

## Role of Bone-Abrasion in Wound Bed Preparation in Pediatric Scalp Electrical Burns

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### Abstract

Electrical burns constitute 3–5% of all burn cases; in developing countries, this ratio increases up to 21–27% and the mortality rate is reported to be between 3.75% and 58.8%. Most acute burns are life-threatening, initially require resuscitation, and require various types of surgical interventions such as eschar excision or split-thickness skin grafting, depending on the size, location, and depth of the lesion. In this case, we will assess the role of bone-abrasion in the scalp electrical burns involving up to the scalp bone. Bone Abrasion is a procedure that can be utilized in wound bed preparation, especially in scalp electrical burns.

**Keywords:** wound-bed preparation, bone-abrasion, Paediatric, electrical burns, scalp.

### Introduction:

In the developed world, electrical burns constitute 3–5% of all burn cases; in developing countries, this ratio increases up to 21–27% [1] and the mortality rate is reported to be between 3.75% and 58.8% [2]. Approximately one-third of the electrical burns occur in electrical workers, one-third in construction workers, and the last third in children playing at home. Most acute burns are life-threatening and initially require resuscitation, followed by various types of surgical interventions such as eschar excision or split-thickness skin grafting, depending on the size, location, and depth of the lesion. The process injures the top layer of bone and causes it to bleed at points. Large full-

thickness defects with exposed bone need a flap cover to cover the defect. Before proceeding with flap cover, a patient needs debridement of an unhealthy wound bed. When a scalp defect with exposed bone post electrical burns, the outer layer of bone is necrosed. The discolored bone with sloughed-out periosteum needs chiseling of the exposed bone to remove the outer layer of the bone to prepare for wound cover with flap. If the scalp bone was infarcted at full thickness, all infarcted bone was debrided. In this article, we report the use of Bone-Abrasion in the Wound bed preparation of scalp defects from electrical burns.

### Material and Methods

This study was conducted in the Department of Plastic Surgery in a tertiary care institute. Informed consent was obtained from the patient under study. Department scientific committee approval was obtained. It is a single-center, non-randomized, non-controlled study. The patient under study was an 8-year-

old male with no other known co-morbidities who presented with 30% TBSA electrical burns. The entry point was his Scalp Vertex parietal calvarium (figure 1),



**Figure 1:** At Admission

and the exit point was his right foot. He was managed by standard WHO international guidelines for burn care and resuscitation. The scalp electrical burns were the deeper burns that involved up to the calvarium. His calvarium

was exposed and devoid of periosteum, along with unhealthy tissues and a discolored top layer of bone (Figure 2).



**Figure 2.** Exposed calvarium with unhealthy tissue and discolored bone debrided with burrtip drill bit.

Dermabrasion was done on the exposed calvarium until bleeding points were encountered (figure 3).



**Figure 3.** Bone abrasion of Outer table of the skull.

In our case, Bone scan showed full thickness bone infarct in the vertex region of the scalp bone. As the whole thickness of the bone was infarcted, the outer

and inner table of the skull bone was abraded with a rotating burr drill (figure 4).



**Figure 4.** Bone- Abrasion of Inner table of skull

Biological scaffold dressing (Integra used in our case- figure 5) was applied to cover the exposed dural layer to promote granulation, followed by Vacuum dressing applied after Bone-abrasion. Bone-Abrasion is a technique that uses a wire brush or a diamond wheel with edges called a burr or fraise to remove

the upper layers of the bone. The brush or burr rotates rapidly, taking off and leveling the top layers of bone. The cost of a bone abrasion drill bit and machine is around 1.5 lakh Indian rupees, along with a handle and multiple drillbits.



**Figure 5.** Biological Scaffold (Integra) application of exposed Dural layer

### Results

Bone abrasion with the round burr tip drill helps in removing the top layer of the bone till the bleeding point appears without damaging the normal bone.

### Discussion

Approximately one-third of the electrical burns occur in electrical workers, one-third in construction workers, and the last third in children playing at home. Most acute burns are life-threatening and require various types of surgical interventions, such as eschar excision or split-thickness skin grafting, depending on the size, location, and depth of the lesion [3]. Bone-Abrasion is a technique that uses a wire brush or a diamond wheel with edges called a burr or fraise to remove the upper layers of the skin or bone. The brush or burr rotates rapidly, taking off and leveling the top layers of the skin or bone.

### Conclusion

In Electrical burns, bone abrasion with a burr tip drill was found to be useful

### References

1. Aggarwal S, Maitz P, Kennedy P. (2011) Electrical flash burns due to switchboard explosions in New South Wales, a 9-year experience. *Burns*. 37(6): 1038–43.
2. Patil SB, Khare NA, Jaiswal S, Jain A, Chitranshi A, Math M. (2010) Changing patterns in electrical burn injuries in a developing country: should

In our case, the whole thickness of the bone was infarcted, which leads to the removal of all infarcted bone by bone abrasion. The postoperative period was uneventful.

Bone-Abrasion of exposed bone improves vascularity and provides the wounded area with undifferentiated mesenchymal cells that have the capacity to transform into migratory fibroblasts. When fibroblasts migrate into a wound, they are closely followed by new capillary formation from endothelial budding, and the typical picture of a granulating surface appears. The fibroblasts synthesize collagen, mucopolysaccharides, and glycoproteins to form new connective tissue [4]. It is over this tissue that the subsequent migrating epithelial cells pass.

in the debridement of the unhealthy outer and inner table of bone without damaging the surrounding healthy bone.

Prevention programs focus on the rural population? *J Burn Care Research*. 31(6):931–4.

3. Koul AR, Patil RK, Philip VK. (2008) Early use of microvascular free tissue transfer in the management of electrical injuries. *Burns*. 34(5):681–7.
4. Martinez, I. R. (1972) Fine structural studies of migrating epithelial cells following incision wounds. In: Maibach, H. I., and Rovee, D. T. (eds.), *Epidermal Wound Healing*. Chicago, Year book Medical Publishers. 323-342.