CASE REPORT

Limb Salvage with Microsurgical Compound Flap in a Seizure induced Deep Flame Burn Injury

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ABSTRACT

Patients with epilepsy have higher incidence and severity of burn injury. Managing epilepsy is challenging in a Low- and Middle-Income setting, exacerbated by a combination of stigma, traditional beliefs, access to health care, and the burdensome costs of long-term treatment. Management of the disease require lifelong medication and regular follow-up care, which makes compliance a major issue. Here we discuss a patient who had suffered deep burn to both legs after a fall into open fire during a seizure attack resulting in amputation of the left leg, however the right leg was salvaged with local, regional and a free flap.

INTRODUCTION

Few studies describe the association between epilepsy and burns in low-income settings. In Nepal, studies show that infection with neurocysticercosis (NCC), toxoplasma, brain tumors, metabolic, trauma, substance use are common causes of seizures.[1] In patients with frequent seizures (>1/month) and with poor adherence to AntiSeizure Medication (ASM), flame injury is most common and they also experience more severe burns.[2,3] This report highlights the importance of prioritizing limb salvage over amputation—a preference shared by approximately 93% of patients—to ensure social independence and maintain ambulatory status and demonstrates a successful multi-modal surgical approach for reconstructing the distal lower extremity, which is clinically challenging due to limited local tissue and poor blood supply. [4-6]

CASE REPORT

An apparently healthy 35years gentleman presented to us, two days post incident, with deep flame burn injury ~15% Total Body Surface Area (TBSA) involving both the legs: circumferential over the Left Leg (below knee) and anteriorly over Right Leg (below knee). He had a history of recurrent seizure attacks for the past 3 years, however, was not on any antiseizure medications. CT scan at admission ruled negative for any focal cerebral lesions.

During the very first debridement, the left leg was deemed unsalvageable and the right leg had exposed medial surface of tibia and distal leg. The patient was counselled for below knee amputation of the left leg – to which he consented. In the second OR visit, he had left below knee amputation and the right leg was again debrided. The posterior right leg muscles appeared fine it was decided to cover the exposed tibial bone with soft tissue. However, during surgical exploration inadvertent injury to the Medial sural venae comitantes occurred so the plan for Pedicled MSAP Flap was abandoned. Thus, the plan shifted to the use of medial gastrocnemius muscle to cover the upper leg, hemisoleus for the mid leg and a free flap for the distal leg.

In the third OR visit, medial gastrocnemius flap for

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the proximal third tibia and a hemisoleus flap for the middle third tibia was performed. However, the distal tibia was still exposed.

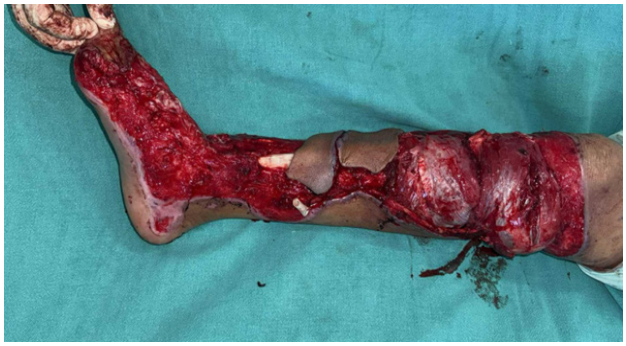

Figure 1. Medial gastrocnemius flap for the proximal third tibia and a hemisoleus flap for the middle third tibia and an exposed distal tibia

In the fourth OR visit, a Peroneal Artery Perforator Propeller Flap was performed to cover the distal tibial defect. However, it fell short to cover the entire defect and so, eventually a Antero Lateral Thigh (ALT) Free Flap was used.

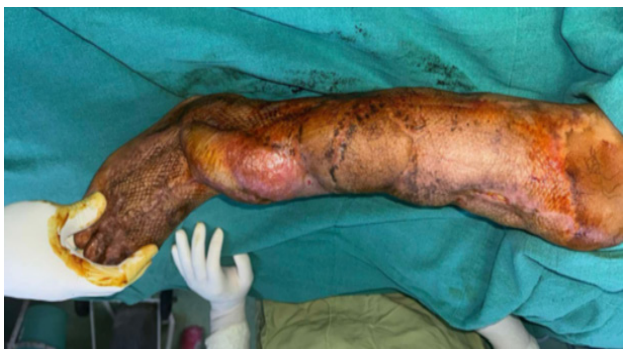

Figure 2. A Free ALT Flap to cover the Distal Tibia

Subsequently, the patient went home on regular dressing changes. And, we lost him for follow-up.

Two months later he returned with dehiscence of the medial gastrocnemius flap and resultant osteomyelitis of proximal and distal tibia. However, he still refused amputation, so aggressive debridement was done and as per Infectious Disease Expert consultation, guided by the Bone Culture and Antibiotic Sensitivity Report, the wound was continuously irrigated with Vancomycin for 5 days.

Eventually, after the wound stabilized, a Lateral Superior Genicular Artery Perforator Propeller Flap for the superior knee defect was performed. Again, this flap had distal tip necrosis. Leech therapy was done to salvage the flap. And the flap survived.

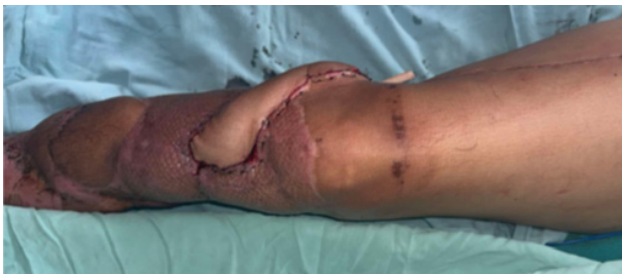

Figure 3. Lateral Superior Genicular Artery Perforator Flap to cover the superior knee defect

After regular dressings, finally the patient was discharged on crutches with a prosthetic limb on the left leg and able to bear weight on his right leg – bearing a compound flap!

DISCUSSION

It has been reported that in a traumatic scenario, a high percentage of patients (93%) would prefer a limb salvage procedure to avoid undergoing amputation, and also in chronic wounds, reconstruction provides a chance for the patient to remain socially independent while maintaining their ambulatory status.[5]

For a reconstructive surgeon, a burned distal lower extremity is challenging due to limited availability of local tissue in the weightbearing area and a relatively poor blood supply compared to other body parts. The tenant of a full thickness burn treatment is early debridement and immediate coverage of the defect with a skin graft or a well vascularized flap.[6]

The Peroneal Artery Perforator Flap itself (as an osteocutaneous island flap) was first introduced by Taylor et al. in 1975, with further modifications into a septocutaneous flap by Yoshimura et al. and Hyakusoku developed several pedicled flaps to treat patients with post burn contractures in the 1980s.[7] In 1989, Koshima introduced the term perforator flaps and in 1991 propeller flaps were first described. The modern application of the Perforator Pedicled Propeller Flap (rotating 180 degrees on a single, skeletonized perforator) was pioneered by Hallock in 2006.[8]

Teo is widely credited with expanding its clinical

application, specifically for distal lower limb reconstruction.[9] Use of Latissimus dorsi (LD) myocutaneous flap or LD muscle flap with a skin graft has been described for leg reconstruction.[6] A free muscle flap transfer with skin graft coverage can successfully reconstruct extensive defects caused by burns of ankle areas and calf muscles. A pilot study suggests that functional outcomes of perforator skin flaps are equal to muscle flaps.[5]

However, it is important to be aware of the high risk of complications, especially chronic osteomyelitis and atrophy of the muscle bulk transfer. If feasible, atrophy of the muscle can be reduced by suturing the motor nerves between the donor muscle and the recipient area. Also, the accompanying prolonged hospital stay and rehab needs to be elaborately discussed.[10]

CONCLUSION

This case highlights the risk of severe burns from untreated epilepsy in low-income settings. While a left below-knee amputation was necessary, the right leg was salvaged through a complex multi-modal approach. Utilizing local muscle flaps (medial gastrocnemius and hemisoleus), Lateral Superior Genicular Artery Perforator propeller flap and a free ALT Flap for extensive distal defects despite complications like osteomyelitis. Prioritizing limb salvage honored the patient's preference, ultimately achieving functional weight-bearing and social independence. This underscores that aggressive debridement and specialized microsurgery can successfully manage challenging lower-extremity burns even with limited local tissue.

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