

Successful Management of Scalp Avulsion with Full Thickness Graft

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Abstract

Scalp avulsion injuries are one of the life-threatening traumatic injuries. There are no clear guidelines to determine which reconstructive method is superior to another in each condition. Our case demonstrates that relatively primitive methods like skin grafting can give greater results if done with circumspection.

Successful Management of Scalp Avulsion with Full Thickness Graft

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Abstract:

Background :

Scalp avulsion injuries are one of the life-threatening traumatic injuries. Rapid management in the emergency department is vital to the successful rescue of an avulsed scalp. There are many replantation methods to treat scalp avulsion so the best esthetic and functional results are achieved. Skin grafting, free flaps, microvascular surgery, and hyperbaric oxygen are all suitable for reconstructive plans.

Case presentation :

We report a rare case of a scalp avulsion injury in a female due to an entanglement of a headscarf in a motorized machine resulting in defects and tissue loss of the hair-bearing skin, nasal area, forehead, left ear, and bilateral eyelids and eyebrows. Preoperative management included early blood transfusion, intravenous fluids, and wound compression after rapid physical examination. Reconstructive surgery was performed using a full-thickness skin graft and the outcomes were pristine.

Conclusion :

There are no clear guidelines to determine which reconstructive method is superior to another in each condition. Our case demonstrates that relatively primitive methods like skin grafting can give greater results if done with circumspection.

Keywords: Scalp Avulsion; Graft; Case Report; Accident

Introduction:

The scalp is considered a mechanical barrier that prevents bruising and provides an important aesthetic appearance. Scalp ruptures are uncommon but serious. Severe traumatic injuries like dog bites, high-speed road collisions, or industrial accidents can damage hair-bearing units and may result in an avulsion of the whole layers of the scalp [1].

It is important to conduct a comprehensive examination of the body before starting treatment. Some injuries will be fatal if left untreated such as pleural effusion, pneumothorax, and intracranial haemorrhages. Hypovolemic shock may be seen in such injuries and must be detected and managed early by both blood and fluid administration [2].

Ruptures of the scalp are painful and difficult to treat. The most successful and available therapeutic option is surgical replantation. However, failure of this process leads to undesirable results such as thermal wounds, infection, prolonged hospitalization period, and bad cosmetic outcomes [3].

In this paper, we present a 10-year-old female that had her scalp ruptured due to an electric bicycle accident. This rupture extended to involve other structures. Such extended injury with its management and outcome is a rare encounter in the literature.

Case Presentation:

A 10 years old girl presented to the emergency department with a complete scalp avulsion as a result to an electric bicycle injury. Initial observation (Figure 1) revealed that avulsed tissue extended to nose root, bilateral supra-tarsal folds of the temporal region including eyebrows, and the left auricle. Additionally, the frontal bone was completely naked. The patient on presentation was oriented and fully responsive with a Glasgow score of 15. There were no nausea, vomiting, or convulsions. The blood pressure was 100/50 and the heart rate was 106. She had no prior medical problems and was not on any medications at the time of her injury. On clinical examination: There were no fractures or bruises in her trunk or limbs. Initial management included Intravenous fluids and antibiotics, blood transfusion, and topical anti-septic. Her laboratory investigations showed low levels of blood component; red blood cells were 1.84×10^6 /ul, haemoglobin was 5.6 g/dl, HCT was 16.1%, platelets were 103×10^3 /ul, and there was a slight elevation in granulocytes 80.9%. Other laboratory tests were normal.

Soon after, we arranged a scalp reconstructive procedure in which we harvested a full-thickness skin graft from the anterior right thigh and was expanded by a zimmer dermatome mesher. Edges of the graft were attached to the scalp using staplers and nylon stitches (Figure 2).

Several follow-ups revealed healthy and uncompromised graft but with complete both hair and sensory loss (Figure 3). Finally, the patient was able to return to her normal life and she reports no difficulty in carrying out daily activities.

Discussion:

Total scalp rupture is a serious injury because of its devastating effect on both the patient's general health and aesthetics. However, this type of injury is considered to be of a rare occurrence and could mostly be encountered during industrial or high-speed road accidents. Our case had a ruptured scalp extending to the temporal and frontal bearing skin, the nasal bridge, and left ear's auricle due to an electric bike accident. Most avulsed-scalp-related injuries are associated with hypovolemic shock and facial trauma. Despite that no signs of hypovolemic shock were clinically observed, prophylactic fluids administration was still ordered in emergency settings. In most similar injuries, a sole or combined injury of blood vessels could be encountered. This includes superficial temporal artery, supraorbital artery, occipital artery, and facial artery. These are rich arterial and venous arcades in the subcutaneous layer above the epicranial aponeurosis [4][5]. Therefore, these injuries should be treated first to evade the possibility of developing any surgical contraindication. Fortunately, we found no similar injures as our case showed an acceptable patient's general condition. She

was fully awake, self-aware, and there were no signs of secondary injuries. Usually, due to the extensive blood supply to the scalp, hemorrhaging of the scalp may appear profuse and should always raise suspicion of intracranial and cervical damage. Thus, patients should be examined thoroughly during the secondary survey by taking cervical spine and brain computed tomography to all patients in order to exclude surgical contraindications. As indicated in this case, test results proved no signs of cervical nor intracranial damage. Surgical replantation is the optimal treatment of the avulsed scalp that was first described by Miller et al in 1976 [6]. A successful replantation can well restore the hair-bearing aesthetic unit that is irreparable by other types of reconstruction [7]. Many surgical techniques were used for managing these types of skin defects usually depending on the defect size including microvascular surgery, skin grafts, and free flap techniques. Free flap techniques allow for reliable wound closure while providing a variety of reconstructive options. The most common flaps that are used to cover the scalp are radial forearm flap, latissimus dorsi free flap, serratus anterior flap, and anterolateral thigh flap [7].

Another method is presented by KHANDELWAL et al. (a successful use of hyperbaric oxygen therapy for a complete scalp degloving injury) [8], discussed a case of a 43-year-old female who presented with a complete scalp degloving injury, the result of a tractor powered take-off that caught her hair, after initial evaluation and stabilization, the patient underwent a microsurgical replantation procedure after 4 hours of her injury and lasted for 4 hours, during the procedure Only the superficial temporal arteries were re anastomosed with no venous anastomosis possible due to the extent injury of the scalp, the surgeons then administered Hyperbaric oxygen (HBO2) treatment at 2.5 atmospheres absolute (ATA) for 90 minutes after surgery due to duskeness of the flap, further HBO2 treatments were administered and a post-operative leech therapy for 10 days. At one-year follow-up the area of granulation tissue was reduced, with no detectable hair growth or nerve function. KHANDELWAL et al. showed in their case that the use of (HBO2) therapy could increase the chances of tissue survival.

The main reason we went for full-thickness graft is the lack of proper equipment at our hospital. Microvascular surgery, free flaps, or HBO2 therapy were all out of reach. Despite that, grafting appears to have great results when certain indications are considered.

Declarations *Ethics approval and consent to participate Ethical approval was given by the Aleppo University Hospital and the parent's patient has given their Parental consent for this study *Consent for publication Written informed consent was obtained from the patient's parent for the publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal. *Availability of data and material All data generated or analyzed are included in this article *Competing interests No conflict of interest exists in the submission of this manuscript. *Funding There were no funding *Authors' contributions all authors have read and approved the manuscript MBA : Lead in writing and reviewing the manuscript SS, AH, AA, AN, BZ, AE :Contributed in writing the manuscript. *Acknowledgements Our sincere thanks to all the doctors and nurses who participated in the treatment of this case, and we also thank the patient's parents for allowing us to reports this case.

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Figures:

Figure [1]: Scalp Avulsion injury on presentation

Figure [2]: Reconstruction operation using full-thickness graft from thigh

Figure [3]: Outcome of reconstruction grafting

Figure [1]: Scalp Avulsion injury on presentation Figure [2]: Reconstruction operation using full-thickness graft from thigh Figure [3]: Outcome of reconstruction grafting