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Management of Thermal Burns Over Breast–Our Experience

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Abstract

The intricate challenge of restoring normal anatomy with minimal deformity in burns over the breast region has prompted the development of innovative tissue regeneration approaches. Addressing the complex nature of challenging wound patterns necessitates a multidisciplinary team with diverse expertise. In our concerted effort, we have successfully integrated advanced reconstructive techniques with regenerative medicine modalities to enhance outcomes in the intricate realm of complex breast reconstruction post-thermal burns. Our approach involves a comprehensive strategy that considers the unique characteristics of the breast tissue. We prioritize a combination of cutting-edge reconstructive methods and regenerative medicine interventions to achieve optimal results. By leveraging the collective knowledge of experts in plastic surgery, dermatology, and regenerative medicine, we have refined a protocol that emphasizes both functional and aesthetic aspects of breast restoration. The synergy between innovative reconstructive techniques, such as autologous tissue transfer and flap procedures, and regenerative medicine interventions, including stem cell therapy and tissue engineering, forms the cornerstone of our approach. This article provides a detailed overview of our integrated methodology, shedding light on the intricacies of treating thermal burns on the breast. Through this collaborative and forward-thinking approach, we aim to contribute to the evolving landscape of burn care, pushing the boundaries of what is achievable in restoring normalcy after such traumatic injuries.

Keywords: Breast, thermal burns, management, regenerative therapy

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INTRODUCTION

In the intricate realm of burn management, particularly in cases involving the chest wall in females, the preservation of the breast assumes paramount significance. The female breast holds a central role in both functional and cosmetic aspects of a woman's life. Functionally, it plays a crucial role in lactation and female development, while cosmetically, it holds immense importance in terms of femininity, self-confidence, and overall body image. Recognizing the multifaceted importance of the breast underscores the complexity of managing burns in this region [3].

While males may also experience burns affecting the breast, the management of such cases is generally less complex. In this context, our case

report delves into the intricacies of our experiences in successfully managing burns specifically involving the female breast. We emphasize the delicate balance required to preserve not only the structural integrity of the breast but also its functional and aesthetic significance [4].

Our approach involves a tailored strategy that addresses the unique challenges posed by burns to the chest wall in females. This includes meticulous consideration of both the immediate and long-term implications of the injury. By sharing our insights and experiences, we aim to contribute valuable knowledge to the evolving landscape of burn care, particularly in cases where the preservation of the female breast is fundamental to holistic recovery and the restoration of a patient's physical and emotional well-being.

MATERIALS AND METHODS

This research was conducted at a specialized hospital, following the patient's informed consent. This is a prospective descriptive non 2andomized case study about a 58-year female with alleged history of accidental fire flame burns while lightening lamp. She has sustained second degree deep burns involving right breast and part of left breast, anterior abdomen, right upper limb and right lower limb involving 25% Total body surface area (Figure 1). She was resuscitated with the standard WHO burn protocol. The thermal burns will undergo progressive skin necrosis, so the debridement was done after demarcation of necrotic patch. The patient was managed initially with wound debridement and dermabrasion assisted tangential excision of the deeper burns [5]. The dermabrasion assisted tangential excision was done using the high-speed rotating head dermabrader with 4200 rpm (Figure 2). The non-viable necrotic tissue was debrided without damaging the normal tissues in both horizontal and vertical planes with dermabrader. After debridement wound bed preparation (Figure 3) was done with the help of regenerative scaffold therapies like low level laser therapy, Autologous platelet rich plasma, Amniotic membrane application, collagen scaffold dressing, cyclic negative pressure wound therapy (Figures 4–8). Once the wound bed was ready, skin grafting was done and for the nipple raw area epidermal cell suspension was applied (Figure 9).

RESULTS

The breast wound was covered with adequate granulation tissue by the regenerative techniques followed by split skin grafting (Figure 10). Patient was compliance with all the above techniques we have used for regeneration of the burn wound. No complications were noted post procedure.

Figure 1. Burn wounds at presentation.

Figure 2. Dermabrasion assisted debridement.

Figure 3. Burn wounds after tangential excision over breast.

Figure 4. Low-level laser therapy.

Figure 5. Autologous platelet rich plasma.

Figure 6. Amniotic membrane application.

Figure 7. Collagen scaffold application.

Figure 8. Negative pressure wound therapy.

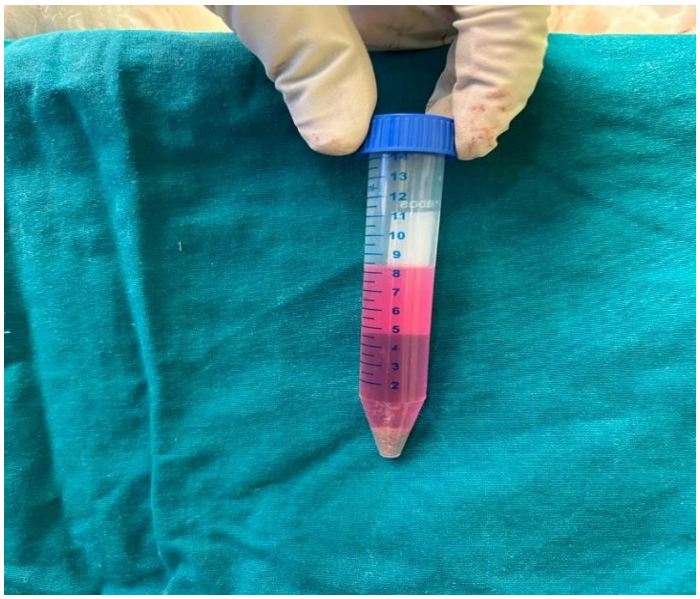

Figure 9. Epidermal cell suspension for nipple raw area.

Figure 10. Split skin graft application.

DISCUSSION

The breast and the nipple-areolar complex are frequently injured in burns involving the anterior chest wall. The majority of burns affecting the breast occur in household settings and involve children [6]. The most common causes of burns to the female breast include scalds (range 66 to 89 percent), flame (range 8 to 34 percent), and cooking oil (range 2 to 5 percent), as well as others (<5 percent). Burns on the breast have the potential to adversely affect both functionality and appearance. The long-term consequences, such as tissue loss and scarring, can lead to restricted movement, pain, altered appearance, and social discomfort. Notably, the absence of a nipple is a prominent and concerning issue for burn patients, even in the presence of more extensive burns and scars in other areas [7]. Damage to the breast bud is especially significant for prepubescent females as it can hinder normal breast development. Moreover, scarring that surrounds the breast and chest may commonly impede breast growth. Superficial (epidermal, superficial partial thickness and mid-dermal burns can heal with conservative treatment (eg, topical agents), and often without significant cosmetic consequences. Deeper burns (deep partial thickness, full thickness, deeper) will require burn wound excision and coverage. The concept of the 'reconstructive ladder' was introduced by plastic and reconstructive surgeons to outline progressive stages of managing soft tissue injuries [8]. In essence, the surgeon starts with the basic or simplest options, symbolized by the lower rungs of the ladder. reconstruction technique–to address a clinical reconstructive problem. The reconstructive surgeon would move up the ladder as a more complex or suitable method was required for a given reconstruction problem. The patient initially underwent regenerative therapies for improving granulation over the wound followed by Split skin grafting. "Dry collagen served as a framework to aid tissue regeneration in the wound bed for subsequent treatment. Platelet-Rich Plasma (PRP) is described as a plasma fraction with an elevated platelet concentration, encompassing platelets essential for clotting and growth factors. Platelets act as regulators of inflammation, angiogenesis, cell migration, and proliferation with the release of various growth factors and anti-inflammatory cytokines which is thought to help in faster and better healing of the wounds [9]. Autologous platelet rich plasma (APRP) has growth factors which when injected in the wound site or sprayed, act at the intracellular level to bring about cell proliferation and healing of a wound. The APRP preparation process is uncomplicated, involves minimal handling, and doesn't rely on anticoagulants or thrombin activators. Hospital settings readily provide the necessary components. Autologous growth factors and the biomechanical strength of plasmatic proteins post fibrin formation contribute to a specialized structure that aids in the healing process. Besides fibrin, fibronectin, and vitronectin, activated platelet alpha-granules release essential growth factors crucial for tissue repair. These growth factors encompass hepatocyte growth factor (HGF), fibroblast growth factor-b (FGFb), PDGF, vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), and angiopoietin-I, among others, such as PDGF, TGF-β, EGF, b-FGF, and IGF-1. The reconstructive grid is a dynamic construct that takes into account the multiple reconstructive options available to the plastic surgeon. It also takes into consideration factors that help the reconstructive surgeon determine the best possible option to achieve the three reconstruction goals, namely, form, function, and aesthetics [10]. The factors that aid the judgment of a reconstruction specialist, including wound complexity, surgeon skill, resources (and technology) available, and patient requests, form the boundaries of the reconstructive grid. Negative Pressure Wound therapy (NPWT) involve removal of exudates and infectious materials and contraction of wound margin. NPWT has been shown to be safe and effective in post debridement wounds. Hence NPWT was started, and size of the wound was measured at the time of change of dressing. Low Level Laser Therapy (LLLT) is one of the proposed modalities to improve wound healing and scar quality [11]. LLLT is said to enhance collagen production, reduce inflammation, and positively influence the remodeling of scars. In the processing of the amniotic sac, particular care was taken to ensure that the epithelial side of the amnion was placed directly on a polyester support net. When applied to the wound, the epithelial side with the basement membrane faces outward, promoting the migration, attachment, and spreading of host cells to encourage epithelialization. Human amnion allografts were preserved using lyophilization or deep-freezing and then radiation-sterilized at a 35 kGy dose. Interestingly, it has been observed that lyophilized, irradiated allografts are absorbed within a few days, while frozen, irradiated ones adhere better to the wound and persist even after 3 weeks post-grafting. Hence, the decision was made to preserve the amnion through deep-freezing.

CONCLUSION

The integration of regenerative medicine therapies in the management of complex reconstruction in scalp electrical burns marks a notable advancement in enhancing reconstructive outcomes. The intricate nature of such injuries, often involving composite tissue damage, requires a comprehensive and evolving approach. The adoption of a hybrid reconstructive ladder has emerged as a pivotal strategy, showcasing promising results in the effective treatment of these challenging cases.

The hybrid reconstructive ladder represents a dynamic and adaptive framework that combines traditional reconstructive techniques with cutting-edge regenerative medicine modalities. This innovative approach aims to optimize functional and aesthetic outcomes, addressing the multifaceted challenges posed by scalp electrical burns. As this hybrid model continues to evolve, it holds the potential to redefine the standard of care in managing complex composite tissue wounds associated with electrical injuries to the scalp.

To validate the efficacy and widespread applicability of the hybrid reconstructive ladder, its application to a diverse range of cases is imperative. Multiple instances of successful implementation must be meticulously assessed to establish its reliability and effectiveness across varying patient profiles. This ongoing evaluation is essential for refining the hybrid reconstructive ladder and ensuring its seamless integration into the broader landscape of reconstructive surgery. By consistently applying and scrutinizing this innovative approach in diverse scenarios, we can further enhance its utility and contribute to the continuous evolution of effective management strategies for scalp electrical burns.

Conflicts of Interest

None

Authors' Contributions

All authors made contributions to the research, is putatively expected to be useful article.

Availability of Data and Materials

Not applicable.

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Consent for Publication

Not applicable.

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