

Case Report

Reconstruction of extensive mid facial trauma following a bear attack: A case report

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Introduction

“Love of life is next to love of our own faces” Shushrut. (600 BC).

Unique and self-specific features of the human face always carry a very high demand for precise reconstruction in any sort of trauma including animal attacks [1].

Bear attacks are reported in Sri Lanka since the 19th century, especially in the North Central Province [2]. These attacks cause facial disfigurements affecting the psychological wellbeing and self-esteem of the victims while profoundly affecting their routine physical activities with functional impairments disturbing their earning capacities [1,2].

Wild animal mauling to the face is uncommon, ranging from 1.2% to 2.3% [1]. However, bear mauling injuries, although rarely reported, have a much higher facial injury incidence of 51.2%, [1]. Most common sites in bear mauling are face (80.57%) followed by scalp (54.67%) [1]. Reconstruction of the extensive soft tissue defects, with or without the facial skeleton, precise relocation of the vital organs and effective management of deep-seated infections (13%-30%) related to the facial bite wounds are the main challenges in the management of such injuries [1,3].

The principal goal of maxillofacial reconstruction should be aesthetic and functional rehabilitation of the patient and necessitates a multi-disciplinary team approach. This report discusses a rare case of bear maul and its management.

Case report

A 37-year-old, male farmer from a remote area of the Eastern Province of Sri Lanka was referred to the accident and emergency department following a bear mauling. He was in the forest when he accidentally came across a bear with a cub. Both bears had attacked his face and upper body while he was trying to defend himself and he sustained multiple injuries to the face, scalp and arms (Figure: 1). He was bleeding profusely when presenting to the nearby rural hospital and transferred without delay to the district general hospital (DGH) following stabilization of airway, bleeding, circulation and the cervical spine with a hard neck collar.



Figure 1: Initial presentation with extensive de-gloving facial injuries

On admission to the DGH, the patient was semiconscious and disoriented, with two episodes of vomiting and two fainting attacks. The Glasgow coma scale (GCS) was 13/15. He had massive facial and scalp de-gloving injuries which urged endotracheal intubation to minimize the risk of aspiration. Anti-rabies and tetanus vaccines were administered

prophylactically. Following proper debridement and primary wound care, detailed clinical assessment, CT investigations and definitive surgical correction were planned.

His face was disfigured due to an extensive, massive, de-gloving, multiple laceration. A 14cm long left side scalp and forehead laceration was crossing the midline and extending downwards about 3cm across the right eyebrow towards right medial canthus. Left upper eyelid was dropped with a fixed dilated pupil with loss of vision and was not reacting to light compared to the normal right eye. Examination under the de-gloving found massive hard tissue injury to the left orbital cavity with avulsion of the left optic nerve. A midline, naso-frontal, displaced fracture was noticed. However, he had no signs of CSF leakage via a severed cribriform plate.

His upper lip was torn apart from the midline towards the ala-base of the right nostril causing another 4cm full thickness laceration. Maxilla and mandible were stable with no occlusal derangement. However, the upper right lateral incisor was missing. All bleeding points were cauterized to obtain haemostasias and gross approximation of the massive lacerations was done with 3/0 vicryl suturing. Soft tissue lacerations of the upper lip and both upper limbs were debrided and appropriately managed.

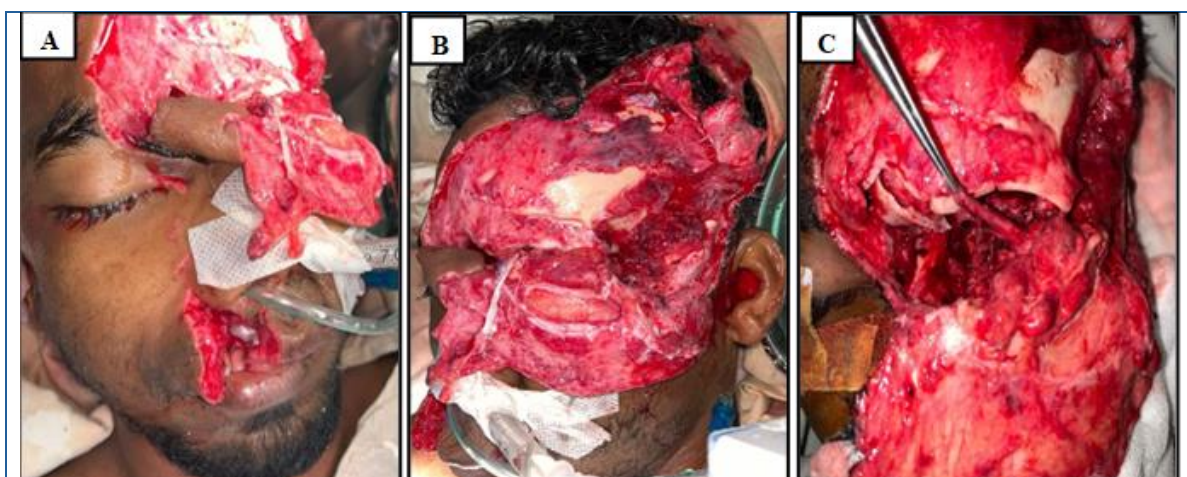


Figure 2: Extensive soft tissue and hard tissue injuries of the scalp, forehead and mid-face

Non contrast computed tomography (NCCT) of the patient revealed a massive hard tissue trauma to the left mid face with complex zygomatico-maxillary-orbital fractures involving the naso-ethmoidal complex exposing the frontal sinus with no involvement of the inner table or the cranium (Figure 3). An extensive, comminuted, left orbital fracture involved the medial, lateral and inferior orbital walls extending to the right inferior orbital rim, crossing the midline across the nasal bridge (Figures 2 & 3).



Figure 3: 3D CT reconstruction images showing extensive hard tissue damage (orbito-maxillary-zygomatic complex) and compound fractures of mid-face

Advanced ophthalmology and oculoplastic opinions were obtained with the CT findings. As there was complete optic nerve avulsion along with avulsion of orbital apex structures, acute orbital intervention was deemed unnecessary at the point of injury. It was decided to reassess the orbital deformities and intervene once in rehabilitation. He was cleared of brain and cervical spine injuries and definitive surgical reconstruction of the facial skeleton with meticulous approximation of the overlying soft tissues was executed after two days.

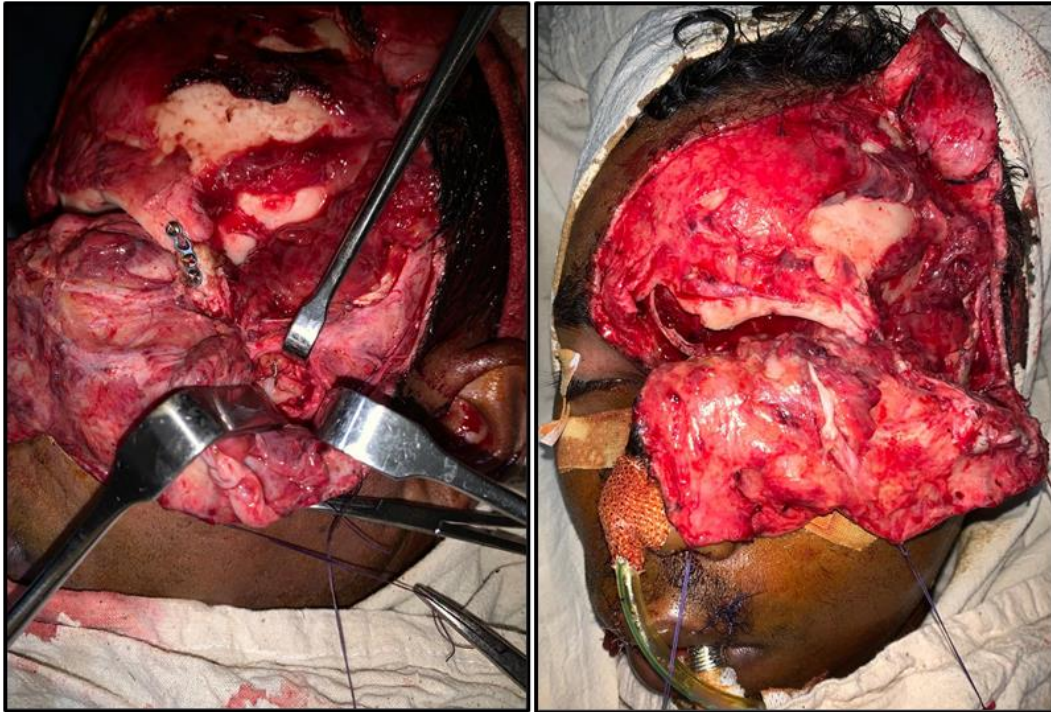


Figure 4: Intra-operative views showing severity of trauma and hard tissue reconstruction with mini plates/stainless steel wires

Nasal bones were repositioned and fixed to the frontal bone to regain midline and mid facial symmetry. The left fronto-zygomatic and left zygomatic arch fractures were reconstructed to re-form the left lateral facial skeleton. Mini plate osteosynthesis of bilateral infra-orbital rims were performed through the trans-conjunctival surgical approach. The left zygomatico-maxillary buttress was reconstructed intra-orally with temporary inter-maxillary fixation to stabilize the occlusion. Approximation of the facial muscles, sub-mucosal aponeurotic system and the superficial skin was done in layers to reform the facial soft tissue harmony. The drooping left upper eye lid was sustained due to oculomotor neural damage. Post-operative NCCT revealed satisfactory correction of the mid-facial skeleton with balanced and symmetrical zygomatic-maxillary-orbital dimensions. (Figure 4).

His recovery was uneventful in surgical aspects but he was anxious with a low mood and had night terrors, poor sleep and screaming episodes at night. On mental health evaluation by psychiatrist, it was found that he was having features to fulfil the diagnosis of acute stress reactions. As these symptoms persisted for more than one month, the diagnosis of post-traumatic stress disorder (PTSD) was made. Fluoxetine was commenced together with a short course of anxiolytic medications. Psychotherapy was also started and his symptoms gradually subsided by three months.

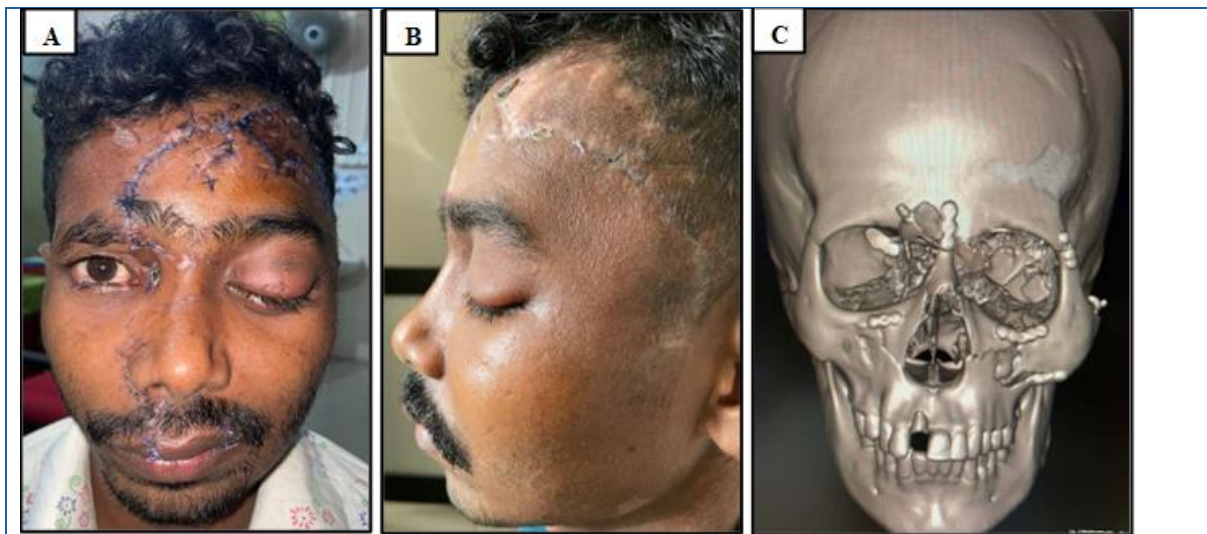


Figure 5: A&B Post-operative, C: 3D CT evaluation of hard tissue reconstruction

With gentle massaging and appropriate physiotherapy, facial and forehead scars were considerably and satisfactorily managed to improve appearance and aesthetics (Figure 5 & 6). Long-term ophthalmology care was recommended to minimize infections and to improve the cosmetics. Regaining the upper eye lid function with possible aberrant regeneration of the third nerve is expected and if so, globe repositioning will be considered. He may need lifting of the lid and prosthetic eye for better cosmetic outcome in the future by the orbital and oculoplastic surgeon as a part of multi-disciplinary care.

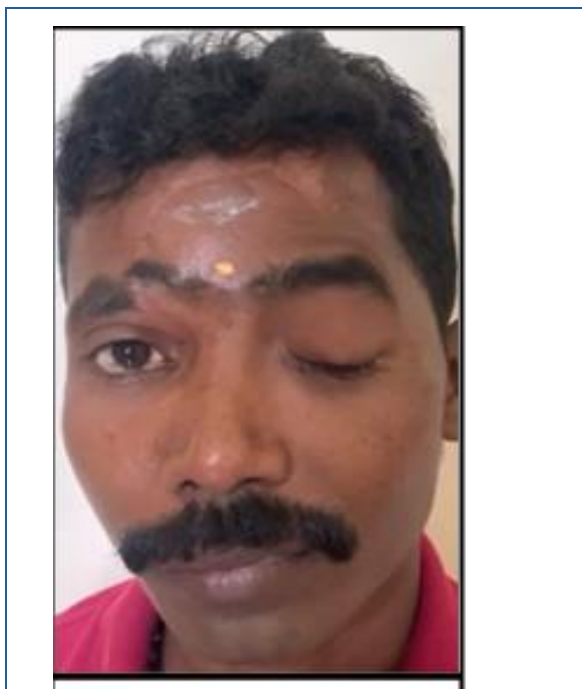


Figure 6: 3 months postoperative

Discussion

The Asiatic black bear (*Ursus thibetanus*) and sloth bear (*Melursus ursinus*) are omnivorous mammals. They are threatened animals and rarely come in contact with humans [1,2]. The Sri Lankan subspecies (*Melursus ursinus inornatus*) is mainly seen in open forests at low elevations (less than 300m) in less populated dry zone areas of the country. It contains a bigger head and powerful front feet. Their powerful jaws with strong canines and well-developed claws can inflict terrible injuries [2].

Bear attacks with powerful slaps cause a combination of cutting, penetrating and crushing injuries and may inflict potentially life-threatening damage [1,2]. The bear has a fearsome reputation among rural people as an animal that attacks without provocation [2]. The majority of these are defensive attacks during unexpected encounters, in response to a perceived threat to cubs and often take place during hiking and hunting activities during the daytime [1,3,4,6]. A majority of the victims are young men, 31-40 years of age, from rural areas [5,8]. This patient also fulfills all these criteria.

Securing the airway is of utmost importance in massive maxillofacial injuries. Foreign bodies including avulsed teeth and external materials, oral secretions, regurgitation of gastric contents and bleeding may compromise the airway with high aspiration risk and may be life-threatening. These must be considered initially and need to be continuously assessed [7]. This patient was promptly managed with stabilization of the airway, bleeding, circulation (ABC) and hard cervical collar to C-spine according to the standard national trauma guidelines at the peripheral hospital and re-assessed with exposure and disability (DE) at the district general hospital. A secondary survey was done meticulously to evaluate the presence of any associated injuries [8]. He was intubated considering the risk of aspiration, deterioration of GCS level with vomiting and faintish attacks and kept in ICU till the definitive surgical reconstruction.

Bear mauling injuries involving facial bones, eyes, nose and soft tissue may result in severe disfigurement with significant functional and aesthetic concerns [1]. All bite wounds are considered infected and contaminated due to the presence of large numbers of microorganisms in the oral cavity [3]. These attacks include struggle on the ground forcing mud, grass and other contaminating material into the wounds and deeper tissue spaces. Hence copious irrigation and elimination of all external material are of paramount importance [4]. Management of extensive injuries necessitates both local wound care and systemic concerns. All injuries should be thoroughly assessed and managed with broad spectrum antibiotic cover including tetanus and rabies prophylaxis [1,3,4]. Thorough cleaning with copious irrigation, debridement, administration of prophylactic vaccines and broad-spectrum antibiotics and delayed definitive surgical reconstruction was done in this case.

Open reduction and internal fixation (ORIF) with sub-periosteal exposure to the facial skeleton was done. Maximum anatomical reduction with accurate bony fragments

approximation prior to osteosynthesis is essential to re-gain the pre-traumatic specific facial dimensions. Neutral zones and bony pillars should be used for facial skeleton mini plate osteosynthesis with a minimum of two screws on either side of fracture [9]. There are specific approaches to different parts of the facial skeleton, to safeguard the vital structures and minimize post-surgical visible facial scars [10]. Zygoma, inferior orbital rims and dental occlusion determines the facial projections/dimensions of the midface [9].

We utilized the extensive de-gloving laceration as the access for the ORIF of the left zygomatic arch, naso-frontal midline fracture and left fronto-zygomatic displacement [9] Firstly, naso-frontal anatomical reduction and internal fixation was done to reconstruct the midline and symmetry of the facial skeleton. Reduction and fixation of the left fronto-zygomatic displaced fracture was carried out subsequently. Repositioning and stabilization of depressed multiple bony fragments of left midface was done to re-gain the symmetrical facial hard tissue contour.

At least three reference points osteosynthesis (out of five) is recommended for accurate reconstruction of the zygomatic complex fractures to re-establish the lateral projection dimensions and width of the upper midface [9].

In this case the left side displaced zygoma was anatomically repositioned and fixed at four places to obtain the stable left lateral facial dimensions. ORIF of the left zygomatico-maxillary buttress was done through the intra-oral vestibular access with temporary inter-maxillary fixation to stabilize the occlusion. ORIF of both inferior orbital rims were done using trans-conjunctival approaches, to minimize visible facial scarring [9]. Nevertheless, based on availability of the mini-plates and screws, we had to reconstruct with one screw at some areas and stainless-steel wire osteosynthesis of the left zygomatic arch but could obtain good, sustained stability with satisfactory outcome (Figure 5).



Figure 7: Final outcome

Bear mauling is commonly followed by psychiatric complications such as depression, anxiety, acute stress reaction, PTSD and phobic anxiety disorders [6]. PTSD is defined as symptoms of severe emotional distress and anxiety, following severe traumatic experience, lasting longer than one month of incident [11]. PTSD was evident in this case and the patient had severe anxiety, re-experiencing trauma and depressive symptoms.

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