

## Case Report

# Bipedicle flap for reconstruction of post-electric scalp burn defect

Kaushik Paul<sup>1\*</sup>, Saurabh Sharma<sup>2</sup>, Deepashree Paul<sup>3</sup>

<sup>1</sup>Department of Plastic Surgery, Apollo Hospital, Kolkata, West Bengal, India

<sup>2</sup>Department of Plastic Surgery, R. G. Kar Medical College, West Bengal, India

<sup>3</sup>Department of Dental Surgery, Gurunanak Institute of Dental Science and Research, West Bengal, India

**Received:** 02 April 2017

**Accepted:** 13 April 2017

### \*Correspondence:

Dr. Kaushik Paul,

E-mail: [dr.kaushik\\_paul@yahoo.com](mailto:dr.kaushik_paul@yahoo.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

High-tension electric calvarial burns are extremely rare and difficult to reconstruct. Invariably, these are third- or fourth-degree-deep burns involving the full thickness of the bone. Historically, these wounds have been treated conservatively, adding to morbidity and prolonged treatment. The patient with high-tension electric calvarial burns presented to us two days after the injury with subsequent loss of full thickness of parietal bone. The defect was covered with a local bipediced scalp flap. The bipedicle flap provides a simple and reliable method of reconstruction of full thickness scalp defect.

**Keywords:** Bipedicle scalp flap, Electric burn scalp

## INTRODUCTION

Burns to the hair-bearing scalp can not only be life threatening but may also impair overall aesthetics. These injuries can be classified into two groups; those which are pure soft tissue injuries and scalp burns which involve the calvarium. If the initial patient assessment indicates a full-thickness calvarial injury, that is, exposed dura; immediate coverage of the defect with a vascularized flap should be the primary operative procedure.

Unipediced pericranial flaps are vascularized, versatile flaps used for reconstruction of the skull base, frontal sinus, and frontonasal region.<sup>1,2</sup>

However, the distal portion of unipediced pericranial flap does not have an axial blood supply, and there is no connection with the contralateral pericranial vessels crossing the cranial midline.<sup>3</sup> Therefore, we designed bipediced pericranial flap that provide a sufficient blood supply to the area afflicted by the electric burn and obtained satisfactory outcomes.

## CASE REPORT

A twenty-year old male patient sustained electric burn injury to the right parietal region at the workplace. He came to the hospital two days after the incident. The patient was initially managed by general surgeons. After initial evaluation and stabilization of the patient they planned for surgical intervention. During operation osteomyelitic part of the parietal bone was removed which resulted in exposure of the underlying dura mater. To close the dural defect relaxing incisions were made on both the sides of the defect as shown in Figure 1.

But even after this it was not possible to close the dural defect. Dressings continued in the ward for two more days and after that opinion of plastic surgeon was sought for. Subsequently another operation was planned by the plastic surgical team. As two parallel incisions were already given both the sides of the defect and the defect was strip like, bipedicle flap to cover the dural defect and split skin grafting to flap donor site were planned. The procedure was performed under general anaesthesia. The patient was kept in supine position with neck extended.

After infiltration of 1:100000 adrenaline solution (around 20 ml) the procedure was started after waiting for about 15 minutes. Bipedicule flap was elevated from both the sides of the defect at the plane above the level of the pericranium. The flap elevated from lateral side was transposed medially to cover the defect. The flap donor site was covered with the help of split skin grafting harvested from anterior aspect of right thigh. The bipedicule flap elevated from the medial aspect of the defect helped in tensionless closure. Two flaps are sutured to each other in the midline with the help of 3-0 polypropylene suture. Tie over dressing was done over the grafted skin area. Two corrugated rubber drains were placed underneath the flap.



**Figure 1: Exposed dura in right parietal region.**



**Figure 2: Bipedicule flap from lateral aspect of the defect mobilised medially**

Drains were removed two days after the operation. Dressings were changed at regular intervals. The wound was kept open ten days after the operation and the patient was subsequently discharged. The patient was followed up closely for about two months.

## DISCUSSION

In this patient, the osteomyelitis occurred in all of the layers of the part of the right parietal bone. As a result, it was removed during the first operation.

Scalp defects of moderate size (2-25 cm<sup>2</sup>) can be treated with a local flap in reconstruction, but if repetitive surgeries are performed, the mobility of flaps becomes poor because scarring occurs in the scalp areas.<sup>5</sup> In addition, the flap design is difficult because surgical incisions have been made previously, which limits the availability of local flaps. A free flap can also be used to reconstruct scalp defects where there is a concurrent presence of osteomyelitis, but it might be disadvantageous, as the operation time is long and the donor site morbidity is relatively high.<sup>5-7</sup>

The advantages of bipedicule flap include versatility and a lack of functional and morphological complications at donor sites. In addition, it receives its blood supply from major arterial branches of the scalp in an axial pattern and from the occasional perforators arising from the calvarium. This ensures that a bipedicule flap receives sufficient blood supply.<sup>8</sup>

The distal portion of unipedicled pericranial flaps does not have an axial blood supply, and there is no connection with the contralateral pericranial vessels crossing the cranial midline.<sup>3</sup> To maximize the vascularity of the flap, we designed a bilateral pericranial flap with the major arterial branches arising in the scalp. The flap should be designed to be as wide as possible because cranial soft tissue shrinks when released owing to its elasticity.<sup>9</sup> In our experience, the width of the flap decreased from 7 cm at the time of design to less than 5 cm after flap elevation. If bipedicled pericranial flaps are elevated with sufficient dissection, they can be transposed to the defect site easily without back cutting due to a lack of mechanical strength. A back-cut into the pedicle may worsen the axial blood supply of the flap. We performed a subgaleal dissection immediately under the galea aponeurotica and thereby maximized the volume of the flap, achieving a restoration of the defects that occurred after bone resection.

In the current study, relaxation incisions were made by the primary surgeon to close the defect. In our experience, these relaxation incisions usually permit bilateral advancement of scalp flaps to primarily close scalp defects less 2 cm in width without tension. If the width of a scalp defect is over 2 cm, we recommend skin grafting onto the flap donor site. A transposition or rotation scalp flap should be designed on the normal

scalp instead of on the previously elevated scalp, which would limit flap mobility because of severe subgaleal scarring and previous incision scars.

## CONCLUSION

Full thickness scalp defect with exposed dura following electric burn injury can be covered with versatile bipedicle scalp flap with satisfactory functional and aesthetic results.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: Not required*

## REFERENCES

1. Argenta LC, Friedman RJ, Dingman RO, Duus EC. The versatility of pericranial flaps. *Plastic and reconstructive surgery*. 1985;76(5):695-702.
2. Al-Qattan MM. The use of multifolded pericranial flaps as "plugs" and "pads". *Plast Reconstr Surg*. 2001;108:336-42.
3. Potpari Z, Fukuta K, Colen LB, Jackson IT, Carraway JH. Galeo-pericranial flaps in the forehead: a study of blood supply and volumes. *Br J Plastic Surg*. 1996;49(8):519-28.
4. Boeckx WD, van der Hulst RR, Nanhekhyan LV, De Lorenzi F. The role of free flaps in the treatment of persistent scalp osteomyelitis. *Operat Neurosurg*. 2006;59(1):ONS-64.
5. Leedy JE, Janis JE, Rohrich RJ. Reconstruction of acquired scalp defects: an algorithmic approach. *Plast Reconstr Surg*. 2005;116:54e-72e.
6. Lutz BS, Wei FC, Chen HC, Lin CH, Wei CY. Reconstruction of scalp defects with free flaps in 30 cases. *Br J Plast Surg*. 1998;51(3):186-90.
7. Nakadai M, Takahashi H, Taniguchi M, Ishijima B, Yanai A. Repair of widely infected scalp defect and osteomyelitis with free radial forearm flap: a case report. *No shinkei geka. Neurol Surg*. 1991;19(7):655-9.
8. Karsidag S, Özcan A, Ozkaya O, Ugurlu K, Bas L. Use of wide bipedicle pericranial flap in anterior scalp reconstruction. *J Craniofacial Surg*. 2009;20(6):2248-51.
9. Tolhurst DE, Carstens MH, Greco RJ, Hurwitz DJ. The surgical anatomy of the scalp. *Plast Reconstruct Surg*. 1991;87(4):603-12.

**Cite this article as:** Paul K, Sharma S, Paul D. Bipedicle flap for reconstruction of post-electric scalp burn defect. *Int Surg J* 2017;4:1783-5.