fluid from the donor site. The patient characteristics collected included age, BMI, type of mastectomy, weight of removed breast tissue, and the type, pathologic stage, and subtype of the breast tumor.

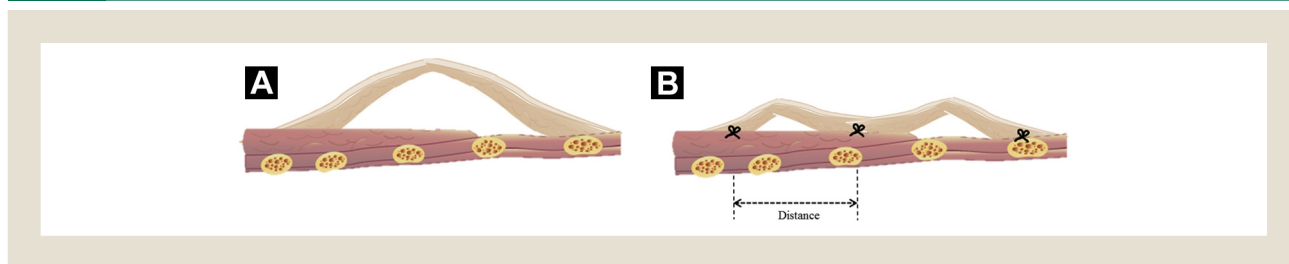
The surgical plan was chosen by the surgeon according to the size, stage, and clinical characteristics of each tumor. A radiologist used preoperative ultrasonography to mark the tumor on the skin before surgery. The LD flap was designed as an elliptical shape on the ipsilateral side of the patient's back and included the skin.

First, the LD flap was obtained with the patient in the decubitus position, and the volume of the flap was adjusted according to the amount of breast tissue expected to be removed. The LD muscle was dissected from the mid-axillary line to the level of the spinous processes of the thoracic and lumbar spine. The volume of the LD flap was estimated to be able to reconstruct the ipsilateral breast to about 120% of the original breast volume, owing to the radiotherapeutic shrinkage effect. All perforating vessels were ligated with electronic cautery and silk ligatures. After irrigating several times with 1 to 2 L of warm saline, 2 drainage tubes were inserted in different directions at the donor site. The incision was then closed with the folded LD flap still located in the cavity. Additionally, in the quilting groups, the sutures were set using 6- or 3-cm intervals of absorbable monofilament 3-0 suture (Monosyn; Ethicon, OH; Figures 1 and 2A). To prevent bulging of the skin after quilting suture use, the upper side of the skin should be pulled down the same as when an LD flap is not located in the donor site cavity.

After harvesting the LD flap, the patient was changed to the supine position, and the breast tumor was removed with a safety margin. In all cases, the breast tumors were removed with a > 1 -cm safety margin and the circumferential surgical margins were evaluated by intraoperative frozen section analysis for the presence of tumor cells. Pathologically, no inked tumor cell was defined as a negative resection margin. If the pathologist found neoplastic cells in the margin, additional excision was performed immediately. Either sentinel lymph node biopsy or axillary lymph node dissection was performed, according to the axillary lymph node status. After the tumor had been removed, the folded LD flap was pulled through the axillary tunnel from back to front. The breast reconstruction was then completed with the LD flap, with or without implant insertion.

The drainage tube, which was inserted at the donor site of LD flap, was removed when the drainage volume was < 30 mL/day during the hospital stay. The postoperative drainage fluid from the donor site was analyzed at postoperative day 3. The hematologic factors analyzed included white blood cells (WBCs), red blood cells, hemoglobin, and the proportions and absolute counts of neutrophils and lymphocytes. In the outpatient clinic, when the seroma volume was grossly estimated to be > 30 mL or the patient reported inconvenience because of seroma formation, ultrasound-guided needle aspiration was performed with a 20-mL syringe. Aspiration was repeated whenever the seroma volume was > 30 mL.

Figure 1 Schema of Seroma Cavity After Obtaining the Latissimus Dorsi Muscle Flap. (A) Nonquilting Group: Quilting Sutures Were Not Performed, and the Seroma Cavity Was Larger Than in the Other Groups. (B) Quilting Group: Quilting Sutures Were Performed At 6- and 3-cm Intervals



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