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Case Report

Reconstruction of post electrical burns scalp defect

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ABSTRACT

Pertinent approach for scalp reconstruction often poses a challenge to plastic surgeons due to numerous reasons like inelastic nature of scalp, hairy nature of scalp and others. Traditional surgical treatment of deep burns of the scalp and skull involved excision of necrotic bone and soft tissues with trephanation of the bone to permit granulation tissue formation followed by skin grafting. However, this approach prolongs wound time and adds additional trauma. Even after initial healing it may necessitate secondary soft tissue and bone reconstruction. Treatment of scalp defect after electrical burn is managed according to the amount of damage. Scalp burn injury with osteomyelitis of the calvarium is seldom mentioned in literature. In the present case, the defect was long standing with skull exposure and hence routine management of scalp defect had to be differed. The calvarial bone was replaced with sequestrum. Complete excision of the sequestrum was done with intact dura. Ensuing defect was covered with local transposition flap. The donor area was covered with split thickness skin graft.

KEYWORDS: Electrical burns, Scalp defect, Transposition flap, Flap coverage, Cosmetic outcome

INTRODUCTION

Scalp defects present a reconstructive challenge, especially in young patient. Reconstruction for contact electrical burns is reported infrequently in the literature. Electric burns of the head causes severe damage of scalp, skull bones, meninges and even brain may be affected, since in the event of deep cranial burn, usually, electron flow is high-voltage (more than 1000 V). Extent of bone damage can be assessed by CT head scan and technetium bone scan. According to complexity, scalp defect coverage includes primary closure, skin grafts, local flaps with or without tissue expansion, regional flaps, and free flaps.[1] Early closure of the defect using a flap is recommended, even if wound contamination is present.[2] The results can be very gratifying. In full thickness burn cases, necrotic soft tissue is excised, and generally, the bony vault is covered with vascularized flaps. However, wound infection, flap necrosis, osteomyelitis and bone sequestration may occur during the treatment. Many opine that leaving the necrosed skull in situ serves as a scaffold of substitution for bone regeneration.[3] Early appropriate treatment initiation prevents desiccation and infection of the skull. The purpose of this article is to demonstrate the management of a case of long standing post electric burn scalp defect with osteomyelitis of the calvarium.

CASE REPORT

A 35 years old male with history of contact electric burns to the head presented with a scalp defect. He had sustained contact live wire burns while working, 7 years ago. He had received initial treatment in a local hospital and had not consulted reconstructive surgeon ever. He also complained of occasional headache and episodes of discharge from the defect site. On examination, the scalp defect was 9 x 6.5 cm lying transversely over both the parietal areas. The calvarium was exposed surrounded by a margin of scarred tissue with serous discharge. The

bone was yellowish and lustreless. Patient had no other co-morbidities. Neurosurgeon advice was sought. CT scan of the skull revealed intact inner table.

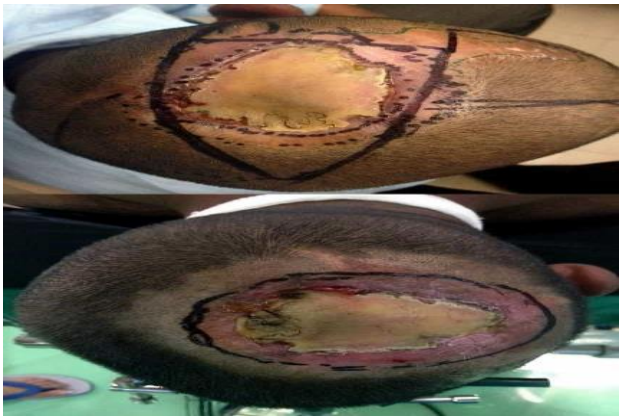

Figure 1: Pre-operative picture showing 7-year-old scalp defect with lustreless sequestrum.

Figure 2: Intra-op picture showing exposed dura after removal of the outer and inner table.

Figure 3: Post operatively scalp defect was closed and with some hairs anteriorly it gave better cosmetic outcome.

Patient was prepared for surgery with planning of outer table (sequestrum) excision, trephanation of inner table and split thickness skin grafting, as the patient was not keen on cosmetic outcome. On operating table, with patient under general anaesthesia after excision of the sequestrum, bleeding from the inner table was not satisfactory and the Neurosurgeon opined for total excision of the affected calvarium and same was performed. Underlying dura was intact. Immediate implant use was deferred in view of chronic infection and a local transposition flap for defect cover was planned. Local transposition flap based on the superficial temporal and posterior auricular arteries from the anterior biparieto-occipital region was raised to cover the defect. Flap was inset directly over the dura. A strip of hair bearing scalp was left anteriorly so as to provide a cosmetically acceptable appearance in the frontal view. The ensuing donor defect was covered with a split thickness skin graft with sparse perforation.

Patient recovered well with no post-operative complications and was discharged on 3rd day. Patient was followed up for 4 months and recuperated satisfactorily. Patient was offered implant at a later stage but he refused citing financial constraints.

DISCUSSION

The selection of method of reconstruction of the scalp defect depends on age, general health, location, defect size, quantity of surrounding tissue and infection. Aesthetic considerations such as hair growth pattern, hairline and brow position should be considered while planning for local flaps.

If the patient is consulted within hours of electrical injury, then priority is to stabilize patient with basic life support. He should be assessed for head injury, abdominal trauma and long bone fractures. After excluding life-threatening injuries, the tissues which are damaged by electrical burns are assessed. Though the total body surface area involved in electrical burns is less when compared to thermal burns, the injury is severe enough to cause third and fourth degree burns. Hair bearing areas like scalp may require complete shaving to assess extent of injury. Often the injured site takes about a week for complete demarcation.[4] Therefore, thorough assessment and serial debridement are required before deciding definitive size of the scalp defect to plan for final dimension of the flap.[5]

Injuries to the frontal sinus, particularly when complicated by leak of cerebrospinal fluid or obstruction of the nasofrontal outflow tract, represent special challenges.[6] In high voltage electrical burns, the injury is deep enough to involve full thickness of the scalp and underlying structures.

After debridement of necrotic tissue, the defect should be covered using suitable flaps. Local scalp flaps used are transposition flap, rotation flap, Orticochea flap and pin wheel flap. Dowbak and Demir also mentioned the use of V-Y-S plasty flap for closure of scalp defects.[7] It is of

utmost importance to incorporate at least one major scalp vessel while designing local flaps. Scoring of the galea, performed parallel to the subaponeurotic blood vessels, helps in gaining flap length. The accurate designing of such flaps yields gratifying result with preservation of the original hairline, acceptable hair follicle redirection, and wound closure without excessive tension. Scalp has a vigorous blood supply from an extensive vascular system which allows survival of relatively long local flaps. Flap loss either partial or total, infection and seroma formation are complications of the local flap use.

If there is larger defect not amenable for local or pedicle flap, then the defect should be covered using free flap. The donor tissue for free flap is more often selected from trunk region because in high voltage electrical injuries, the human body serves as a volume conductor and the damage to tissues while passing through trunk is less. Commonly used free flaps for scalp reconstruction are rectus abdominis flap, latissimus dorsi flap, serratus anterior, radial forearm flap, and omentum flap. Dermal Substitutes have also been tried to cover over the dura for full thickness calvarial defects with positive results.[8]

Early surgical attempt to cover the defect with a well-vascularized tissue provides excellent healing, osteogenesis, short hospital stay, and low rate of infection in treatment of scalp defects.

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