

Role of External Tissue Expansion Wound Closure in the Electrical Burn Wound to the Scalp

Jackson Nuli¹, Ravi Kumar Chittoria², Barath Kumar Singh³

Author's Affiliation: ¹International Visitor, ²Professor & Registrar, Department of Plastic Surgery & Telemedicine, ³Senior Resident, Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

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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 of the 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. The deep electrical burns to the scalp were difficult to manage as it was more prone to exposure of the calvarial bone. In our case, calvarial bone at the vertex exposed post eschar excision. Tissue expansion is based on the principle that all living tissues respond in a dynamic fashion to mechanical stress placed on them. Below we present a case of electrical burns wound to the calvarium utilizing the use simple cost-effective external tissue expansion technique for preventing wound retraction and for holding the dressing of the scalp wound.

Keywords: External tissue expansion wound closure; Scalp; Electrical burns.

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 of the 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. Tissue expansion is based on the principle

that all living tissues respond in a dynamic fashion to mechanical stress placed on them. Tissue expansion incorporates the phenomena of biological creep and physiological creep. In this article, we suggest the role of external tissue Expansion wound closure system on the scalp 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 a 45-years-old male, with no other known co morbidities presented with electrical burn wound to the Scalp. His wound was managed according to international standard guidelines. Antimicrobials were given

Corresponding Author: Ravi Kumar Chittoria, Professor & Registrar, Department of Plastic Surgery & Telemedicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605006, India.

E-mail: drchittoria@gmail.com

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according to culture and sensitivity. After thorough wound bed preparation, a simple cost-effective tissue expansion technique (ETEWC) was applied after wound debridement to prevent wound retraction. We used easily available, cost-effective (Rs 5/-) materials like blouse hooks and rubber bands for External Tissue Expansion wound closure. Sterilization of rubber bands was done with ethylene oxide gas. Under local anesthesia the skin hooks were sutured to the healthy skin edges of the wound using non-absorbable stitches (fig. 1). The hooks were fixed circumferentially around the wound. Then the rubber bands were applied over the hooks under appropriate tension to allow advancement of edges of the wound following biological collagen scaffold dressing (fig. 2,3). The tension was maintained just enough as to avoid the cut through of the hooks. The necessary dressing and padding was done over the hooks. During the next dressing, new rubber bands were reinforced over the old ones to maintain the tension and continue advancement of the edges.

Results

Scalp wounds are prone for wound retraction and they tend to increase in the dimension of the wound. External Tissue Expansion Wound Closure System is a cost-effective method for preventing the wound contraction in the scalp and also for holding the dressing. Post procedure no complications noted.



Fig. 1: Application of the skin hook surrounding the wound



Fig. 2: Collagen scaffold dressing done post debridement



Fig. 3. ETEWC wound dressing with rubber bands

Discussion

Tissue expansion is based on the principle that all living tissues respond in a dynamic fashion to mechanical stress placed on them. Tissue expansion incorporates the phenomena of biological creep and physiological creep. Ever since the technique was introduced by Neumann and popularized by Radovan and Austad, the utilisation of this technique has been on the rise. These principles are not only limited to the skin but even been replicated in the bone. But the process of internal tissue expansion is not without

complications. The most important factors are the prolonged duration, cosmetic deformity and the need for the field to be free of infection. Because of this, internal tissue expansion is of limited use for cover of raw areas. This paved the way for the development of external tissue expansion. Many techniques of external tissue expansion were published including negative pressure⁷ and other expansion devices like Wise Bands⁸, Derma Close.⁹ The practical limiting factor of these commercially available devices is the cost. So we started using easily available, cost-effective (Rs 5/-) materials like blouse hooks and rubber bands. These can be applied bed side by nurse or doctor. Using this device we were able to achieve results comparable with those of the commercially available devices. The main drawback of this procedure is that it cannot be used in inflamed and indurated skin around the wound. It cannot be used in areas without surrounding skin laxity.

Conclusion

External Tissue Expansion Wound Closure (ETEWC) using hooks and rubber bands is easy to apply, cost-effective, can be applied bed side and results are comparable with commercially available ETEWC devices.

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