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Case Report

Failed limb salvage by microsurgery, resolved by super-microsurgery

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ABSTRACT

Advances in perforating artery flaps have improved reconstruction in various body parts, particularly the lower extremities, offering benefits in patient quality of life and reduced public health service costs. The use of flaps and microsurgery extends beyond trauma to address conditions like osteomyelitis, tumor resection, osteoarthritis, and post-radiation necrosis. Notably, the superficial circumflex iliac artery perforator flap (SCIP) is highlighted for its thin profile and utility in limb coverage, minimizing donor site morbidity. Microsurgical techniques contribute to limb salvage, reducing amputation risks in severe fractures and post-osteosynthesis complications. A 29-year-old male with cerebral palsy suffered bimalleolar fracture from a high-energy motor vehicle accident. Initial ALT flap reconstruction failed, leading to flap removal and osteosynthesis exposure. After 48 hours, removal of the flap was necessary due to venous thrombosis. Salvage with SCIP flap involved anastomosis to perforators of both posterior tibial artery and vein. This case details a patient with a bimalleolar fracture post-motorcycle accident, initially treated with conventional microsurgery using an ALT flap. Complications arose from venous thrombosis, necessitating flap removal. Salvage was achieved through a SCIP flap with supermicrosurgery techniques, employing 0.5 mm anastomosis for improved functionality and reduced complications in flap recovery and donor site comorbidities. Successful outcomes in microsurgery and supermicrosurgery necessitate comprehensive training. Specialized limb salvage centers must possess specific equipment and instruments for these techniques. The literature reviewed doesn't indicate contraindications related to the patient's mental state for the execution of microsurgery and supermicrosurgery.

Keywords: Superficial circumflex iliac artery perforator flap, Supermicrosurgery, Limb salvage

INTRODUCTION

A case of right pelvic limb salvage by supermicrosurgery, derived from failed microsurgery, is presented. The advances achieved from the knowledge of the use of perforating artery flaps have allowed a more refined reconstruction in different parts of the body.

In the particular case of the lower extremity, these have brought benefits to the quality of life of patients and reduced costs in public health services. Reconstructions

through the use of flaps and microsurgery are designed not only for trauma; they are very useful in cases of osteomyelitis, reconstructions after tumor resection, osteoarthritis or post-radiation necrosis. The purpose is to achieve adequate skin coverage with better vascular supply and reduce post-surgical pain, as well as better bone consolidation.[1,2]

Among others, the perforator flap of the superficial circumflex iliac artery (SCIP) from which the superficial and deep branch is taken; its venous pattern is generated in a cutaneous vein of acceptable dimensions 3. These flaps are usually thin and of good utility for limb coverage 4 high risk of presenting complications, since they allow the contribution of tissues from distant sites to the injured area; as well as performing anastomosis to perforators, preserving the main vessels of the affected limb; thus achieving a better esthetic and functional result5. Another advantage is that they minimize the morbidity of the donor site.

The aim is to achieve adequate skin coverage with better vascular supply and reduce post-surgical pain, as well as better bone consolidation.[1,2]

The latest microsurgical and supermicrosurgical techniques have made limb salvage possible and have contributed considerably to reducing the risk of amputation in the case of grade IIIC fractures.

Reconstructions in extremities and mainly pelvic reconstructions are usually secondary to post osteosynthesis complications, as well as to high energy trauma, due to the type of vasculature and its thin skin coverage free flaps, as well as microsurgical techniques.[6,8] In these microsurgical techniques, limb salvage has been possible, reducing costs and improving the quality of life of patients.[7]

It is worth mentioning that the flaps should be selected taking into account the extension of the affected area, being necessary the anterolateral thigh flaps (ALT) fasciocutaneous, composite or chimeric.[9]

Reconstruction through post trauma microsurgery is performed following the following objectives: perform a wide debridement of the affected area, stabilize the fracture, early vascularized coverage; always looking for the best functional result.[1,2]

Among others, the superficial circumflex iliac artery perforator flap (SCIP), arises from the use of the circumflex iliac artery taking the superficial and deep branch, its venous network is generated thanks to a cutaneous vein of acceptable dimensions and the nervous part is given thanks to lateral cutaneous branches coming from the intercostal nerves.[3] These flaps are usually thin and useful for limb coverage.[4] They are used in patients with a high risk of complications, since they can provide tissues from distant sites to the injured area, as well as perform anastomosis to perforators while preserving the main vessels of the affected limb, thus achieving a better aesthetic and functional result.[5]

There are risks present in microsurgery which can lead to partial or total loss of the flap, this is mainly due to poor preparation of the recipient bed, as well as a deficient technique in the performance of the anastomosis. Therefore, in order to reduce this complication, super microsurgery techniques have been developed, based on the performance of micro anastomosis of less than 0.5 mm in patients with a high risk of rejection, either due to damage to the vascularization of the recipient area, etc.[10]

CASE REPORT

29-year-old male patient with cerebral palsy. He presents sequelae derived from failed ALT flap reconstruction and removal of the same and exposure of osteosynthesis material. Evolution 7 days (Figure 1).

Bimalleolar fracture, derived from a high energy accident in a motor vehicle. The patient underwent open reduction with internal fixation with plates and screws. Subsequently, reconstruction was performed with anastomosis to the anterior tibial artery with ALT flap in a termino-terminal anastomotic configuration (Figure 2). This technique failed forty-eight hours later due to venous thrombosis, forcing the removal of the flap (Figure 3). SCIP to one of the perforators of both posterior tibial artery and vein (Figure 4).



Figure 1: Prior to the first surgical intervention by the plastic and reconstructive surgery team (A) antero lateral radiograph of right ankle showing fractures with osteosynthesis material; (B) lateral ankle radiograph showing the fractures with the osteosynthesis material; and (C) cutaneous defect in external malleolar area with exposure of plate.

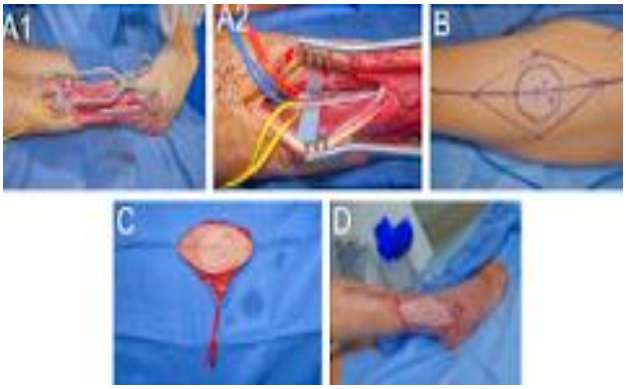


Figure 2: Site preparation with lesion, planning, making ALT flap (A) 1 and 2 Anterior tibial receptor vessels; (B) marking of the left thigh anterolateral flap; and (C) autonomized ALT flap pedicle of 10 cm and vessel caliber of 1.2 ml; (D) final result of the ALT flap.



Figure 3: Loss of the flap due to venous thrombosis.



Figure 4: Figure 4: Second operative time for the SCIP flap: (a) cutaneous island marking and vascular bundle location with diameter less than 0.5 mm (b) revascularization of the anterior tibial artery with inverse Safena vein; and (c) final SCIP result.

DISCUSSION

We present the case of a patient with a history of bimalleolar fracture, derived from a motorcycle accident; operated with osteosynthesis and conventional microsurgical reconstruction by ALT flap with arterial and venous anastomosis to anterior tibial; presenting complication by venous thrombosis, which may be due to problems in the vascularization in the area and forcing the removal of the flap. We opted for salvage by SCIP flap with supermicrosurgery techniques because of the 0.5mm anastomosis; to achieve a functional result with less risk of complications in the recovery of the flap and to reduce the comorbidities of the donor site.[3,5]

CONCLUSION

Adequate training is an indispensable condition to achieve successful results in both microsurgery and super-microsurgery. Centers specialized in limb salvage should have specific equipment, training and instruments for microsurgery and super-microsurgery techniques. The literature consulted does not warn of contraindications that depend on the patient's mental state for the performance of microsurgery and super-microsurgery techniques.

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