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Case Report

Anterolateral thigh mega flap for upper limb reconstruction: a case report

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ABSTRACT

The innovative concept of employing "Megaflaps", large free flaps, in particular the anterolateral thigh megaflap, for the reconstruction of large surface defects remains relatively unexplored. Although the theoretical value of "megaflaps" is recognized, their documentation remains limited. Microsurgical free flaps are essential for treating musculotendinous, osseous, and vasculonervous injuries. The appeal of these flaps lies in their minimal donor site morbidity, which offers an alternative approach. Taking advantage of the intricate anatomy of the lateral femoral circumflex artery and its branches facilitates the creation of large surface area flaps.

Keywords: Anterolateral thigh megaflap, Free flap, Microsurgical flap

INTRODUCTION

Reconstruction of large extensive defects of the upper extremity poses complex challenges due to the involvement of various elements such as muscles, tendons, bones and blood vessels. Immediate and durable coverage is imperative for anatomical and functional restoration.[1] Microsurgical transplantation of free flaps is often necessary to address these injuries in a comprehensive manner. In cases of major defects, compromised blood supply or need for multi-tissue or functional reconstruction, autologous tissue transfer is essential.[2]

The selection of an appropriate flap depends on the specific anatomical defect and flap size, guided by the fundamental principle of using similar tissues for replacement. Since the 1980s, Japanese surgeons introduced the concept of "mega flap", which involves large volume free flaps.[3] However, there is a trade-off between flap size and the risk of complications such as marginal necrosis or total flap loss When the size of a flap exceeds the limits of its vascular territory, surgeons have several options: use the flap with a higher risk of complications, use two separate flaps or transfer a "mega flap" with two vascular pedicles.[4]

The anterolateral thigh flap is adaptable for various clinical situations and can replace any soft tissue surface, one of the advantages being the reduced morbidity on the donor site. Since its description in 1984, it has become the reconstructive option of first choice for large soft tissue defects. The anatomy of the lateral femoral circumflex artery and its branches has been important for the design of flaps of the anterior and lateral surface of the thigh, making it possible to design three flaps depending on each of its branches and to take advantage of the extensive territory that this artery irrigates.[5] The extensive distribution of the perforators of the branches of the lateral femoral circumflex artery ensures that mega-flaps can be obtained from the anterior and lateral surface of the thigh. The anatomical constancy of the vessels makes them safe long pedicle flaps, although this is greatly influenced by

the type of perforator on which the flap is based. The purpose of the anterolateral thigh megaflap is to cover different vascular territories in order to cover a larger fasciocutaneous island surface.

CASE REPORT

The patient was a 43-year-old woman with a history of type 2 diabetes mellitus controlled with oral hypoglycemic drugs, who was involved in a car accident that resulted in a wound on the right axillary surface. Immediate medical attention allowed primary wound closure, 48 hours later skin flap necrosis occurred. After surgical debridement, a large surface cruciate area emerged (Figure 1a). Treatment was based on nutritional therapy, hydrotherapy, antibiotic therapy, serial surgical cleansing, negative pressure therapy (Figure 1b). The procedure was performed 2 weeks after her admission, obtaining an adequate skin coverage, and a partial thickness graft was taken and applied in the donor area of the flap.

Figure 1: (a) Left upper extremity with bone, muscle and nerve exposure before treatment with antibiotherapy and negative pressure system, and (b) left upper extremity after the use of antibiotherapy and negative pressure system.

The surgical technique consisted of carefully marking the surface of the flap to be taken according to the perforators found by handled doppler, these are located from the anterosuperior iliac spine to the lateral border of the patella, which coincides with the path of the descending branch of the lateral femoral circumflex artery, in the area to be taken in its horizontal axis was from the anterior midline to the posterior midline of the thigh (Figure 2). A 35×20 cm flap was marked and dissected in a suprafascial plane, dissection from medial to lateral, perforators of the descending branch of the lateral femoral circumflex artery as well as the transverse branch of the same were identified, these were dissected in order to include them in the cutaneous island (Figure 3). The entire fasciocutaneous flap was released (Figure 4).

Figure 2: Anterolateral thigh (ALT) mega flap design with 25-centimeter skin paddle is prepared to the donor site.

Figure 3: The taut anterolateral lateral flap (ALT) is elevated with its vascular pedicle accompanied by the dissection of the cutaneous muscle perforators.

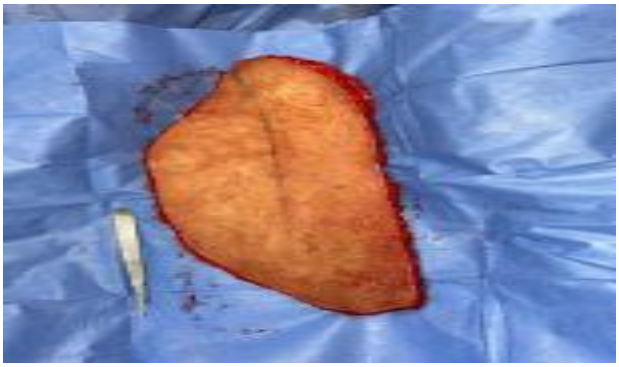

Figure 4: Mega flap "ALT".

Multiple anastomoses were performed from: transverse branch of the lateral femoral circumflex artery to the termino-lateral brachial artery, transverse branch of the lateral femoral circumflex vein to the termino-lateral brachial vein, descending branch of the lateral femoral circumflex artery to the transverse branch of the termino-lateral lateral femoral circumflex artery, and descending branch of the lateral femoral circumflex vein to the transverse branch of the termino-lateral lateral femoral circumflex artery (Figure 5). Subsequently, the flap was inset in its recipient site (Figure 6). A partial thickness graft was taken from the contralateral thigh and applied to

the donor area of the flap, as well as to the resulting cruciate area on the posterior surface of the arm.

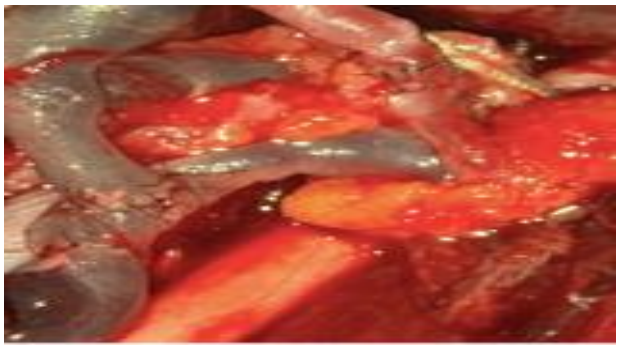

Figure 5: Microsurgical anastomosis.

Figure 6: Total coverage of the defect with the anterolateral thigh flap (ALT) in the upper extremity, placing a partial-thickness graft in the uncovered area.

DISCUSSION

We present this flap for two reasons. Firstly, there is little literature on the use of this “mega flap” anterolateral thigh flap to cover upper limb defects, although the theoretical knowledge of this flap is known and described.[6] This type of flaps had been previously described by Belesouv et al in which they mention thoracodorsal- intercostal, lateral thigh and deltoid, however, we can mention the effectiveness of this flap as a surgical alternative. Secondly, we recognize the low morbidity of its donor site, so we can support the use of this flap in selected cases in which more conventional options do not meet the needs presented by the defect.[7] The obvious visibility of the donor site of the anterolateral thigh flap remains the main disadvantage of this flap. Obviously, it also has the morbidity associated with the donor sites of grafted flaps, which include pelvic limb paresthesia, hypersensitivity of the grafted site and an aesthetic defect. The microsurgical objectives in this patient were defined as: to achieve optimal coverage of the soft tissue defect allowing early rehabilitation and to achieve functional reconstruction. The main clinical characteristics in this patient that made him an ideal candidate were: extensive cruciate area, bone exposure and nerve exposure. This gave the advantage of presenting flexible and stable coverage for the elbow crease, olecranon and axilla, not being a candidate for partial thickness grafting since it would have presented greater scar retraction that limited the movements of the joints.

CONCLUSION

Initially introduced for head and neck reconstruction, the anterolateral thigh flap has proven to be a versatile tool for microsurgical reconstruction of the upper extremities. In particular, Pribaz et al highlighted its attributes, such as its long pedicle, avoidance of sacrifice of important vessels, inclusion of nerves, versatility of skin blades and the possibility of using independent skin blades. In this case, the ``mega flap" approach met the specific needs of the patient, providing stable coverage and paving the way for effective wound healing and functional reconstruction.

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