Original Article

Journal of Global Public Health
Volume 5 Number 2, July – December 2023

Role of Integra in Scalp Burn Wound Management

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How to cite this article:

Deepak Ranjan Patro, Ravi Kumar Chittoria, Amrutha J S. Role of Integra in Scalp Burn Wound Management. Jr of Glob Pub Hea. 2023; 5(2): 71–73.

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 initially which 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 INTEGRA in the scalp electrical burns. INTEGRA is a manufactured acellular dermal regeneration template composed of a bilaminate sheet of cross-linked bovine tendon collagen and shark glycosaminoglycans (chondroitin-6-sulfate) with a silicone sheet cover.

Keywords: INTEGRA; Pediatric; Electrical burns; Scalp.

INTRODUCTION

Burn injuries in children remain a serious global epidemiologic concern. The youngsters under 16 account for over a quarter of all burn injuries. Most of the youngsters are under five years old. The majority of thermal injuries in children under the age of five tend to be scald injuries, making up over 65% of cases. On the other hand, fire injuries typically affect older children, making up over 56% of instances. Burn wound management is the focus once the child with burn injuries has had their critical care difficulties stabilized. The ultimate goals of burn restoration techniques are to conceal injuries, reestablish function, and maintain appearance. The three main surgical procedures for managing a wound are excision, grafting, and reconstruction.[3] Early excision and skin grafting minimize necrotic and diseased tissue while simultaneously enabling the first acute covering of burns. Regenerative treatments such as. INTEGRA aid in the improvement of scar formation and the repair of second degree superficial burns. INTEGRA serves as a scaffolding for the growth of a neodermis. Blood vessels and other cells migrate into the matrix and begin to lay down a new layer of dermis. The impermeable silicone layer serves to close the wound and prevent fluid egress.

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Received on: 05.12.2023 **Accepted on:** 28.12.2023

MATERIALS AND METHODS

This study was conducted in tertiary care centre in department of plastic surgery after getting the department ethical committee approval. Informed consent was obtained. The subject was a 8-year-old male child who had accidental electrocution burn injury (High voltage) sustaining 35 percent burns to the face, neck, chest, abdomen, bilateral upper limb and bilateral lower limb with deep burn injury to the scalp (entry wound) and right great toe (exit wound) (Fig. 1).

Fig. 1: At admission

He was admitted in burns care ICU. He underwent wound debridement of the burns under general anaesthesia. To avoid damage to the exposed scalp bone on entry wound, dermal substitute was applied over which negative pressure wound therapy (NPWT) was applied. (Fig. 2, 3)

Fig. 2: Integra application

Fig. 3: Biological Scaffold (Integra) application of exposed Dural layer

The remnant non-healed raw area of the burn wound around 20% present and exposed scalp bone. The remaining raw area over the body chest, abdomen was grafted with skin grafting. For exposed scalp bone, periodical bone abrasion was done and bone infarct scalp bone was excised. Bone scan showed infarct bone in vertex. Integra was used five times in the patient to achieve the adequate granulation over bone and dura. Further surgeries are planned for the above patient, including Split skin grafting and flap cover for the scalp entry wound.

RESULTS

Intra-operative and post-operative periods were uneventful for the patient. The raw area took up the INTEGRA and burn wounds granulated well. Split skin grafting was done to the raw area (Fig. 4). The wounds healed well after 2 weeks with minimal scarring (Fig. 5). No complications and side effects were noted.

Fig. 4: Wound bed after intergra application and Split skin grafting over wound bed

DISCUSSION

The utilization of appropriate scaffold matrices is ultimately what drives skin tissue regeneration. Scaffolds can be porous, fibrous, microsphere shaped, hydrogel based, composite, or acellular. Ulcers that don't heal well, post-burn ulcers, larger area wounds that need to be covered require skin grafting or flap covering, depending on the situation. The greatest biological substance to cover a wound is skin. Certain situations prevent a patient from receiving skin grafting, such as major burns when additional skin is needed to cover a wound because sufficient skin is not present. We require biological material that is both efficient and economical to cover the wound and act as a barrier against wound infection. INTEGRA is thought to be a significant prospective source of scaffolding material.

Four distinct phases of dermal regeneration have been observed imbibition, fibroblast migration, neovascularization, and remodeling and maturation.[4] Imbibition occurs within minutes and the initial take of the matrix is enhanced via fibrin in the wound exudate. Swelling of the matrix during this period is expected. Around day seven, fibroblasts begin migration into the matrix.[4] In the third week, myofibroblasts arrive and begin depositing native collagen within the matrix. By week four, host collagen is dominant and replaces the matrix collagen. During this stage, the neodermis is thicker than host dermis, but through maturation, the neodermis thins and gains pliability. By the end of week four, the neodermis is fully vascularized. This can be appreciated clinically by the color progression from pink to pale yellow to peach. Other groups have found vascularization to be complete after two weeks; however, these studies were in patients with acute burns and the earlier vascularization may be attributed to increased metabolism and systemic inflammatory response. It is important to note that once the neodermis has formed, no adnexa, nerve endings, or elastic fibers will be present. After the neodermis is fully vascularized, it is ready to receive a graft. Once the graft is placed, the dermal epidermal junction will develop rete ridges.

CONCLUSION

INTEGRA plays a role in burn wound healing in burns. It helps in promoting the wound healing process. It helps in better healing second degree superficial burns and wound bed preparation for deep burn wounds for further intervention

Conflict of Interest: None declared.

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