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Case Report

Scalp reconstruction using triple rotation flap and reverse posterior tibial flap for lower limb reconstruction in electric burn patient: a case report

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ABSTRACT

A 16-year-old male presented with a high-voltage electrical burn affecting the scalp, resulting in a 25 cm x 10 cm lesion, and third-degree burns on the right fifth toe and the base of the left first metatarsal. Initial management included a medial plantar flap for the pelvic limb injury, but perfusion failure led to the use of a reverse posterior tibial flap for coverage, along with a split-thickness skin graft. For the scalp injury, a triple rotation flap technique achieved adequate coverage. Four-day postoperative follow-up showed successful perfusion of the reverse tibial flap without complications, highlighting the challenges and need for adaptive surgical strategies in managing high-voltage electrical burns.

Keywords: Electric burn, Reverse posterior tibial flap, Líder limb reconstruction, Scalp reconstruction, Triple rotation flap

INTRODUCTION

Burns on the scalp are rare. When they occur, they are usually caused by high electrical voltage. They are usually caused by high electrical voltage, fire, boiling liquids or other heat sources.[1] In fire burns, the commitment of the total thickness of the scalp and the underlying skull is rare; a series has an incidence of 1.2%, lower than for electrical burns (5.6%).[2,3] Traditionally, the management of these lesions included active debridement of necrotic, bone and soft tissue tissue, with trepanation of the remaining bone to stimulate the formation of granulation tissue and subsequently be grafted.[4] However, it has been considered that this procedure has certain disadvantages, including additional trauma, prolonged healing and the need for subsequent reconstruction of soft tissues and bone, so it should only be considered in the face of the impossibility of resorting to reconstruction techniques using flaps. The first treatment reference of an avulsion

was made in 1870.[5,6] In defects that compromise all the layers of the hair skin, of great extension, with devascularise tissue, flaps are preferred, which entail the transport of tissue from a giving area to a receiving area, maintaining its vascular connection with the site of origin.[7] The triple rotation flap is ideal for reconstructing the hair implant line on the forehead and nape of the neck. Bipediculated are used in both superficial temporal arteries that, advanced forward, reconstruct the anterior line of the hair.[8]

CASE REPORT

16-year-old male patient, with no pathological or surgical history, he goes to the emergency service for presenting an electrical burn showing a contact site to the physical examination, the entrance of the discharge that initially covers the parietal region is observed, with frontal and temporal limits of 25×10 cm, with discharge exit in pelvic limbs, on the right foot with third degree burn in the fifth ortejo without feasibility data, and 3 degree burn burn on the basis of the first left metatarsal. 2nd and 3rd degree burn injury is found on the head and both feet with a SCTQ of 10.5%. First approach of a pelvic limb injury is carried out, making a medial plantar flap, justifying perfusion through the medial plantar artery. At three days of evolution, perfusion failure of the flap is observed (Figure 1).

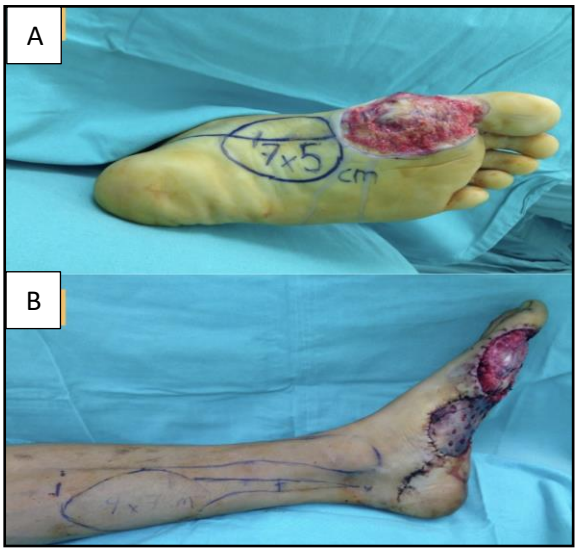

Figure 1: A) Failure medial plantar flap. B) Planning of the procedure.

It is decided to perform reverse posterior tibial flap, securing in pedicle of rotation posterior tibial artery, advance is made covering defect of burn injury, removing anterior dysfunctional medial plantar hanging. Partially thick graft is placed in a donor region of reverse tibial flap of 9×7 cm (Figure 2). High-voltage burn in parietal regions of the skull, with bloody areas of temporal, parietal and frontal regions of the skull, which compromised skin, subcutaneous cell tissue, aponeurosis and bone tissue (SCALP), lesion of 25×10 cm is delimited, taking into account the 4 vascular territories of the affected region, triple technical rotation flap is chosen for the closure of SCALP.

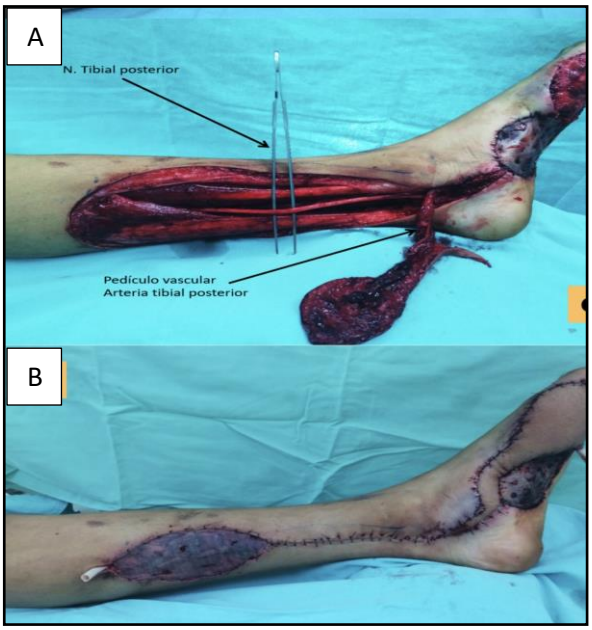

Figure 2: A) Dissection of tibial zone. B) Covered zone.

Figure 3 (A and B): Following of the injury.

An advance of 10 cm is obtained with adequate coverage in the temporal, frontal and parietal region, it is observed in the area of the rotation in the right temporal region area in which adequate coverage is not achieved. 4-day post-surgical follow-up of reverse tibial flap, with adequate perfusion, without complication data. The ASC was more in males bilaterally than in females. The difference was statistically significant on right side

(p=0.00). The ASS was more in females than in males on right and vice versa on the left side.

Figure 4: Electric burn in the SCALP

Figure 5: Triple rotation flap.

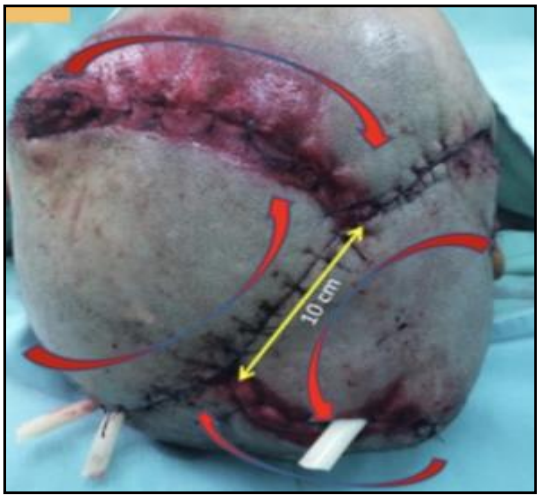

Figure 6: Immediate post-operative.

Figure 7: Post-operative 20 days.

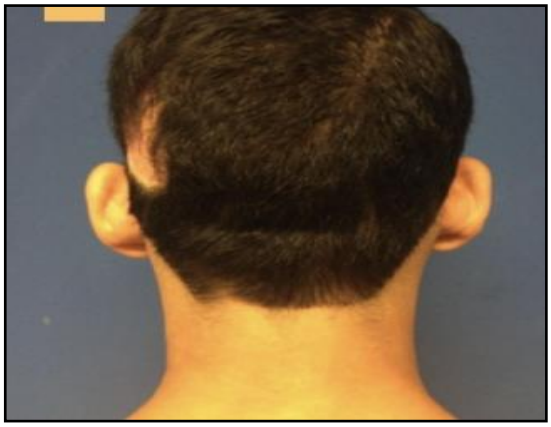

Figure 8: Anual following

DISCUSSION

The loss of all layers of the scalp and the damage to the vascularization that prevents it from scarring is a condition that is not often seen in the emergency room.[9] It must be carried out actively managed with rapid surgical intervention, including several procedures that require proper cleaning, until an area without signs of infection and a colony of granulated tissue that acts as buttons for the formation of vascular structures.[10]

In large and difficult-to-control areas, the Triple posterior flap is recommended, since sufficient development has been observed in large wounds at the level of the scalp, considering its transposition.[11] If the defect is larger than can be covered with the entire graft, another approach should be used using the same flap or opt for other treatments such as grafts, provided that the receiving area is adequate.[12]

CONCLUSION

Scalp burns are unusual in our environment, those of electrical cause being of great importance because they are generally deeper and difficult to handle, requiring more advanced treatments and may lead to potential cognitive and affective sequelae.

Therefore, we consider that multidisciplinary interventions are of vital importance to improve the prognosis of these patients. There are multiple therapeutic alternatives for this type of injury, with a reconstructive ladder depending on its complexity, from second-intention closure to such promising treatments as scalp transplantation, through grafts, different types of local and free flaps, dermal substitutes or expanders, among others. Case-by-case evaluation should always be practiced to give the most appropriate treatment to each of them with the best possible result, both in terms of the stability of the coverage performed and in the aesthetic results obtained.

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REFERENCES

1. Manuel CHC, Lorente Gil Sergio Ramón, Pérez Suárez Francisco Andrés, Pérez Núñez Vivian. Reconstruction of the scalp after a high-voltage electrical burn. Rev Cubana Cir. 2018;57(3):600.
2. Pereira N, Léniz P, Enríquez E, Mangelsdorff G, Piñeros B, Calderón W. Experience in the treatment of scalp burns. Cir Plást Iberolatinoam. 2013;39(1):61-5.
3. Michaelidis IG, Stefanopoulos PK, Papadimitriou GA. The triple rotation scalp flap revisited: a case of reconstruction of cicatricial pressure alopecia. Int J Oral Maxillofac Surg. 2006;35(12):1153-5.
4. Iribarren O, Ríos P, Saavedra F. Immediate reconstruction of the scalp; Ibero-Latin American Plastic Surg J. 2012;32:1:55-6.
5. Morais Oliveira T, Brito da Costa C, Silva Boulhosa FJ, Nicolau da Costa LR, Cordeiro de Macêdo R, Esteves da Silva PK, et al. Fisioterapia em grande queimado: relato de caso em centro de tratamento de queimados na Amazônia brasileira. Rev Bras Queimaduras. 2015;14(4):285-9.
6. Pereira N, Léniz P, Enríquez E, Mangelsdorff G, Piñeros B, Calderón W. Experience in the treatment of scalp burns. Cir Plást Iberolatinoam. 2013;39(1):61-5.
7. Tarragona FR, Ferreiro GI, Gabilondo ZFJ. High-voltage electrical injury to the head and limbs in a 15-year-old patient. Cir Plást Iberolatinoam. 2014;41(3):321-8.
8. Delgado Ruiz T, Simón Sanz E, Villaverde Doménech E, Forés Zaragoza A, Pérez del Caz MD. The dorsal ulnar fasciocutaneous flap in electrical burns of the hand: a constant, fast and safe flap. Cir Plást Iberolatinoam. 2016;42(1):65-72.
9. Almulhim AM, Madadin M. Scalp Laceration. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. Available at: https://www.ncbi.nlm.nih.gov/books. Accessed on 15th May 2024.
10. Alhajj M, Goyal A. Physiology, Granulation Tissue. [Updated 2022 Oct 24]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. Available at: https://www.ncbi.nlm.nih.gov/books.
11. Shash H, Marzouq S, Alghamdi A, Alrayes M, Alkhaldi SK, Shash H, Abu Quren AM. The 1-2-3 cm Advancement Flap Rule in Scalp Reconstruction. Cureus. 2023;15(2):35301.
12. Ramsey ML, Ellison CA, Hohman MH, et al. Interpolated Flaps. In: StatPearls. Treasure Island (FL): StatPearls Publishing. Available at: https://www.ncbi.nlm.nih.gov. Accessed on 29 August 2024.

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