v. 4, n. 8, 2024

International Journal of Health Science

THIRD DEGREE BURN ON THE HAND: A TREATMENT OPTION – CASE REPORT

José Alberto Guilherme Frota Júnior

Salustiano Gomes Pinho Pessoa

Fernando Soares de Alcântara

Vitor de Vasconcelos Muniz

Maria de Fátima de Brito Coutinho Nogueira Lima

José Isnack Ponte de Alencar

Gustavo Gomes Martins

Thaylandiê Basilio Cavalcante Cruz

Abstract: A burn is an injury caused by an external agent that acts on the body covering tissue, which can cause partial or total loss of the affected tissue function. Agents can be thermal, chemical, electrical or radioactive.
We report a case of a 49-year-old patient suffering from an electrical burn on the upper limb, who underwent reconstruction with a free flap after initial care for the injury.
Free flaps are of great importance in the treatment of injuries with loss of substance in the hands, due to the possible scarcity of tissue that may occur in the region after extensive trauma, making regional flaps impossible.
We noticed that the anterolateral thigh free flap fulfilled its role, providing good tissue coverage to the lesion, combined with a small morbidity in the donor area.

INTRODUCTION

A burn is characterized by being an injury caused by an external agent that acts on the body covering tissues, which can cause partial or total loss of function of the affected tissue. Agents can be thermal, chemical, electrical or radioactive. It has always been present throughout the history of humanity, even after man dominated fire. Likewise, the first treatments for burns date back to the first civilizations, where plant extracts were applied to heal injuries.[1,2,3]

It is most commonly classified by how deep the injury is. Thus, it is divided into first, second and third degree. First-degree burns are the most superficial, affecting only the epidermis, causing only local symptoms, without systemic repercussions. Second-degree burns are classified as intermediate, affecting the epidermis and part of the dermis. In addition to local symptoms, it generally presents blisters and can cause systemic changes. Finally, the third-degree burn, being the deepest, affects tissues beyond the dermis, with exposure of subcutaneous tissue, muscles, bones and tendons. In this last stage, there is no spontaneous re-epithelialization and generally leaves sequelae. The systemic repercussions are more intense, compromising the recovery of the affected patient.[1,2,3]

Hand burns, despite corresponding to a small area of the body, require preferential care due to the anatomical complexity of the region, in addition to the fact that local sequelae interfere with the patient's quality of life. It is important to check local blood flow during the first visit, generally using Doppler USG and comparing oxygen saturation between limbs. More superficial burns will require an occlusive dressing and elevation of the limb to reduce edema. In deeper burns, surgical debridement must be performed if there is the presence of devitalized tissue, which may later require reconstruction with a graft or flap.[1,2,3]

Our objective in this work was to report a treatment option for hand reconstruction. In this case, an anterolateral fasciocutaneous flap of the thigh was used to provide sufficient coverage to a lesion with extensive loss of substance.

CASE REPORT

The patient, 49 years old, was admitted to the hospital with an electric shock burn and injuries to his right hand and left leg. He was transferred to the burns sector of the IJF hospital the following day, with a 3rd degree burn on his right hand and a 2nd degree burn on his left leg. Surgical debridement of devitalized tissue of the hand and leg was performed immediately after admission and on 4 other occasions. Compromise of the distal end of the ulna was observed, requiring resection of the affected segment, causing joint instability of the wrist. It was then decided to fix the radiocarpal joint with Kirschner wire. (Figure 1 and 2).

(Figure 1: View of the volar surface of the right hand after surgical debridement, with fixation of the radiocarpal joint with a Kirscher wire)

(Figure 2: Dorsomedial view of the right hand after surgical debridement)

After improvement in the appearance of the lesion, the patient was sent back to the surgical center for skin coverage to be created using a fasciocutaneous flap. The patient was positioned in the supine position under the effect of general anesthetic. Antisepsis was performed on the entire right upper limb and the entire right leg, with subsequent placement of sterile surgical drapes. The procedure began with new debridement of the volar and dorsal surface of the right hand, with subsequent identification and isolation of the ulnar artery and veins of the superficial system. The flap was marked on the right leg by drawing a line between the anterior superior iliac spine and the superolateral border of the patella. In the area close to the midpoint of this line, the central perforating artery could be located. Dissection began from the medial to the lateral aspect, with inclusion of the muscular fascia, until the identification of the perforating vessels. The perforating vessels were dissected through the vastus lateralis muscle to the descending branch of the lateral circumflex femoral artery, with the perforating vascular pedicle being sectioned as proximally as possible. Soon after, the microsurgical flap was transposed with a tissue island measuring approximately 10cm x 5cm for the osteocutaneous defect of the right wrist, with end-to-end anastomoses of the perforating artery with the ulnar artery using 10-0 mononylon. The perforating veins were also anastomosed with 10-0 mononylon to the superficial system veins. Local hemostatic control was carried out, with good perfusion of the flap confirmed. Synthesis of the flap was performed on the skin of the right hand with 4-0 nylon. Closure of the donor area after hemostatic control with 3-0 nylon. Local occlusive dressing performed with plaster splint.

The patient remained with the upper limb elevated during the postoperative period for approximately 10 days (figure 3).

(Figure 3: Post-operative patient with plaster splint on the right upper limb)

On the 10th postoperative day, a necrotic area was identified at the distal end of the flap (Figure 4). A new surgical approach was chosen, where surgical debridement of devitalized tissue was performed with distal progression of the flap to close the edges of the wound. In addition, bone cement was applied to fill the bone gap in the right wrist region. At the time of sending this article, the patient remained in hospital with good recovery, with future plans for reconstruction of the extensor tendons.

(Figure 4: Patient on the 10th postoperative day. Flap with good general appearance, except for a necrotic area at the distal end)

DISCUSSION

Free flaps are of great importance in the treatment of injuries with loss of substance in the hands, due to the possible scarcity of tissue that may occur in the region after extensive trauma, making regional flaps impossible. It allows correction with healthy tissue, generally in just one surgical time. Despite this, microsurgical flaps tend to have a longer surgical time and a greater degree of complexity, requiring specific training from the surgical team. It is important that the patient does not have systemic vascular pathologies, which would harm the viability of the flap if the anastomoses were performed in compromised vessels. [4,5]

The anterolateral thigh flap was initially described by Song et al. in 1984. Since then it has been used to reconstruct various areas of the body. It is a Mathes-Nahai type C fasciocutaneous flap, being nourished by musculocutaneous perforating vessels from the descending branch of the lateral circumflex femoral vessels, close to the medial border of the vastus lateralis muscle. The central perforating vessels can be found by drawing a line between the anterior superior iliac spine and the superolateral edge of the patella. These vessels must be within a radius of 3cm from the median point of this line. A preoperative assessment with Doppler ultrasound helps identify the likely location of the perforators. It can be used as a pedicled flap for locoregional treatment or as a free flap, thus increasing its possible applications. The great advantage of this flap is the type of vascular pedicle, generally composed of long perforating vessels with good diameter. The available tissue also tends to have good volume, without causing major morbidity in the donor area. [4,5,6,7]

CONCLUSION

In the case described, we noticed that the anterolateral thigh free flap fulfilled its role, providing good tissue coverage to the lesion, combined with a small morbidity in the donor area. Therefore, we believe that this flap is a good tool for treating hand injuries, as it can also be used for injuries in other areas of the body.

REFERENCES

1. CIRURGIA Plástica Fundamentos e Arte: Princípios Gerais. 1ª edição. Ed. [*S.I.*]: Guanabara, 2003.

2. CIRURGIA Plástica Fundamentos e Arte: Cirurgia Reparadora de Troncos e Membros. 1ª edição. Ed. [*S.I.*]: Guanabara, 2003.

3. CIRURGIA Plástica: Extremidade Inferior, Tronco e Queimaduras. 3ª edição. Ed. Rio de Janeiro: Elsevier, 2015.

4. SCHULZ JIF, JEZIOROWSKI A, BITTENCOURT RC, KAIMOTO CL, HUBER P, MIMA W, TIRAPELLE R. Retalho Livre Anterolateral da Coxa para Reconstrução de Extremidades. Arq. Catarinense de Medicina.2007

5. Groth AK, Silva ABD, Maluf Junior I, Ono MCC, Faris NA, Chociai AC. A versatilidade do retalho anterolateral da coxa em reconstruções oncológicas: série de casos do serviço de cirurgia plástica reconstrutora e microcirurgia do hospital Erasto Gaertnera. Rev. Bras. Cir. Plást.2014;29(1):176-178

6. Mateus FN, Jeziorowski A, Kaimoto CL, Bittencourt RC, Chociai ACS, Biagi VM. Uso do retalho livre ântero-lateral da coxa para reconstrução de extremidades: experiência de 10 anos do Hospital Universitário Cajuru . Rev. Bras. Cir. Plást.2013;28(3):102

7. Song YG, Chen GZ, Song YL. The free thigh flap: a new free flap concepted based on the septocutaneous artery. Br. J. plast. Surg. 1984 Apr;37(2):149-59.