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Free saphenous venous flap and its modifications: Turbo- and supercharged

Sir,

Nakayama *et al*. first reported an experimental work on venous flap in 1981,[1] followed by reports of clinical application and development of the arterialized venous flaps by various authors.[2] The venous flap is useful where arterial donor site morbidity is undesirable, where large healthy veins are found proximal and distal to the wound, or soft-tissue coverage is needed in arterial reconstruction. The disadvantages include higher flap loss rate and persistent oedema.[3] We demonstrated the use of a modification of saphenous venous flow-through flap in the reconstruction of upper limb arteries with soft-tissue coverage. To the best of our knowledge, this is the first reported case using a turbo- and supercharged saphenous venous flap.

Patient B is a 64-year-old gentleman who sustained an open posterior dislocation of right elbow and right brachial artery injury. An emergency right brachial artery repair and external fixation were performed but he subsequently developed a bleeding right brachial artery aneurysm. The patient was planned for resection of aneurysm and reconstruction of right brachial artery with long saphenous vein graft.

Intra-operative findings revealed fragile and inflamed overlying skin with macerated distal portion of brachialis up to point of insertion and macerated proximal portion of the flexor origin. Resection of the pseudoaneurysm measuring 6 cm × 7 cm and debridement of the macerated tissues left a large defect at the medial aspect of the arm and forearm, exposing some tendons and ulnar nerve.

In view of the need for soft-tissue reconstruction besides the brachial artery reconstruction, we initially harvested a left saphenous venous flap with a skin paddle measuring 13.5 cm × 7 cm. Two arterial perforators (proximal and distal) were identified using pencil Doppler prior to flap elevation and were included in the flap design to increase the survival of the skin paddle. These perforators were traced to the left posterior tibial artery [Figure 1]. We eventually harvested a free saphenous venous flow-through flap turbocharged with the posterior tibial artery perforator and supercharged with cephalic vein to reconstruct the brachial artery and surrounding soft-tissue [Figure 2]. Donor site was closed primarily.

After establishing flow of the brachial artery using the saphenous vein, we noted strong arterial blood flow through the vena comitans of the proximal perforator (via communication between the deep and superficial venous system of the lower limb). Therefore, the proximal perforator was anastomosed to the vena comitans of the perforator ("arterial limb" of the flap) as turbocharge [Figure 3]. Post-anastomosis, a strong arterial signal was detected using pencil Doppler. A cutaneous vein from the flap was anastomosed to the cephalic vein (venous limb of the flap) to supercharge the venous outflow of the flap [Figure 4].

The flap survived with the brachial artery and the anastomosis between the vena comitans of the

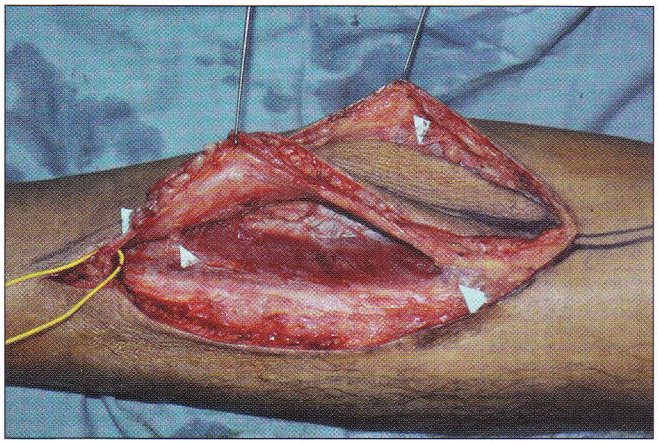

Figure 1: Patient B - initial left saphenous venous flap raised. Note the two perforators supplying the flap (arrowheads pointing upward)

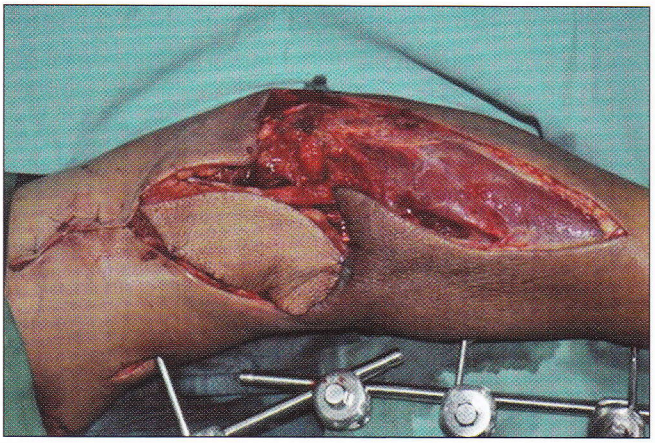

Figure 2: Patient B - flap inset into the wound which was exposing the brachial artery and soft-tissue defect

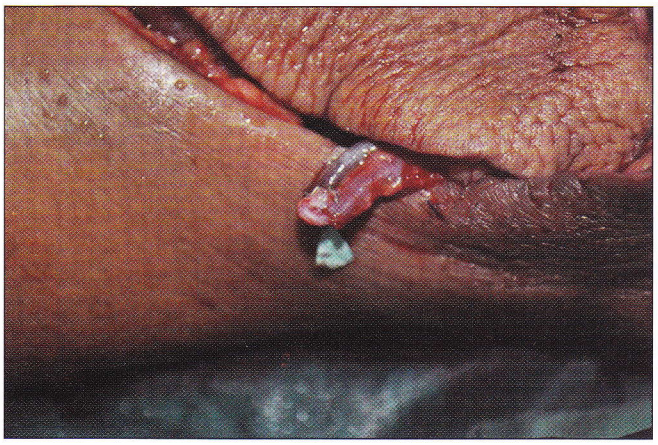

Figure 3: Patient B - arrowhead pointing at anastomosis between perforator artery and vena comitans of perforator artery (arterial supply to the skin paddle)

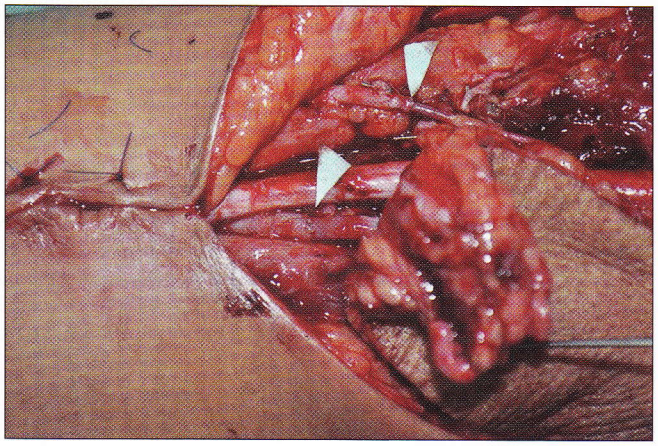

Figure 4: Patient B - flap inset on recipient site. Upper arrowhead pointing to the anastomosis between the flap cutaneous vein and cephalic vein. Lower arrowhead pointing to the anastomosis between proximal end of saphenous vein and distal end of right brachial artery

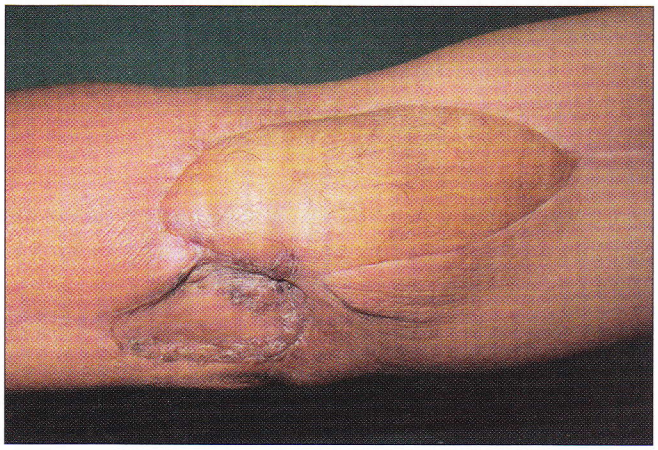

Figure 5: Patient B - flap at 4 months post-operation. Notice the hair growth on the flap

perforator artery and the perforator artery ("arterial limb" of the flap) remaining patent with strong arterial signal when monitored with pencil Doppler for up to a week. Despite the large skin paddle, the recipient site required split-thickness skin graft for complete wound closure [Figure 5].

A study by Koshima *et al.*[4] demonstrated that a supercharged arterialized saphenous venous flap measuring 11 cm × 7 cm or more can survive without superficial necrosis. We developed a modification to our initial saphenous venous flow-through flap. Initially the posterior tibial artery perforator was included in the flap with the intention to supercharge the arterial supply of the flap. However in view of the good arterial flow from the vena comitans of the posterior tibial artery after reconstruction of the brachial artery, we decided to turbocharge the flap. The vena comitans received arterial blood in retrograde fashion from the saphenous vein graft via communications between the deep and superficial venous system. The arterial inflow to the skin paddle was established by anastomosing the vena comitans of the perforator to the perforator. We believed that by creating an arterial inflow to the skin paddle of the flap, a more physiologic blood flow was provided. The venous outflow of the skin paddle was supercharged by

anastomosing the cutaneous vein of the skin paddle to the cephalic vein. The flap did not experience any venous congestion for the first 72 hours post-operation.

We believed by turbocharging and supercharging the flap, the skin paddle received a more reliable and physiological inflow and outflow, thus increasing its survival. As this modification is a new technique, we have yet to establish the reproducibility of this technique in improving flap survival. However, we have shown that the skin paddle in patient B's flap survived 100%.

The saphenous venous flow-through flap is a functional alterative with minimal donor site morbidity for reconstruction of major limb vessels. The flap can be turbocharged if a perforator artery is discovered supplying the skin paddle and supercharged by creating another venous outflow to improve flap survival.

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Superior gluteal artery perforator flap for meningomyelocele defect: A saviour when other options vanish

Sir,

Early repair of meningomyelocele prevents infection, eliminates cerebrospinal fluid leaks, preserves neural function and diminishes late sequelae such as pain over the repair site. Neurosurgeons can usually reconstruct both spinal and skin defects. Although primary closure is sufficient in most cases, when the defect is larger, skin flaps are required. A variety of random flaps, different suture techniques and surgical materials have been described for the reconstruction of meningomyelocele defects.[1,2] Most of these techniques achieve successful results. But sometimes, partial or total losses of the flaps can be encountered. In these situations, as the surrounding soft tissue coverage is insufficient, the defect becomes larger and more difficult to reconstruct than the primary defect.

We reconstructed such a complex defect with the Superior Gluteal Artery Perforator (SGAP) flap after two previously failed operations and wish to discuss the advantages of SGAP flap in complicated cases.

A two-day-old girl with a meningomyelocele was operated on by the paediatric neurosurgery department. The dura was repaired with artificial biomaterial,

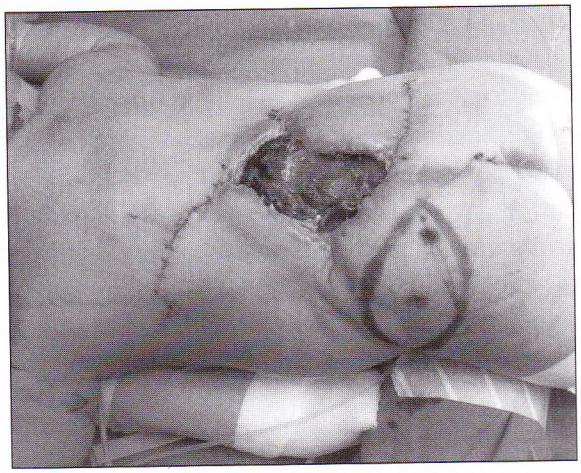

Figure 1: Dehiscence was encountered following defect closure with opposing fascia cutaneous flaps due to cerebrospinal fluid leakage and tissue oedema. Reconstruction was planned with an SGAP flap