International Journal of Research in Medical Sciences
Ignacio DC et al. Int J Res Med Sci. 2021 Apr;9(4):1192-1195
www.msjonline.org

pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20211374

Case Report

Clinical application of the anterolateral thigh free flap in high energy injuries of the lower extremity

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Received: 02 February 2021
Revised: 14 March 2021
Accepted: 15 March 2021

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ABSTRACT

One of the recurring problems in plastic and reconstructive surgery is the loss of tissues of the lower extremities as a result of high-energy injuries. The difficulty of this reconstruction lies in the need for a sufficiently suitable and resistant tissue to allow this restoration. The thigh-free anterolateral flap, since its description in 1984, has great versatility for complex or extensive lower extremity reconstructions. We presented the case of a 37-year-old male patient who had a high-energy road accident on a bicycle, impacting a moving vehicle causing a multi fragmented fracture of the right proximal tibia AO 41 C2.2/Schatzker V. He was treated surgically with material from osteosynthesis and iliac crest graft. It is complicated by infection of the surgical wound, exposure of osteosynthesis material and absence of skin covering. Reconstruction of the upper third of the right leg was performed with a thigh-free anterolateral free flap with 2 end-to-end venous anastomoses from the flap to anterior tibial veins, and 1 end-to-end anastomosis from perforating artery to anterior tibial artery, with no associated complications. The thigh-free anterolateral free flap is a versatile and reliable mechanism for the reconstructive surgeon, as it provides excellent coverage for complex lower extremity wounds as well as low donor site morbidity. Outpatient follow-up with adequate clinical evolution was done.

Keywords: Anterolateral flap, Microvascular reconstruction, Lower limb fracture, Microsurgery

INTRODUCTION

One of the recurring problems in plastic and reconstructive surgery is the loss of tissues from the lower extremities. The close exposure of the bone tissues and the composition of the superficial tissues adjacent to them makes it necessary to carry out detailed procedures to restore the functional and aesthetic loss of the region.[1] The difficulty of this reconstruction lies in the need for a tissue suitable and resistant enough to allow this restoration. Therefore, reconstruction with a flap is almost always necessary, whether it is free, cutaneous, fasciocutaneous, musculo-cutaneous, osteocutaneous, suprafascial or subfascial.[2] Currently, the use of perforator-free flaps is a particularly useful alternative since they provide coverage for tissue loss and low morbidity at the donor site. The thigh free anterolateral (ALT) flap from its description by Song et al in 1984, had a great evolution through the years until today, all this due to its great versatility for complex or extensive reconstructions, both in the lower extremities and in other regions.[3] Depending on the characteristics of the thickness of the receptor site, the ALT flap can be adapted to include different tissues, such as exclusively skin, skin and subcutaneous tissue or skin with sub-cutaneous tissue and muscle.[4]

Respecting one of the central concepts of plastic and reconstructive surgery, such as the replacement of similar to similar tissues, we apply this concept to the reconstruction of the lower limb with the ALT thigh free flap, which has become in a free flap frequently used for the restoration of soft tissue defects that involve the lower extremity.[5] This is why we present a clinical case of the use of this free flap to restore the function and aesthetics of the anterior tibial region secondary to high energy injury.

CASE REPORT

We present the clinical case of a 37-year-old male patient, with no medical history, a worker as a specialist welder in a refinery. The current illness began three months ago with the presence of a high-energy road accident on a bicycle, impacting against a moving vehicle, causing entrapment of the lower right limb in a bicycle pedal, suffering a forced varus mechanism in the knee and axial load, which causes intense pain and limitation of mobility. He was sent to the emergency service of his affiliation unit, for which he was initially treated and managed by the Orthopedics and Traumatology service, diagnosing it as a multi fragmented fracture of the right proximal tibia AO 41 C2.2/Schatzker V. It was decided to perform open reduction and internal fixation of the proximal tibia with the placement of an autologous graft of the right iliac crest showing the integrity of the cruciate and collateral ligaments, the integrity of the body, anterior and posterior horns, as well as central subsidence and multifragmentation of the medial plateau. He presents an adequate evolution, so he is discharged without complications (Figure 1).

Figure 1: AP radiograph of the right leg; (A) Proximal tibia fracture with osteosynthesis material (T-plates, cortical and cancellous screws); (B) Consolidated fracture.

15 days after surgery, a decision was made to hospitalize the patient due to surgical wound infection, exposure of osteosynthesis material of the right proximal tibia, and a 16×7 cm skin defect, so treatment with antibiotic therapy, mechanical wound washing in six times, removal of osteosynthesis material and placement of VAC (Vacuum Assisted Closure) negative pressure system, showing torpid evolution, so it was decided to request an assessment from the plastic and reconstructive surgery service.

Figure 2: Clinical assessment; A solution of continuity in the anterior tibial region in the middle third of 16×7 cm with exposure of tibial bone tissue.

Figure 3 (A-C): Angio-CT; Adequate gauge and course from the common, superficial, deep, popliteal femoral artery to distal beds, specifically the anterior tibial, posterior tibial and right fibular.

On examination our evaluation showed move-ment present and limited to flexion and extension of the limb, pulses present, immediate capillary filling, solution of continuity in the anterior tibial region in the middle third of 16×7 cm, with exposure of tibial bone tissue, clean edges without the presence of local data of infection

(Figure 2), biochemically without data of systemic inflammatory response, negative cultures, angio-tomography report with the adequate caliber and path from the common, superficial, deep, popliteal femoral artery to specifically distal beds tibialis anterior, tibialis posterior and right fibula (Figure 3). Therefore, it was concluded as a candidate for the reconstruction of the upper third of the right leg with an isolateral ALT free flap and was programmed for this procedure.

Figure 4. Surgical plan. Donor zone marking.

Figure 5. Post-surgical result; (A) Receiving area; (B) Donor are;. Adequate appearance, temperature and pulse are verified.

Before the surgical intervention, the donor and receptor sites are marked (Figure 4), with Doppler arterial flow to identify facilitate dissection. The anterior aspect of the lower third of the right leg is dissected in planes until the anterior tibial artery and two concomitant veins are visible. Subsequently, the donor area is dissected, lifting a 19×7 cm fasciocutaneous flap on the anterolateral face of the right muscle, 2 perforating arteries >0.5 mm are identified, which are dissected over their entire length respecting the fascia. It rises with a pedicle of 7 cm approximately, one artery and two veins. Under the microscopic vision, 2 end-to-end venous anastomoses of the flap to anterior tibial veins and one end-to-end anastomosis of perforating artery to anterior tibial artery with prolene 8-0 and 9-0 were performed. Anastomotic patency and absence of leaks were verified. Two closed system drains are placed in the donor and recipient areas respectively. Finally, temperature, appearance and pulse are verified with Doppler (Figure 5). At 48 hours after surgery, he was progressing satisfactorily and his discharge from the hospital was decided.

Later, outpatient follow-up was continued with adequate clinical evolution, with viable donor and recipient areas, complete recovery of flexor and extensor mechanics, without associated neurovascular compromise. A month after surgery, your successful discharge is decided by our service.

DISCUSSION

In microsurgical reconstruction, plastic and reconstructive surgeons are now committed to providing not only functional results but also aesthetic results, especially when the extremities are involved. ALT free flap coverage remains the standard of care for lower extremity reconstruction where there is a shortage of local tissue.[6] However, the traditional ALT flap is often too voluminous to cover superficial and distal defects in these extremities, resulting in limits the function or proper use of orthoses, for which the successful use of suprafascial flaps has been implemented.[7]

The selection of the flap should be based on an experienced evaluation of its characteristics, as well as the conditions of the existing defect and characteristics of the patient.[8] The free ALT flap offers different advantages; relatively constant anatomy, long pedicle, thickness variability, ability to provide sensory innervation, and low donor site morbidity.[9] Another advantage of the ALT free flap in lower extremity reconstruction is the ability to use the ipsilateral leg as a donor site. limiting post-surgical discomfort to a single limb.[10]

Muscle and fasciocutaneous free flaps are equally effective in restoring lower extremity form and function after traumatic injury, including open tibial fractures and chronic osteomyelitis, with comparable recovery rates.[11,12] However, based on in our experience, fasciocutaneous flaps are ideal for covering soft tissues combined with bone defects, especially when a prior graft or use of osteosynthesis material is required, achieving better rates of functional and aesthetic recovery, reflected in the relatively earlier reincorporation to daily life.

CONCLUSION

The ALT free thigh flap is a versatile and reliable mechanism for the reconstructive surgeon, providing excellent coverage for complex lower extremity wounds. This analysis of our clinical case demonstrates the safety and efficacy of the flap for reconstructing high-energy open fractures of the lower limb, demonstrating its reliability and low morbidity at the donor site. Fortunately, our patient did not present comorbidities or risk factors such as atherosclerosis or smoking, which allowed us to carry out this procedure with complete confidence since a higher rate of postoperative complications has been observed with these associated factors, as they produce vasoconstriction and a gradual decrease in blood flow adjacent to the flap.

We recommend and implement these procedures more frequently in this type of high-energy lesions in the lower extremities, which are undoubtedly frequent in our population, and failure to perform them would completely delay the management and evolution of the patient, primarily affecting their prognosis and quality of life.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Ignacio DC, Ignacio CA, Michel JE, Enrique SMC. Clinical application of the anterolateral thigh free flap in high energy injuries of the lower extremity. Int J Res Med Sci 2021;9:1192-5.