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Managing a Traumatic Scalp Wound with Adequate Hydration with Mineral Oil: Case Report

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Abstract

Scalp reconstruction primary management include primary closure as well as local flaps. We present a 2-year-old male patient brought to the emergency room presenting a traumatic frontal laceration and a scalp wound located at the left temporal area. He was taken to the operative room; wounds were washed and sutured with a two-plane closure and a Penrose drainage was used. In the first post operative day the flap became ecchymotic, for which hydration with mineral oil was increased. At the 4th post operative day, the flap started to enhance its color becoming reddish. Patient was discharged at his 7th day, after removing the frontal stiches and Penrose. Temporal wound stiches were withdrawn posteriorly showing an adequate healing process. Scalp wound reconstruction represents a great challenge for any plastic or reconstructive surgeon, in which the main goal is to achieve an aesthetic outcome with the minor donor morbidity.

Keywords: Hydration, Mineral oil, Penrose drainage, Scalp, Wound

Introduction

Our skin is not only a protective barrier; it reflects our overall health and well-being. It is essential to maintain adequate hydration to blockade surroundings stressors. The outermost layer known as the stratum corneum acts as a moisture barrier, which prevents and excessive water loss as well as protection to the underlying layers of the skin [1]. As the largest organ in the body, the skin plays an important role in maintaining body temperature and water balance. This organ regulates heat exchange with the environment, particularly through the blood vessels and sweat glands. The skin manages the rate and amount of water evaporation and absorption [2]. Fortunately, the head and neck cutaneous regions are richly vascularized, with significant redundancy of the vascular system. Perfusion is dictated by major distributing vessels along septocutaneous and musculocutaneous perforators, which lead to a densely interconnected network of dermal and subdermal plexuses [3]. The stratum corneum regulates the Transepidermal Water Loss (TEWL), which refers to the process by which water evaporates from the skin's surface into the environment. A weaken barrier can lead to increased TEWL, resulting in dry, dehydrated skin. Several factors can influence the hydration levels of our skin. As we age, our skin's ability to retain moisture diminishes [1]. Understanding the

skin hydration involves knowing the key parts that contribute to maintaining optimal moisture levels. Humectants are ingredients that attract and hold water. These ingredients help to hydrate the skin by drawing moisture from the environment and the deeper layers of the skin. Emollients are lipids or oils that fill in the gaps between skin cells, creating a soft and smooth surface. They help seal in moisture and strengthen the skin's moisture barrier [4].

A primary closure as well as local flaps can be used for the primary management of a scalp wound. The intrinsic skin vascularity of a local flap is the most critical determinant of successful transfer [5]. Fortunately, the head and neck cutaneous regions are richly vascularized, with significant redundancy of the vascular system. Perfusion is dictated by major distributing vessels along septocutaneous and musculocutaneous perforators, which lead to a densely interconnected network of dermal and subdermal plexuses [6]. Perfusion is dictated by major distributing vessels along septocutaneous and musculocutaneous perforators, which lead to a densely interconnected network of dermal and subdermal plexuses [7]. Local tissue rearrangement through the targeted manipulation of local tissue flaps is a fundamental technique in facial reconstruction. A flap is a unit of



tissue that maintains its own blood supply while being transferred from a donor site to a recipient site. Small and moderate-sized facial cutaneous defects are very often reconstructed with local flaps [8].

Complications are an inherent and inevitable part of surgery and learning how to prevent them, as well as manage them when they occur, is essential [9]. Good surgical techniques, including flap design, delicate tissue handling and tension-less closure, help reduce the risk of flap compromise. Determining the etiology of compromise, including arterial, venous, hematologic or infectious, is the first step in salvaging a failing flap. Common causes include pedicle kinking, hematoma, pressure/tension, systemic patient factors and poor surgical technique [8,9]. The most concerning postoperative complication of skin flaps is necrosis of the distal parts, which limits their clinical utility [10]. In addition, poor surgical technique, cool ambient room temperature, kinking of the flap or pedicle, hematoma and pressure on the flap may also lead to flap failure. Therefore, careful preparation and excellent technique are critical for a successful outcome [11].

Case Report

We present a 2-year-old male patient that was brought to the emergency room presenting a traumatic frontal laceration as well as a scalp wound located at the left temporal area. The mother of the patient indicated that they suffered a motorcycle accident, colliding with another motorcycle causing the patient to fall, after which, was brought by the voluntary firefighters for a more specialized evaluation. At the emergency room the patient presented normal vital signs, was crying, conscious, presenting a frontal laceration as well as a left temporal scalp wound. There was no active bleeding, no palpable fractures, wound borders were irregular and had a 15 points Glasgow score. The wound was covered with a wet to dry cure, however, knowing the traumatic mechanism, a cerebral computed tomography was performed, without showing any fractures, no epidural or subdural hematomas, no hemorrhagic contusions. Cervical, thoracic and pelvic x rays were performed showing no abnormalities; after receiving the pre operative laboratories the patient was taken to the operating room for and adequate cleaning, irrigation and wound closure.

After patient was intubated, the wound area was washed with surgical soap and irrigated with 1000cc of sterile saline solution, necrotic borders were debrided (**figure A**). The frontal wound was sutured in a two-plane closure, using 4-0 vycril and skin closure with nylon 6-0. The temporal scalp was sutured also in a two-plane closure with 4-0 vycril and skin closure with a nylon 3-0, a Penrose drainage was also used below the

scalp wound (**Figure B**). The patient completed a 7-day antibiotic regimen (clindamycin) calculated at 40 mg/kg/day, non-steroid anti-inflammatories were used for pain management, daily wound cleaning and flap hydration with mineral oil. However, in his first 24 post operative hours the flap became ecchymotic (**Figure C**), for which hydration with mineral oil was improved to 5 to 6 times per day, extensive educational information was provided to the mother related to the flap complications. At the 4th post operative day after the mineral oil continued to be used, the flap started to enhance its color becoming reddish (**Figure D**), for which the hydration was strictly continued. It is important to emphasize that no anticoagulants or antiplatelets or vasodilators were used, the Penrose only drained serous fluid. After the 7-day antibiotic regimen, the frontal stitches and Penrose were removed, the flap improved its color, mineral oil was continued and he was discharged with pain management, broad educational information about wound cleaning and referred to the outpatient clinic. The temporal wound stitches withdrawal was at his 14th post operative day.

He was evaluated at his 20th day showing and adequate healing, with a small dry scab (**Figure E**) for which only adequate cleaning and hydration was continued. At this 30th post operative day and due to the proper evolution, the case was concluded.



Figure 1: Operation and post operative room photograph; (A) Operating room after being washed; (B) Post operative wounds; (C) First post operative day (D) 4th post operative day; (E) 20th post operative day.

Discussion

Scalp and forehead reconstruction constitutes a significant clinical challenge, given the intricate complexities inherent in the disease process, the distinct properties of the tissue designated for reconstruction



and the elevated postoperative expectations, especially considering the prominent positioning of the forehead and scalp in facial aesthetics [12]. The skin of the scalp has unique characteristics, with limited skin mobility, inelastic galea aponeurotic tissues and dense hair follicles [13].

The scalp is an important functional structure that covers the cranial bones and protects the brain from external factors. It is also an important aesthetic structure in that it is hair-bearing. Damage to this structure, such as from trauma, burns, radiation or tumor excision can result in poor quality of life from factors such as alopecia or deformity [14]. Additionally, surgeons should consider how the scalp reconstruction can be achieved so as to not distort the hairline and, if possible, minimize scars, alopecia or deformity [15]. The skin of the scalp has unique characteristics, with limited skin mobility, inelastic galea aponeurotic tissues and dense hair follicles; thus, it is difficult to close even a small defect [13].

Several options exist for closure of medium and large scalp and forehead defects, ranging from skin grafts and granulation *via* second intention to more extensive advancement flaps and microvascular free tissue transfers [16]. A primary closure is the first surgical method to consider for small size defects. If there is little tension at the time of primary closure after undermining the subcutaneous tissue around the defect, this can be considered as the first choice, because it reduces operation duration and minimizes alopecia [17]. If the local flap can be performed on healthy tissue, it can be useful in compromised conditions such as with radiotherapy, infection and postoperative skin necrosis [18]. Good surgical techniques, including flap design, delicate tissue handling and tension-less closure, help reduce the risk of flap compromise. Determining the etiology of compromise, including arterial, venous, hematologic or infectious, is the first step in salvaging a failing flap. Common causes include pedicle kinking, hematoma, pressure/tension, systemic patient factors and poor surgical technique [5].

Conclusion

Acute scalp wound reconstruction represents a great challenge for any treating physician. No unique approach can be applied to all the type of scalps, for this reason is important to assess every patient separately, keeping in mind that every wound has its own characteristics, healing process and its own specific complications. Reconstruction of large, medium and small scalp defects require the use of one or a combination of techniques and a strict follow up. Wound cleaning as well as skin's hydration is essential to promote a humid environment maintaining water to

improve moisture leading to maintain skin's integrity. The surgical challenge for any plastic or reconstructive surgeon is to restore any defect with a minimal donor site morbidity having an acceptable cosmetic outcome.

Patient Consent

The patient provided written consent for the procedure and the use of the images.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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