

Perforator Reconstruction to Salvage the Jeopardized Flaps

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During flap elevation, most perforators are cut except one or more perforators that are essential to flap survival. However these cutout perforators can cause deterioration of the blood circulation of the flap. To salvage the jeopardized flaps, rebuilding the perforator system is essential for flap survival. In the first case, after flap elevation, the upper abdominal flap margin was severely ischemic. To supply blood to the upper abdominal flaps, we found and used a major perforator underneath the upper abdominal flap which was cut earlier during the elevation, and we performed reanastomosis with ipsilateral deep inferior epigastric artery. Upper abdominal flap ischemic area was limited to a narrow suture area. In the second case, we performed free superficial inferior epigastric artery (SIEA) flap reconstruction. After successful anastomosis of the SIEA and superficial inferior epigastric vein (SIEV) with internal mammary artery and vein, serious venous congestion occurred immediately because of SIEV malfunction. We found the largest perforator vein under the flap, as an alternate way to drain, then connected it with the thoracoacromial vein with a vein graft harvested in the contralateral SIEV. Circulation has improved. In conclusion, perforator system reconstruction is essential in a jeopardized flap salvage.

Key Words: Microsurgical free flaps, Mammoplasty, Perforator flap

Breast reconstruction using autologous tissue is one of the main surgical options to reconstruct defects that result from mastectomy.¹ Autologous tissue from the abdomen can be transferred, pedicled, or free, by anastomosing inferior epigastric vessels to the internal mammary vessels aided by microsurgical techniques.² Despite developments in microsurgery, flap failure remains a complication that may arise in from 1.5% to 10.0% of cases.^{3,4} Among multiple causes of flap failure, arterial insufficiency and venous congestion have been a major concern. Perforator is a main pedicle of perforator flap. Originally primary route of blood flow to the skin and nourish the skin and subcutaneous tissue. During flap elevation, most perforators are cut except one or more perforators that are essential to flap survival. But these iatrogenically destroyed

perforators can deteriorate the blood circulation of the flap. But ligated perforator has potential to be a alternative route of blood supply to the flap. In these cases, rebuilding perforator system is a key for flap survival. So we want to present 2 cases of flap salvage with perforator reconstruction.

CASE REPORT

Case 1

Upper abdominal flap necrosis while breast reconstruction with deep inferior epigastric perforator (DIEP) flap. After flap elevation, upper abdominal flap margin was severely congested and sluggish bleeding (Fig. 1). For a new route blood supply to the flaps, we find a big perforator underneath the abdominal

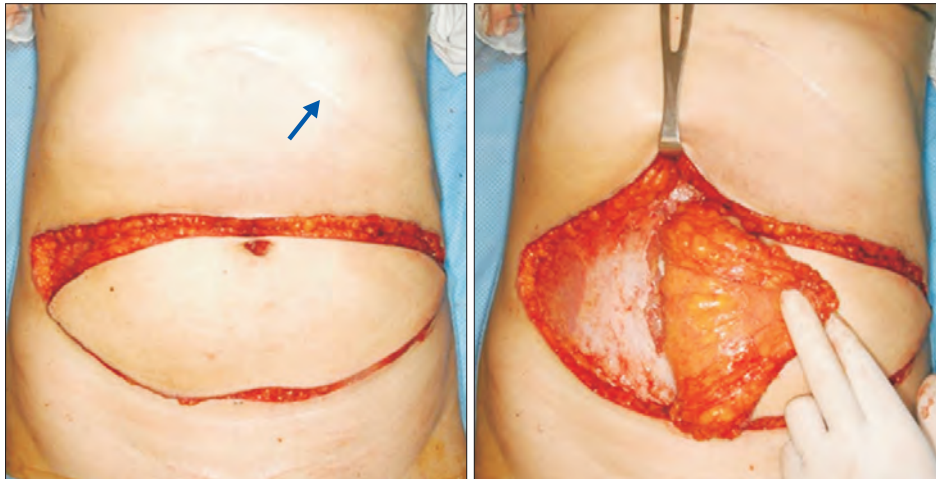


Fig. 1. Postoperative scar formation after left nephrectomy because of renal cell cancer (arrow). Patient who underwent nephrectomy and followed by band-like scar formation on her left upper abdomen. After flap elevation, upper abdominal flap appeared skin redness and sluggish bleeding in abdominal flap margin.

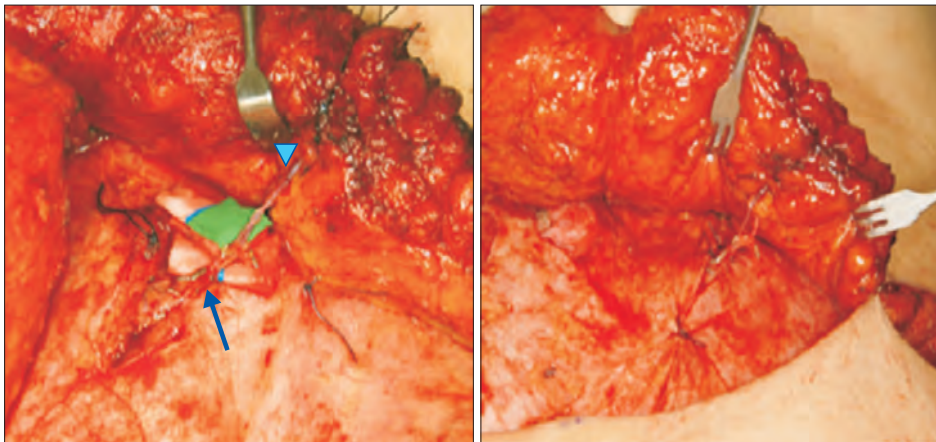


Fig. 2. Dominant perforator was dissected in upper abdominal flap which was cut while flap elevation (arrow head). And anastomised with other deep inferior epigastric artery branch (arrow).

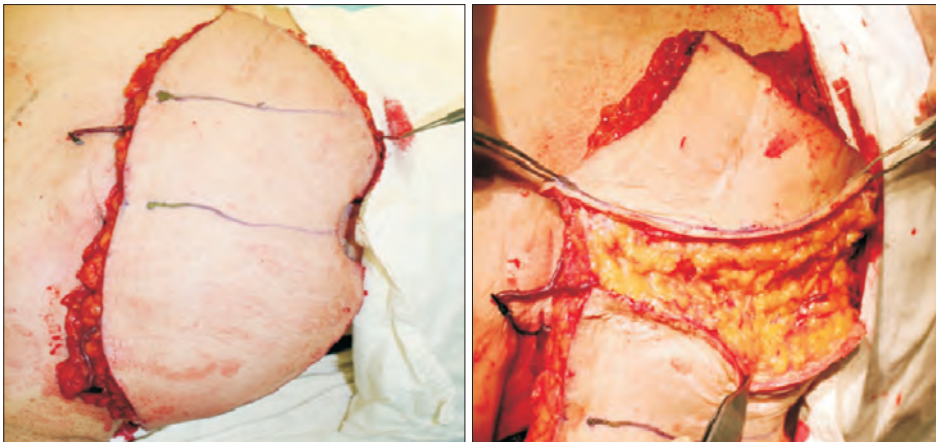


Fig. 3. We harvested contralateral superficial inferior epigastric vein for anastomosis with thoracoacromial vein and perforator vein as a connection.

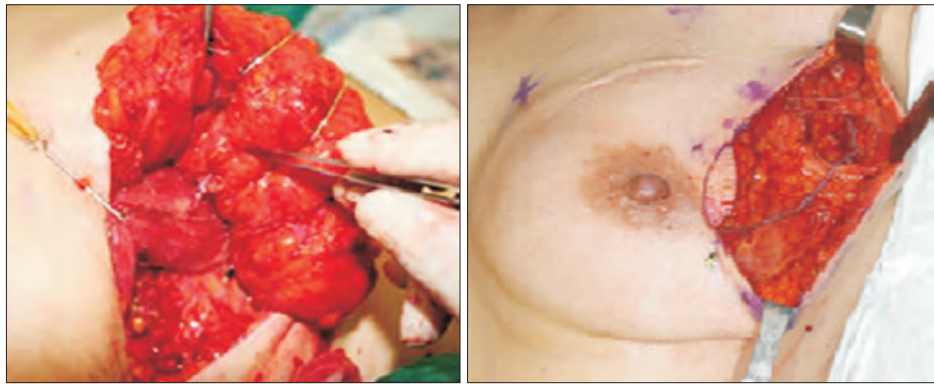


Fig. 4. We found a perforator vein as alternate way to drain under the flap, and then connected with thoracoacromial vein with vein graft which harvested from contralateral superficial inferior epigastric vein.

flap which was cut during the elevation. And dissect into the fat tissue 2 cm, reanastomosis with distal deep inferior epigastric artery (Fig. 2). After anastomosis upper abdominal flap circulation was improved. Flap became pinkish and soft. Severely ischemic area was limited to narrow limited suture area. Post operation day 12, only partial skin necrosis appeared, sized 2×5 cm.

Case 2

Free superficial inferior epigastric artery (SIEA) flap reconstruction. After successful anastomosis of the SIEA and superficial inferior epigastric vein (SIEV) with internal mammary artery and vein, serious venous congestion occurred immediately because of SIEV malfunction. We found a biggest perforator vein under the flap, as an alternate way to drain, then connected it with a ipsilateral thoracoacromial vein with vein graft which harvested in contralateral SIEV (Fig. 3, 4). After vascular anastomosis with vein graft, blood circulation has been improved. And capillary refilling sign was normal. Re-operation can be avoided.

DISCUSSION

The DIEP flap has evolved to minimize the donor site morbidity compared to earlier techniques that use the lower abdominal tissue for breast reconstruction. However, with the inclusion of only a few large perforators and the sacrifice of the many small but collectively significant perforators, combined with the interruption of the superficial veins, arteriovenous drainage can be insufficient. This sacrifice of small perforators

often brings partial necrosis or failure of flap post operation, therefore a better operation result could be achieved if perforator damage is repaired promptly. As shown in Case 1, damage of major perforator in upper abdominal flap can result in failure of most donor site. This ischemic change can be prevented with reanastomosis of the perforators that were damaged during the flap elevation. Case 2 suggests risk of total flap failure caused by severe venous congestion immediately after SIEA flap anastomosis, in which case venous drainage is difficult to be achieved. To restore venous drainage in Case 2, DIEP vein perforator that functions in the patient's SIEA flap was used in reanastomosis. Recipient vessels were thoracodorsal artery and vein. We were able to alleviate venous congestion in free flaps by augmenting venous drainage by deep inferior epigastric vein to tholacoacromial vein using vein graft which harvested from ipsilateral SIEV. Arterial insufficiency of local flap and diffuse venous congestion after breast reconstruction can be treated by rebuilding perforator system.

Flap survival after breast reconstruction is of the utmost importance for the patient's health and psychological well-being, and every effort should be made to prevent an impending flap failure. Venous congestion of abdominal flaps can occur despite correct surgical technique.⁵ Even with patent deep inferior epigastric vein (DIEV) anastomosis, the superficial system might need to be connected elsewhere to relieve congestion.^{6,7} Available recipient veins for vein graft include the thoracodorsal vein, harvested SIEV, intercostal veins, transverse cervical vein, cephalic vein, and basilica vein.⁷⁻¹⁰

Perforators are originally primary route of blood flow to the skin and subcutaneous tissue. So perforator system

reconstruction is a option of flap salvage in reconstructive and even aesthetic surgery.

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