

Case Report

Scalp replantation in a cervical spine injury patient: Lessons learnt

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ABSTRACT

Total scalp avulsion injury with cervical spine injury is rare. This article is to describe the technical difficulties and precautions to be taken during anatomical replantation. The patients with cervical spine injury should not be considered as an absolute contraindication for anatomical replant if patients are fit for general anaesthesia. We found that the supratrochlear and supraorbital vessels which are anterior and superficial temporal vessels which are lateral can be used to replant without much technical difficulty. We conclude that anatomical replant is always better keeping in mind the technical limitations of anatomical replant in case of cervical spine injury.

KEY WORDS

Cervical spine injury; replantation; scalp avulsion

INTRODUCTION

Total scalp avulsions are rare but serious injuries owing to the rich blood supply, the patient runs a risk of massive blood loss. At the same time, total scalp avulsions also pose a significant cosmetic disability. Scalp avulsion injuries are associated with cervical spine injury, although not very common. Miller *et al.* in 1976 did the first successful scalp replant. Replant is the best choice for achieving the best result cosmetically.^[1]

This article aimed at highlighting the lesson learnt during a replantation of scalp with cervical spine injury.

CASE REPORT

A 38-year-old female was brought to the emergency department with a total scalp avulsion injury which happened 8 h ago. She complained of pain in the head and neck. She was conscious, oriented and vitals were stable when she arrived to casualty. The avulsed scalp was brought with an ice pack which was inspected and found to involve bilateral eyebrows, the root of the nose and total scalp [Figure 1]. The scalp dressing was opened in the operation theatre. There were no neurological deficits, but tenderness was noted on the cervical spine.

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Head and cervical spine computed tomography scan was done and which had shown doubtful instability in the subaxial cervical spine at C4-5 level [Figure 2]. Magnetic resonance imaging (MRI) could not be performed due to progressively prolonging ischemia time of the scalp and also the active bleed, which required immediate attention. Hence, discussion with neurosurgeon, plastic surgeons and anaesthesiologist concluded at the procedure, targeting at minimally mobilising the neck. This decision was also taken considering the absence of neurological deficit, lateral mass and facet fractures, which provided clue towards the probable lesser degree of trauma to the cervical spine. The decision was made to do the replantation with hard cervical collar *in situ* and post-operative MRI spine. The patient was anaesthetised with intubating laryngeal mask airway (LMA) with cervical collar *in situ*. The horseshoe stand was placed for better access to the posterior scalp, and anterior part of the collar was removed and cut a bit upper lateral part. Initial haemoglobin was 11.5 g % with packed cell volume 38%.

With two-team approach, the bench dissection was started. Bilateral superficial temporal artery and vein, bilateral supraorbital vein and left supratrochlear vein were identified. The post-auricular and occipital vessels were not dissected as it was not intended to do the anastomosis of these vessels. The other team dissected on patient simultaneously. The scalp was placed and inset was done in post-auricular region bilaterally. The occipital area inset was not possible. Quilting sutures were placed at vertex with 3-0 Vicryl®. The right superficial temporal artery and vein, bilateral supraorbital veins and left supratrochlear veins were anastomosed. The left superficial temporal artery

and vein were anastomosed with vein graft. The scalp started to bleed once anastomosis of artery was done. It was difficult to achieve haemostasis on the posterior scalp. Intraoperative blood loss was significant and the patient received 2 units packed red blood cells, four fresh-frozen plasma along with crystalloids. The procedure time was 9 h.

Post-operative day 1: The haemoglobin dropped to 6.6 g%, which was corrected with 2 units packed red blood cells and was maintained around 10 g%. The patient was extubated uneventfully. On post-operative day 3: MRI of cervical spine was done and showed no evidence of the cervical spine injury. Hence, hard cervical collar was removed. On post-operative day 15, the patient was taken to the operation theatre and necrosed left occipital area was debrided along with the left eyebrow area. Vacuum-assisted closure (VAC) dressing was done. There was progressive necrosis of scalp in occipital extending to the parietal area due to infection. The patient was taken to the operation room, the scalp was debrided and split-thickness skin graft (STSG) with VAC was done on day 27. The scalp and STSG settled with minimal raw area which healed with dressing [Figures 3 and 4].

DISCUSSION

Total scalp avulsion injury is an emergency situation. Apart from having other life-threatening injuries, isolated total scalp avulsion patients may present with haemorrhagic shock.^[2] Zhang *et al.* reported 9.4% of cases with scalp avulsion injuries have a cervical spine injury. The cervical spine injury is an emergency and may require surgical stabilisation or conservative management depending



Figure 1: Frontal view showing complete scalp avulsion involving bilateral eyebrows



Figure 2: Cervical spine computed tomography showing suspected C4-5 instability



Figure 3: Frontal view

on the severity of the injury.^[3] The incidence of cervical spine injury associated with clinically significant head injury is 4%–8%.^[4]

In the situation where the patient is having cervical spine injury with total scalp avulsion injury is a challenge for the plastic surgeon. The decision of doing anatomical replantation is controversial^[5] and few authors have mentioned it as a contraindication.^[6] Xu *et al.* did ectopic implantation of avulsed scalp to forearm with cervical spine injury as they considered it as contraindication.^[6] Sanger *et al.* did ectopic replantation to abdomen in a similar situation as they mention it was technically impossible. The ectopic replant will require multiple stages, other problems such as limited vessels for anastomosis, maintaining the position of scalp without causing shearing or kink in vessels.^[5] Zhang *et al.* have done five composite grafts and one microvascular replantation. They have used cervical protection in the form of cervical collar, cervical traction and halo fixation depending on the extent of injury.^[3]

Anaesthesia in cervical injury is a challenge, especially in emergency situations. Saini *et al.* and Komatsu *et al.* concluded that a blind tracheal intubation through intubating LMA is a possible option for airway management in patients with a semi-rigid cervical collar with an overall success rate of 85%.^[7-8]

Although single artery and vein is enough to perfuse the whole scalp,^[9-11] most of the authors have done as many vessels as possible.^[8,12-14] Quilting sutures are important not only to prevent the minor shearing forces on anastomosis^[9] but we also found it to be useful in



Figure 4: Posterior view extended loss at right parietooccipital and left parietal region with island of scalp surviving

obliterating a potential dead space and preventing hematoma collection which can lead to flap failure.^[10] Intraoperative blood loss is significant if proper care is not taken in doing haemostasis. It is usually difficult once revascularised as scalp is very vascular and vessels do not collapse once cut.^[15] We used low-molecular-weight heparin as post-operative anticoagulation as routine, in case of thrombogenic individuals, we use unfractionated heparin with close monitoring of international normalised ratio.^[16] The occipital area necrosis is significant problem and multiple reasons have been discussed, most authors are of the opinion that it is the distal most part and least vascular or increased risk of venous congestion.^[9,10,12-14] The other obvious reason is pressure necrosis due to immobilisation. Koul *et al.* used halo frame to prevent pressure necrosis.^[17] In our patient, apart from this reason, we think the posterior inset was not done and significant area was left open for infection to set in. The hematoma formation in occipital region is another factor.

CONCLUSION

Lessons learnt in the whole journey to replace like with like i.e., replantation,

If the patient is fit for GA then:

1. It is possible to do anatomical replant of avulsed scalp with cervical spine injury if the anterior and lateral vessels are available for anastomosis
2. Hard cervical collar and immobilization will not allow posterior access to do inset and anastomosis. The raw area left open has to be addressed as early as possible to prevent the infection

3. The proper clipping or haemostasis of all possible vessels on the specimen and patient is important to prevent hematoma and blood loss. As manipulating the neck may lead to disastrous complications; hence, limitations and precautions have to be kept in mind.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initial will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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