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Case Study

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VARYING DEGREE OF SCALP AVULSION – CASE SERIES

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ABSTRACT

Background - There are so many ways, by which head injury / Scalp trauma can be sustained by the patient. Most of which are due to road traffic accident, fall from height, physical violence and even due to more rare causes such as dog bite or simple household activities such as blast in kitchen while cooking food or accident by electric cables as in one of our case. In this article we present four cases with varying degree of scalp avulsion in graded order, due to various causes. **Case Reports** – The first case is an elderly woman who sustained a small scalp laceration due to physical violence, by a sickle, without any tissue loss. In the second case, a 3 yr old boy sustained huge scalp laceration due to fall from height, again without loss of any tissue. The third case presents a boy who sustained scalp laceration with a significant tissue loss. For which scalp reconstruction with local advancement of flap was done to cover the defect. The last case shows a young female with complete degloving of scalp. **Conclusion** - Scalp trauma are very common now a days due to increased motor vehicles on the road, industrialization (leading to industrial accidents), as well as other unavoidable circumstances. As many of these incidences can not be eliminated, most of these cases can be managed by proper and timely treatment, without leaving permanent disfigurement, as they have strong physical as well as psychological impact on the patient.

KEYWORDS: accident, case report, graft, scalp avulsion.

INTRODUCTION

Scalp makes a mechanical type of barrier which prevents the skull from any injury and also bears hair which are very important in aesthetic perspective. Scalp ruptures are quiet common due to various type of head trauma and pose a serious threat. Avulsion of the scalp most commonly results from the entrapment of long hair in high-speed rotary parts of industrial machinery, although it has also occurred as a result of dogbites and assaults.[1,2] Severe traumatic injuries such as high-speed road traffic accidents or burn also could be few of various causes which can result in avulsion of the whole layers of the scalp. Although there is tremendous variability seen in the patterns of avulsion for sharp force and animal attack scalpings, there is very little variability seen in the patterns of industrial scalpings, which tend to follow similar lines of least resistance along the insertions of the frontalis and temporalis muscles anteriorly, and the occipitalis muscle posteriorly.[3,4] Many of the times underlying brain injuries are also associated with these injuries, which definitely require priorty management. It is also important to conduct a comprehensive examination of the whole body before starting treatment, as some injuries can be proved fatal if left untreated or overlooked, such as pleural effusion, pneumo-thorax, and intracranial hemorrhages. Hypovolemic shock must be detected and managed early by both blood and fluid administration.[5] Avulsions of the scalp are very painful situation for the patient. The most common therapeutic option is surgical repair. However, poor post – op care, surgical site infection, rejection of flap or graft can lead to worsening of situation and bad cosmetic outcomes.

In this article we are presenting case series of four patients with different degree of scalp avulsion and their respective treatment, in an hirerchial order.

CASE PRESENTATION

Case 1

A 65 year old female presented to the emergency department with a scalp laceration behind left ear. The cause of injury was attack by a sickle during a fight with neighbours. It was a semi-circular deep, full thickness, lacerated wound of size approximately 15 cm, reaching upto bone. Periosteum was intact. The patient on presentation was oriented and fully responsive with a Glasgow score of 15. There was no nausea, vomiting, or convulsions. No history of ENT bleed. There is no other injury to head, face or any other body part.

Figure 1: Case 1 – Laceration of scalp.

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, inj TT, analgesics, and topical anti-septic.

Table 1

Pulse	110 BPM
Blood Pressure	90/60 mm Hg
Haemoglobin	9.4 gm/dL
TLC	10,300 /mm3
Random Blood Glucose	110 mg / dL
S. LFT / KFT	Within normal limits
S.Albumin	Reduced
HIV, HbsAg, HCV	Negative

Management

Under local anesthesia, and proper cleaning of wound with 7.5% betadine and Hydrogen Peroxide, wound was thoroughly irrigated with normal saline to remove any dirt or other contamination. Lacerated wound was sutured by primary closure as there was no loss of tissue and periosteum was present. Tension free repair was done and patient sent home same day.

Figure 2: Case 1 – Picture after repair.

Case 2

A 3 year old boy presented to emergency department with a big lacerated, clean cut wound over skull vault, in anterio – posterior direction, of size approximately 25 cm, The cause of injury was fall from height of approx 10 feet, while playing. The toddler, on presentation was oriented and fully responsive with a Glasgow score of 15. There was no history of nausea, vomiting, or convulsions. No history of ear or nose bleeding. There is no other injury to head, face or any other body part.

On clinical examination, there were no fractures or bruises in his trunk or limbs. NCCT head was normal, with no signs of any sub dural hematoma or intra cranial

bleed. Cervical spine and chest X ray were normal. Initial management included intravenous fluids and antibiotics, inj TT and analgesics.

Figure 3: Case 2 – Huge scalp laceration, without any tissue loss.

Laboratory investigations showed reduced hemoglobin – 7.6 g/ dl, red blood cells were 1.64×106 /µl, platelets were low, and there was a slight elevation in granulocytes. Other laboratory tests were within normal limits.

Management

After achieving hemostasis, wound was thoroughly irrigated and cleaned. The layer of galea aponeurotica was sutured by continuous suturing technique and later skin closure was done. Aseptic dressing applied.

Figure 4: Case 2 – Picture after repair.

Case 3

A 5 year old boy presented to the emergency department with a contused lacerated wound of scalp over vault region, due to fall from motorbike. It was a deep crushed wound of size around 15 cm, with tissue loss. The patient on presentation was oriented to time, place and person and fully responsive with a Glasgow score of 15. There was no nausea, vomiting, or convulsions. No history of ENT bleed. There is no other injury to head, face or any other body part, except minor abrasions over right shoulder and right elbow.

Figure 5: Case 3 – Lacerated scalp injury with tissue loss.

On clinical examination, there were no fractures or any major injury to his trunk or limbs. NCCT head was normal, with no signs of any sub-dural hematoma or intra cranial bleed. Cervical spine and chest X ray were normal. Initial management included intravenous fluids and antibiotics, inj TT and analgesic.

Table 2

Pulse	118 BPM
Blood Pressure	110/70 mm Hg
Haemoglobin	13.6 gm/dL
TLC	7,500 /mm3
Random Blood Glucose	127 mg / dL
S. LFT / KFT	Within normal limits

Management

Scalp reconstruction with local advancement flap was considered, as there was tissue loss and primary closure was not feasible in this case. Under general anesthesia, the wound was thoroughly washed with antiseptic solution and irrigated with 1 lit of normal saline. Possibility of any impacted foreign body was ruled out. Necrotic and dead tissue at the margins was excised. After surgical margins were drawn, a rotational advancement flap was raised in the loose connective tissue deep to galeal aponeurosis. Careful incision of the galea was performed to assure uninterrupted scalp arterial blood supply. Approximation of galea was done with vicryl 3/0. Flap was advanced to cover the defect. Pressure dressing was applied to the operated area, to avoid any accumulation of discharge. Sutures were removed after 2 wks with healthy flap uptake. However, alopecia was noted at the suture-line.

Figure 6: Case 3 – Picture after flap repair.

Case 4

A 23 yr old female patient presented to the surgery OPD, with complete loss of scalp tissue. The patient got burnt her hair, scalp skin and underneath tissue 6 month back by high tension electric cables while roaming on roof of her double story house. At that time she was admitted to a local hospital where she got primary treatment, but scalp tissue and skin could not be salvaged.

On examination it was a complete loss of scalp with no tissue left. Complete skull bone exposed. There was no other injury to head, face or any other body part.

Figure 7: Case 4 – Total scalp avulsion.

Her vitals were stable and she had no other complaints, as if she had learnt to live in this phase.

Plan of Management: Complete graft was planned after multiple burr holes all over skull bone, to allow grow granulation tissue, so that graft could be placed. But could not be done as the patient did not turn up, even after regular follow up.

DISCUSSION

Scalp avulsion is a serious injury because of the devastating effect it poses on both the patient's physical condition as well as its psychological effects due to its aesthetics aspects. Also this types of injury is quiet common in modern world because of fast moving vehicles and industrial growth. These type of injuries generally associated with underlying intra cranial haemorrhage, if these are result of fall from height or road traffic accident , apart from industrial accidents, but the cases we have presented here are free of any brain injury and limited to only scalp region, and so with very low chances of mortality. In most scalp injuries, a sole or combined injury of blood vessels is also encountered. This includes superficial temporal artery, supra-orbital artery, occipital artery, and facial artery.[6] Therefore, these injuries should be treated first. The success of scalp replantation is determined by a comprehensive management of the tauma and well trained microsurgical technique.[7] As there were no such injuries in our cases and all had fair general condition. All four patients were fully awake, self-aware, and there were no signs of secondary injuries. Usually, due to the extensive blood supply to the scalp, there is a lot of bleeding at the time of presentation and should always raise suspicion of intracranial and cervical damage. That's why, all patients should be examined thoroughly during the secondary survey by taking cervical spine and brain CT in order to exclude any major surgical emergency.

As the test results showed no signs of cervical or intracranial damage, surgical replantation is the optimal treatment of the avulsed scalp. A successful replantation can well restore the hairbearing aesthetic unit that is irreparable by other types of reconstruction.[8] Many surgical techniques are used now a days for managing these types of skin defects, depending upon the size of the defect including microvascular surgery, skin grafts, and free flap techniques. 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. Another method is presented by Khandelwal et al. (a successful use of hyperbaric oxygen therapy for a complete scalp degloving injury). Khandelwal et al. showed in their case that the use of (HBO2) therapy could increase the chances of tissue survival.[9]

CONCLUSION

All the four cases presented above have different degree of scalp avulsion, due to various reasons. As most avulsed scalp related injuries are associated with hypovolemic shock and facial trauma, their was no such signs, still prophylactic fluids administration was ordered in emergency settings. The first two case with different degree of laceration were managed by primary closure due to no or minimum tissue loss, and without any other brain injury. But the case with loss of significant amount of tissue should be taken into consideration for flap reconstruction, to cover the defect.

Total degloving of scalp is rare and require high level of skillfulness as well as a lot of time and patience, but are completely amenable to repair if proper and timely management is provided.

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CONFLICT OF INTEREST

No conflict of interest exists in the submission of this manuscript.

CONSENTS

Written informed consent was obtained from the patients and their legal guardians in case of minors for the publication of this case series and any accompanying images.

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