Case Report

Resurfacing of Amputation Stumps using free Tissue Transfer

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Introduction

Loss of limb is a catastrophic event in the life of an individual. It takes a long time for him to come to term with the reality. The amputation stump requires a well-padded, stable, pain free and sensate soft tissue cover to allow wearing of a well fitted prosthesis. Providing such a cover is difficult at times due to paucity of soft tissue in the vicinity of the stump. Such cases may be treated by bringing tissue from a distant site. Cross leg flaps place the patient in an awkward, uncomfortable position for a long time and involve multistage surgery. Free tissue transfer using micro-vascular technique offers a single stage surgery in difficult cases. Three cases are reported, using the latissimus dorsi myocutaneous free flap in two cases and the radial artery forearm free flap in one patient.

Case Report - 1

A 32 year driver sustained multiple injuries including bilateral below knee amputations, in an improvised explosive device blast. After initial debridement he underwent revision of the stumps. The amputation stump on the right side could be covered by local flaps, but a large raw surface over the left stump had to be skin grafted. He was thereafter sent to a different service hospital for provision of prosthesis. During trial of the same he had repeated breakdown of the grafted skin on the left stump because of shearing with the prosthesis. Clinically he had a 23 cm, cylindrical, well covered below knee (BK) stump on the right, and a 11 cm, cylindrical BK stump on the left leg that had multiple ulcerations on the skin along with gross scarring all around (Fig 1). As preservation of length was of utmost importance and the limb could not be shortened any further, it was decided to cover this stump by a free latissimus dorsi myocutaneous flap. The pre-operative workup included colour-doppler and angiographic studies, which revealed a normal configuration of the left popliteal artery with its peroneal and tibial branches reaching, near the stump. Excision of the unstable grafted and scarred area resulted in a 12cm x 10cm defect with exposed tibial stump. The posterior tibial vessels were dissected as the recipient vessels. The latissimus dorsi flap consisting of a portion of

the muscle, its overlying skin and its long vascular pedicle (thoracodorsal vessels) was dissected so as to reach the recipient vessels easily. It was then transferred to the recipient site on the left leg stump, anastomosing these vessels with the posterior tibial vessels using the operating microscope with 16 X magnification and size 10/0 polyamide sutures. A close monitoring of the flap was done postoperatively, checking its colour, warmth and blood flow by Doppler studies. Twelve hours post-operatively, the flap appeared pale and flow signals became weak. Suspecting an arterial block, the anastomotic site was re-explored. A thrombus at the arterial anastomotic site was evacuated using a Fogarty balloon catheter and the anastomosis was performed again.

Fig. 1 : Below knee amputation stump left leg with scarring and ulcerations

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Fig. 2 : BK amputation covered by a free latissimus dorsi myocutaneous flap

Recovery thereafter was uneventful and he had a robust, stable and painless soft tissue cover over the amputation stump (Fig 2).

Case Report - 2

A 32 year diabetic, right hand dominant individual, sustained crush injury to the left forearm in an accident, resulting in gangrene of the distal limb, for which a below elbow guillotine amputation was done. When he reported to this hospital seven days later, a large raw area over the stump was gradually debrided and covered with a split skin graft. On review after 6 weeks, he was found to have breakdown of the grafted area, with the radius and ulna protruding through the stump (Fig 3). Colour-Doppler studies and angiography showed a normal brachial artery with its branches, the radial and ulnar reaching next to the stump. The unstable graft was excised resulting in a defect of 18x10 cm. This was similarly covered by a latissimus dorsi myocutaneous free flap, anastomosing the thoracodorsal vessels with the radial vessels, and one venae comitantes with a superficial vein. The donor site defect on the back was covered by a skin graft. The procedure went off smoothly, but for an episode of profuse bleeding from all the operation sites following administration of heparin, which is usually given just before dividing the flap pedicle. This was managed by blood transfusion and injection protamin. Haematological investigations were found to be within normal limits. He had a satisfactory recovery thereafter (Fig 4).

Fig. 3 : Below elbow amputation stump with scarring and protruding ulna

Case Report - 3

A 30 year individual sustained a trans metatarsal amputation of the right foot following a mine blast injury. He had a large raw area over the terminal portion of the stump. The same was covered by a radial artery forearm free flap (Chinese flap). He had an uneventful recovery with minimal donor site discomfort. All the patients have been provided with appropriate prosthesis.

Discussion

Amputation of a limb puts an individual under an insurmountable physical agony and mental stress. The incidence has risen as a result of an increase in ageing population with more cases of diabetes and peripheral vascular disease [1]. Surgical endeavour is to provide an ideal stump, over which a well fitting prosthesis may be given. An ideal stump is the one that has sufficient length, a stable, well padded and sensate soft tissue cover with a non-adherent painless scar. With the advent of modern total contact sockets and sophisticated prosthetic fitting techniques, the level of amputation is less important. However, the cardinal rule is to preserve all possible length [2]. Preservation of the knee or elbow joint is of paramount importance for an optimal use of the prosthesis [3]. In a majority of cases it is possible to cover the stump with locally available soft tissues, giving a non-terminal scar. In the event of paucity of the local soft tissue, other methods are to be considered. Split skin grafting (SSG) is the simplest technique of covering the raw soft tissue defect over the amputation stump.

Fig. 4 : Early post-operative picture of the stump covered by a free latissimus dorsi myocutaneous flap

However, it undergoes repeated break-down and ulcerations when subjected to shearing stress of the prosthesis, as happened in our first case. Local flaps are not possible in all patients because of the tissue tightness and scarring in the adjacent area. Tissue expansion of local skin has its own risk and requires special care [4]. Distant flaps in the form of the cross-

leg flaps are other alternatives. However, they involve multistage surgery and the patient has to remain in an awkward, uncomfortable position for weeks together. Free tissue transfer using micro-vascular technique is one of the most reliable reconstructive procedures today, with success rates varying from 91% to 99% in various series [5]. It has the advantage of being a single stage procedure, given a wide choice of tailor made tissue with little restriction in size, as evident from the second case. It also has an assured blood supply, does not require immobilization of the limb and usually has an aesthetically acceptable donor site. The latissimus dorsi myocutaneous free flap is a sturdy, reliable flap with an optimal caliber donor vessel available for anastomosis. The pedicle length may be increased by dissecting more proximally, to include the sub-scapular vessels too [6]. The radial artery forearm flap is a time tested reliable flap providing supple skin. A readiness to re-explore these cases is essential in the event of a complication, as seen in the first case. The unusual complication of excessive bleeding in the second case was attributed to an idiosyncratic reaction to heparin as he never had any similar episode during the earlier operations and no haematological abnormality was detected in a complete check up postoperatively. Though the micro-vascular free tissue transfer is demanding and requires a dedicated team with an excellent anaesthetic support, we have found it to be a reliable method for covering the amputation stumps in difficult situations.

References

1. Tooms Robes E. General principles of amputations. In : S.Terry Canale Campbell's Operative Orthopaedics. 9th ed. Mosby 1998;521-60.
2. Jones NF. Upper limb salvage using a free radial artery forearm flap. Plastic and Reconstructive Surgery 1987;79:468-71.
3. Stokes R. 3D reconstruction of below-knee amputation stump, use of combined scapular and parascapular flap. Plastic and Reconstructive Surgery 1994;94:732-6.
4. Rees RS, Nanney WB. Tissue expansion-its role in traumatic amputations. Plastic and Reconstructive Surgery 1986;77:133-7.
5. Weinzwieg N. Free tissue failure is not an all or none phenomenon. Plastic and Reconstructive Surgery 1995;96:648-60.
6. Hammond DC. The free fillet flap for reconstruction of upper extremity. Plastic and Reconstructive Surgery 1994;94:507-12.