Breast reconstruction with the deep inferior epigastric artery perforator (DIEP) flap is now widely used because it has a high quality of skin texture, rich adipose tissue, and less donor site morbidity. However, a disadvantage of the DIEP flap is that it can only be used once for the same patient.

A patient in our institution developed metachronous breast cancer after contralateral breast reconstruction with a DIEP flap. The DIEP flap cannot be used or considered for breast reconstruction; therefore, the latissimus dorsi musculocutaneous flap (LD flap), profunda artery perforator flap (PAP flap), superior gluteal artery perforator flap (SGAP flap), inferior gluteal artery perforator flap (IGAP flap), fasciocutaneous infragluteal flap (FCI flap) and tensor fasciae latae perforator flap (TFL flap) were the alternative choices. Because the patient had a large breast size, the LD flap, TFL flap, and PAP flap could not be considered owing to the lack of tissue volume. The patient was expected to have more adipose tissue volume in the lumbar area than in the gluteal region, and the patient preferred to have a donor site scar in the lumbar area. The stacked PAP flap was also considered because it allows simultaneous flap harvesting during mastectomy, while maintaining the same patient position. In addition, it has the advantage of a shorter surgical time. However, this patient had...
insufficient tissue volume even if the stacked PAP flap were to be used. Moreover, the patient did not want to undergo breast implant reconstruction, and it was also thought that it would be difficult to achieve breast symmetry using a breast implant in this case. Therefore, we chose the lumbar artery perforator flap (LAP flap) to ensure sufficient tissue volume and achieve a natural and symmetrical breast.

Case Report

A 45-year-old woman had undergone right mastectomy and an immediate two-stage breast reconstruction with a DIEP flap for breast cancer three years ago. Subsequently, she underwent left lumpectomy and sentinel lymph node biopsy for metachronous breast cancer. However, nipple-sparing mastectomy and immediate one-stage breast reconstruction were planned owing to positive margins (Fig. 1). She had a history of endometriosis, and the breasts were not treated with radiation therapy or chemotherapy. The breast size was 138 mm in width and 52 mm in projection. Preoperative contrast-enhanced computed tomography (CT) revealed a right fourth lumbar artery perforator (Fig. 2). Breast reconstruction with a LAP flap with the left deep inferior abdominal artery and vein (DIEA/V) as an interposition graft was planned.

After induction of general anesthesia, the patient was placed in the supine position and a left nipple-sparing mastectomy with a lateral inframammary fold incision was performed by the breast surgeon. The mastectomy weight was 548 g. Subsequently, two teams of plastic surgeons exposed the internal mammary artery and vein in the fourth intercostal space and harvested 6.0 cm of the left DIEA and DIEV after a 5 cm incision along the previous abdominal surgical scar harvesting the DIEP flap. Next, the left superficial circumflex iliac vein (SCIV) was collected as a back-up vein. The patient was then placed in the prone position, and a LAP flap was harvested with a skin island size of 14×6 cm, including two perforators (Fig. 3). The flap weight was 516 g, and the pedicle length was 2.5 cm. The caudal perforator artery had better pulsation. When the cephalic perforator was clamped and skin viability was evaluated using indocyanine green (ICG) fluorescence angiography, fluorescence contrast was observed in all areas of the flap. However, the flap showed mild congestion. Therefore, an extra drainage vein was considered necessary.

During donor site closure, the caudal perforator artery and vein were anastomosed to the interposition graft of the DIEA and DIEV at the other operation table using a microscope. The cranial perforator vein was anastomosed to the interposition graft of the SCIV, and the other end of the SCIV was anastomosed to the second DIEV. The patient was placed in the supine position, and the DIEA and one side of the DIEV were anastomosed to the internal mammary artery (IMA) and internal mammary vein (IMV) (Fig. 4). Because there were multiple communicating branches between the two DIEVs, only one side of the DIEV was anastomosed to the IMV. The final pedicle length after DIEA and DIEV grafting was 8.5 cm. The total flap ischemia time was 133 minutes. After shaping the breast, the wound was then closed with two suction drains placed on the reconstructed breast. The blood loss was 200 mL, and the total procedure time was 749 minutes (90 minutes for mastectomy and 659 minutes for breast reconstruction).
There were no postoperative complications, and the patient was discharged on the eighth postoperative day. Six months postoperatively, she was satisfied with the shape and volume of the reconstructed breast and the donor site scar (Fig. 5).

Discussion

The pedicled flap using the lumbar artery is known as the “reversed latissimus dorsi flap.” It has been used for the reconstruction of lower lumbar defects since the 1980s9. De Weerd reported autologous breast reconstruction using a lumbar artery perforator flap in 200310. This is the first case report of a second autologous breast reconstruction using the LAP flap for a metachronous breast cancer patient who had previous contralateral side breast reconstruction with a DIEP flap.

The advantages of the harvested LAP flap are its shape, which resembles the mammary gland, its ideal tissue volume, and an acceptable donor site scar. The quality of the reconstructed breast in terms of smoothness and softness is very similar to that of the original breast. Opsomer11 stated that the LAP flap can provide a more natural shape for breast reconstruction because its morphology is similar to that of a breast implant making it easier to create a breast shape. In this case, we were able to harvest > 500 g of the LAP flap. Asian women usually do not have extra fat tissue volume around the thigh and gluteal area. Therefore, it might be difficult for any flap other than the LAP flap to provide such a volume. Furthermore, the donor site is located on the back. Although it is not hidden by underwear, it does not cause significant discomfort. Another advantage is that the donor site scar might be less distorted compared to scars with the use of other flaps, such as SGAP in some cases12.

The disadvantage of the LAP flap is that it requires changes in the patient’s position during surgery, increasing the operative time. Particularly in our case, there were two position changes, from supine to prone and from prone to supine. We started with the supine position first to prepare donor site vessels and harvest the interposition graft, and then the LAP flap was harvested with the patient in the prone position. Only one position change would be required if the LAP flap is harvested in the supine position first, and the subsequent surgery is performed in the supine position. We believe this is not a practical way considering the issue of ischemia time involved. In our procedure, we anastomosed the interposition graft to the
LAP flap during the LAP flap donor site closure on the other surgical table under a microscope. The patient was again placed in the supine position after closing the donor site. We immediately started micro-anastomosis between the internal mammary vessels and the flap pedicle vessels, because the donor site vessels had been explored and the interposition graft was ready. Therefore, this procedure reduced the ischemic time of the LAP flap.

Peters reported that using the DIEA/V as an interposition graft eliminates the need for patients to undergo deep and complicated pedicle dissection. Opsomer reported that by maintaining a pedicle dissection length of < 4 cm, neuraapraxia of the lower extremity can be prevented, whereas there is a risk of damaging the sensory nerves arising from the transverse process if the dissection length is > 4 cm. Opsomer also reported that when harvesting the DIEA/V as an interposition graft, it is sufficient to harvest the flap pedicle for 3.5 cm to avoid damaging the sensory nerve. Dissecting deeper to obtain a longer length of the flap pedicle entails the risk of damaging the sensory nerve and bleeding from small branch vessels because the surgical space is limited and narrow during the flap pedicle dissection. In this case, SCIV was harvested during interposition graft harvesting. The SCIV should be harvested as a backup graft vein if possible.

In the case of metachronous bilateral breast cancer, Chang found that a similar reconstruction method to the contralateral side would give a better result with regard to maintaining breast symmetry. In this respect, the LAP flap might be another good option for primary autologous breast reconstruction for patients who with metachronous bilateral breast cancer and who had previous breast reconstruction with the DIEP flap. DIEP flap breast reconstruction using a LAP flap could maintain breast volume and create a more symmetrical breast. The limitation of our study is that our case needed an interposition graft to extend the pedicle length, and there was unexpected drainage issues. Interposition graft and drainage issues increase the number of micro-anastomoses, which might increase the risk of flap failure for a surgeon who has insufficient experience with microsurgery. To avoid multiple micro-anastomoses, conventional flaps, such as LD flap with lipofilling, was another option available in our case. However, lipofilling is not covered by the Japanese insurance system and is entirely self-pay, and this patient could not afford to pay for lipofilling.

Conflicts of interest

All authors declare no conflict of interest in this study.

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