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Immediate two-stage nipple reconstruction with a local mastectomy flap following secondary autologous breast reconstruction

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Summary Because of the inevitable postoperative shrinkage, an initial hypercorrection is emphasized in nipple reconstruction with a random skin flap. However, the breast shape will be damaged if an excessively large flap is raised on the surface of the breast mound. A technique for immediate two-stage nipple reconstruction with a local mastectomy flap during the secondary breast reconstruction was reported in this study. From February 2011 to March 2014, 33 patients underwent breast reconstruction and immediate two-stage nipple reconstructions. A bipedicle deep inferior epigastric artery perforator (DIEP) flap was raised and folded upward to form the breast. Simultaneously, a deepithelialized lower mastectomy flap with a distant skin paddle was elevated and pulled throughout the reconstructed breast. The skin paddle was carefully sutured to the position of the future nipple. After 3 weeks, the pedicle of the mastectomy flap was divided, and the paddle was modeled to form the new nipple. Both the new nipple and the DIEP flaps survived postoperatively. The average projection of the reconstructed nipple was 15.4 ± 2.7 mm immediately after the surgery, which gradually decreased to 8.2 ± 1.1 mm during the first year of follow-up. A total of 29 patients ranked the aesthetic appearance of the reconstructed nipple and breast as "very good" or "good." On the basis of our breast-shaping techniques, the proposed immediate two-stage nipple reconstruction approach is able to maintain long-term residual projection and results in considerable patient satisfaction.
Level of evidence: IV.

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Introduction

Nipple reconstruction is the final stage of breast reconstruction, which can transform the breast mound into a real breast.[1,2] Various techniques involving local flap transfer have been proven to be more reliable, and have become the best options for recreating the nipple.[3–5] However, patients and plastic surgeons are often concerned about the long-term loss of nipple projection.[6,7]

Therefore, because of substantial flap shrinkage, it is currently a general practice to recreate a nipple that is 40–60 percent larger than the contralateral nipple.[8,9] However, it should be stressed that a significant amount of local tissue is harvested for such nipple reconstructions, and thus primary closure of the donor site results in a significant distortion and flattening of the reconstructed breast.[10]

Many Asian breast cancer patients do not have sufficient skin and adipose tissue in the lower abdomen. Therefore, a varied bipedicle deep inferior epigastric artery perforator (DIEP) flap is harvested and folded upward to form the breast.[11,12] The lower mastectomy skin that lies above the new breast footprint is often deepithelialized and inserted under the flap.[13] No study reports whether this skin can serve as an innovative source for nipple reconstruction. The purpose of this study was to investigate the effects and complications of our immediate two-stage nipple reconstruction procedure with a local mastectomy flap in secondary breast reconstruction involving a DIEP flap. Patient satisfaction was also evaluated via a questionnaire.

Patients and methods

Patients

The results of 33 patients who underwent immediate two-stage nipple reconstruction with a lower mastectomy flap during delayed breast reconstruction involving a DIEP flap in our department from February 2011 to March 2014 were retrospectively collected. Informed consent was obtained from all of the patients for using their data in accordance with the ethical standards of our institutional ethical committee. The mean age of the patients was 46 years (range 33–58) and their body mass indices (BMIs) ranged from 18.3 to 25.7 kg m^{-2} (mean 21.8). It is worth noting that all the patients previously underwent modified mastectomy without radiation therapy, which is evident from the appropriate horizontal scars visible on their chest walls.

Surgical techniques

Prior to the surgery, the normal breast footprint was reversed and drawn on the reconstructed side with the patient in the standing position. An inverted ladder-shaped flap based on a superior pedicle was designed along the midclavicular line between the horizontal scar and the new inframammary fold. The distant skin paddle, which will be used to reconstruct the future nipple, was designed to be slightly larger than the contralateral nipple (Figure 1, *top, left*). The remaining flap skin was deepithelialized without damage to the subdermal vascular networks. A deep skin incision was made through the subcutaneous fat to the pectoral fascia from the new inframammary fold, and the flap was elevated in this plane. A small piece of pectoralis major muscle was incorporated into the flap at the base to protect the tiny musculocutaneous perforators. An adequate flap length was ensured to prevent excessive tension when the flap was pulled throughout the DIEP flap. The flap viability was assessed by stabbing the distant border with a small needle. The remaining area of the new breast footprint was undermined and prepared for DIEP flap transfer (Figure 1, *top, middle*).

A bipedicle DIEP flap was harvested from the lower abdomen and transferred to the recipient site (Figure 1, *top, right*). The breast mound began to be shaped once the vascular supply to the flap was reconstructed.[12] The flap was folded upward into a conical shape to form the breast mound (Figure 1, *bottom, left*). The future nipple–areola complex was placed at the apex of the reconstructed breast mound. The symmetry of the nipple positions on the two sides was corrected with the patient in a semi-upright position[13] (Figure 1, *bottom, middle*). Subsequently, the elevated mastectomy flap was pulled throughout the breast mound and the distant skin paddle was sutured to the position of the future nipple (Figure 1, *bottom, right*).

After 3 weeks, the mastectomy flap pedicle was divided within the surrounding breast mound after reconstruction of the skin paddle vascularity. The skin paddle was then folded by itself to form the nipple (Figures 2 and 3). The deepithelialized flap pedicle was buried in the breast mound.

Clinical assessment

The projection of the new nipple was measured using calipers by an investigator during surgery and 3, 6, and 12 months after the surgery. After 1 year of follow-up, all the patients were asked by the investigator to evaluate their degrees of satisfaction (very good, good, moderate, or poor) regarding the projection, shape, size, position, and overall impression of the new nipple and breast.

Results

In all 33 patients, both the new nipple and the DIEP flaps survived postoperatively. Complications, such as partial or total flap necrosis, wound infection, and formation of hematoma and seroma, were not observed in any of them.

Six patients were tattooed in an outpatient clinic after nipple reconstruction. The remaining patients were satisfied with the outcome of the reconstruction and required no tattooing.

The mean nipple projection was 15.4 $\pm$ 2.7 mm immediately after the surgery, which gradually decreased to 11.3 $\pm$ 2.0, 9.1 $\pm$ 1.6, and 8.2 $\pm$ 1.1 mm at 3, 6, and 12 months, respectively.

Patient satisfaction was also assessed via a questionnaire after 1 year of follow-up. Regarding the overall impression of the breast and nipple reconstructions, 73%, 15%, and 12% of the patients ranked it as very good, good,