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Case Report

Dentistry Section

Complex Traumatic Degloving Facial Injury with Multiple Maxillofacial Fractures: A Case Report

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ABSTRACT

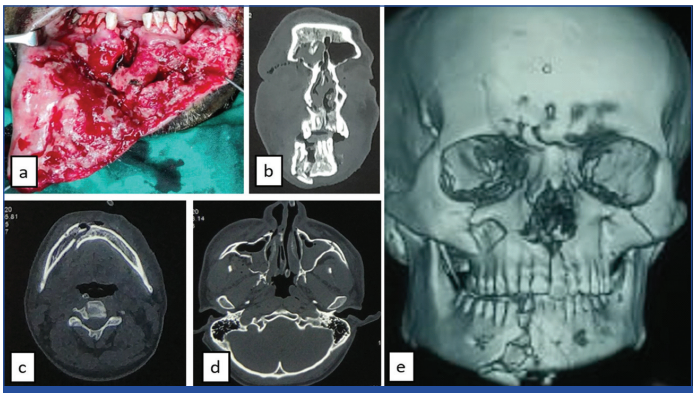
Reconstructing mutilating soft-tissue injuries, lacerations, and extensive degloving injuries of the face is a very challenging and exacting task, It becomes more challenging and difficult if these types of injuries are associated with maxillofacial fractures. Such injuries require meticulous treatment and care; inadequate and poor treatment may lead to grotesque unsightly deformities, with inevitable physiological and psychological ill-effects. It requires a staged treatment method for optimal and successful aesthetic and functional outcomes. Meticulous anatomic repositioning of soft tissues as well as hard tissues, and proper postoperatively gives good aesthetic and functional results. The present article presents a case of 45-year-old male patient of a complex traumatic degloving soft-tissue injury along with multiple facial bone fractures, detailing the measures taken to prevent necrosis and infection through surgical debridement, internal fixation of maxillofacial fractures, and timely restoration of vital soft-tissue elements in position. Following a road traffic accident, the patient was diagnosed with a frontal bone fracture, Lefort-II fracture with a comminuted parasymphysis fracture of the mandible, and a degloving injury to the lower lip. Open Reduction and Internal Fixation (ORIF) were performed for the mandibular fracture, and an autologous cancellous bone graft from the anterior iliac crest was grafted to bridge the gap between fractured segments. Intermaxillary Fixation (IMF) (Closed reduction) was done for the midface fracture. Meticulous multiple-layered suturing was performed for the degloving soft-tissue injury. After three months, there were no complications, and the patient was satisfied with no functional or aesthetic deficits.

Keywords: Aesthetic, Avulsion, Function, Infection, Mandible

CASE REPORT

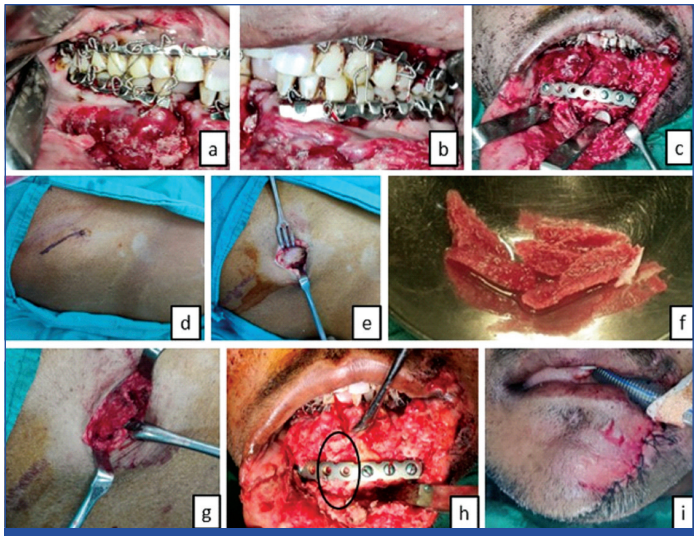
A 45-year-old male reported to the Casualty Department with alleged history of a motor vehicular accident, suffering from a full-thickness facial laceration with a degloving injury of the lower lip extending to the chin region. There was gaping and partial avulsion of the lower lip with the anterior mandible completely exposed through the laceration, revealing a fracture in the parasymphysis region [Table/Fig-1a]. The patient's neurological status was normal, with a Glasgow Coma Scale (GCS) score of 15. Clinical examination revealed tenderness present on bilateral infraorbital region and bilateral zygomatico-maxillary buttress region, severely deranged occlusion, and mobility of multiple teeth in the upper and lower anterior regions. There was avulsion of the mandibular incisors on the right-side, a defect in mandibular continuity in the anterior region with a palpable step deformity and mobile fracture segments. Slight mobility of the maxilla was palpable at the Lefort-II level. The Computed Tomography (CT) scan of the brain was normal, but the CT scan of the face [Table/Fig-1b-e] suggested a minimally displaced fracture of the frontal bone on the right-side, a minimally displaced Lefort-II fracture with a comminuted parasymphysis fracture of the mandible. Closed reduction for the midface fracture and ORIF was planned for the mandibular fracture. The patient and relatives were explained about the condition and need for surgery, and informed consent was taken.

After preanaesthetic clearance, the patient was shifted to the operating theatre, and surgery was performed. Submental intubation was performed. Meticulous debridement of the wound was carried done by thoroughly removing all debris, foreign bodies, devitalised tissue, and blood clots. The wound was irrigated thoroughly with a copious betadine-saline solution. Arch bars were placed in both jaws, achieving satisfactory occlusion by slight manipulation at the fractured site, and IMF was done [Table/Fig-2a,b]. The fracture site at the mandibular parasymphysis region was opened through the existing degloving injury site, and bone segments were anatomically



[Table/Fig-1]: Preoperative photographs. a) Full thickness facial laceration with degloving injury of lower lip and fracture of mandibular parasymphysis region; b) CT scan (Coronal view) suggestive of communited parasymphysis fracture of mandible; c) CT scan (Axial view) suggestive of communited parasymphysis fracture of mandible; d) CT scan (Axial view) suggestive of minimally displaced Lefort II fracture; e) 3-D CT scan face showing maxillofacial fractures (Fracture of frontal bone, maxilla, zygomatic bone and mandible).

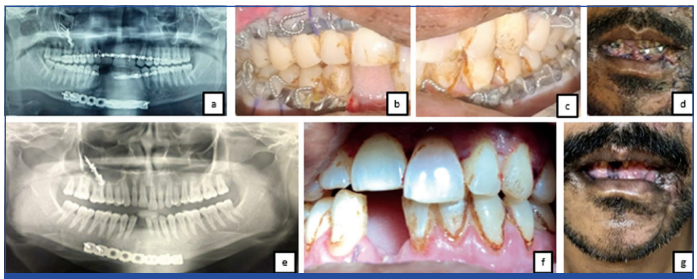
reduced and fixed with a 2.5 mm titanium reconstruction plate and screws [Table/Fig-2c]. However, a defect was observed between the fixed fractured segments. Autologous cancellous bone graft from the anterior iliac crest was harvested by maxillofacial surgeons [Table/Fig-2d-g] and grafted to bridge the gap between the fractured segments [Table/Fig-2h]. The fracture at the right zygomatico-maxillary buttress was exposed using an intraoral vestibular approach and fixed with a 2.0 mm titanium miniplate and screws. The degloved flap of the lower lip was anatomically repositioned, and meticulous multiple-layered suturing was performed with 3-0 vicryl suture subcutaneously and 4-0 prolene suture over the skin [Table/Fig-2i]. An Orthopantomogram (OPG) was done on postoperative day 1, showing a satisfactory reduction of the mandibular fracture [Table/Fig-3a]. Mouth opening was restricted to 25 mm due to pain. The occlusion was satisfactory, and IMF was performed. The patient was administered medications



[Table/Fig-2]: Operative photographs: a,b) Arch bar placed, occlusion achieved and IMF done; c) Parasymphysis fracture reduced and fixed with 2.5 mm titanium reconstruction plate and screws; d) Skin incision marking for harvesting anterior iliac crest graft; e) Exposure of the anterior iliac crest avoiding neurologic structures; f) Harvested cancellous bone graft from anterior iliac crest; g) Haemostasis achieved at donor site after harvesting the graft; h) Autologous cancellous bone graft from anterior iliac crest bridged gap between fixed fractured segments at mandibular parasymphysis region (black circle); i) Primary closure of operative site performed with 3-0 vicryl suture subcutaneously and 4-0 prolene suture over skin.

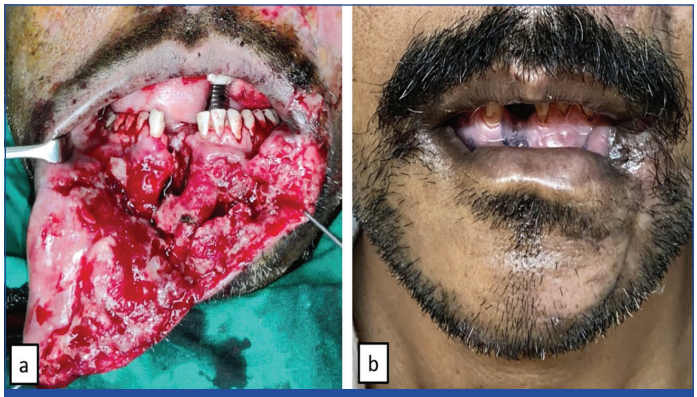
(Inj. Augmentin 1.2 g i.v. BD, Inj. Metronidazole 500 mg/100 mL i.v. TDS, and Inj. Paracetamol 1 g TDS) intravenously for five days, followed by oral administration for the next two days.

Antiseptic ointment (Betadine 10% ointment) was applied locally over the extraoral sutured wound, and wound support dressing was done twice daily. Sutures were removed on the seventh postoperative day, and the patient was discharged uneventfully. Patient was kept on regular follow-up visits. IMF was maintained for one month, and the IMF tie wire was released at the one-month follow-up. After the removal of the IMF tie wire, the mouth opening was around 20 mm, so patient was advised to perform active physiotherapy to increase mouth opening. The occlusion remained satisfactory [Table/Fig-3b,c]. Extra-oral soft-tissue healing showed no signs of infection and was satisfactory [Table/Fig-3d]. Arch bars were removed at the six-week follow-up. At the three-month follow-up, there was no evidence of infection, bone necrosis, or non union, and graft healing appeared normal on the orthopantomogram [Table/Fig-3e]. There was no tooth mobility, and the preinjury occlusion was restored [Table/Fig-3f]. Healing was uneventful and the mouth opening was around 40 mm. The patient had normal sensation in the lower lip. However, a visible scar remained on the skin as deeper layers of the soft tissues were injured during the trauma [Table/Fig-3g]. The patient was not willing for any treatment, of scar as he was satisfied with the functional restoration of the maxillo-mandibular complex as well as his facial aesthetics [Table/Fig-4]. In [Table/Fig-4], the observation indicated that the patient's



[Table/Fig-3]: Postoperative photographs: a) Immediate postoperative OPG showing satisfactory reduction of mandibular fracture; b) Satisfactory occlusion on right-side (One-month postoperative); c) Satisfactory occlusion on left-side (One-month postoperative); d) Satisfactory healing of soft-tissues (One-month postoperative); e) Three months postoperative OPG showing healed fracture sites with no sign of infection/bone necrosis/non-union with satisfactory graft healing; f) Satisfactory dental occlusion (3 months postoperative); g) Healed facial laceration (3 months postoperative).

lips were not positioned in accordance with the clinical rest position, thereby presenting as incompetent. Nevertheless, it was noted that the lips attained contact at the clinical rest position without eliciting any involuntary effort.



[Table/Fig-4]: a) Preoperative trauma with soft-tissue injury and bony fracture; b) Postoperative recovery with minimal-to-no functional or aesthetic deficit.

DISCUSSION

Soft-tissue injuries developing from the impact of shearing or stripping forces are termed degloving injuries. These injuries lead to separation or division of the skin and subcutaneous tissue from underlying bones, compromising adjoining structures including fascia, muscles, blood vessels, and nerves [1,2]. Degloving soft-tissue injury comprises 4% of all traumatic injuries [3]. Extensive comminuted multiple mandibular fractures occur when a high-energy/high-velocity force or impact is exerted over any region of the mandible. This type of high-energy/high-velocity impact is commonly seen in gunshot injuries, road traffic accidents, assaults with sharp objects, and falls from heights. It can generate enough concentrated force to cause multiple comminuted fractures of the mandible [4]. Degloving soft-tissue injuries can be classified as either open or closed. Open degloving injury usually present as avulsions and commonly occur in the head and neck region. Closed degloving injuries manifest as a cavity filled with haematoma and commonly occur in the trunk and extremities [5]. The treatment of open degloving injuries scales from meticulous debridement and primary skin closure to complex reconstruction surgery involving local flaps, skin grafts, or microvascular free flaps, depending on the site, extent, and severity of the injury. Delay in the treatment of these degloving injuries can lead to infection, full-thickness necrosis, or necrotising fasciitis of the avulsed flap [6].

Although maxillofacial injuries are rarely life-threatening, they can significantly impact an individual's physical, physiological, as well as psychological health of individual, hence goal of treatment should be to reconstruct, restore, and rehabilitate the normal facial projection, function, and aesthetics preinjury with minimal-to-no morbidity [7]. Facial reconstruction and rehabilitation pose a challenge in treating patients with craniomaxillofacial traumatic injuries. The reconstruction becomes even more difficult and challenging with multiple sites of degloving/avulsive injuries and maxillofacial fractures [2]. The management of such maxillofacial injuries includes surgical debridement, fracture reduction and stabilisation, primary closure (meticulous suturing), and subsequent correction of residual deformities [8]. Prompt attention and treatment are essential for facial degloving and avulsive injuries. Infection may occur if, these injuries are not promptly treated, and any delay may even result in necrotising fasciitis [6]. Careful examination of tissue vascularity and preservation of blood supply to affected tissues are mandatory. There are definite general treatment principles, including preservation of as much tissue as possible, early primary definitive skin coverage, early functional recovery, and the necessity of any secondary corrective surgery [9]. Regular wound debridement and antiseptic dressing should be done for the first two weeks to relieve tension from the

wound bed and prevent excessive collagen deposition [2]. Suture removal should be done by the seventh day, and encrustations should be periodically removed. Once the tissue is epithelialised, local application of topical silica gel sheets or local administration of corticosteroids can be performed to minimise scar [10].

Treatment of comminuted mandibular fractures is always a challenge, even for experienced surgeons. Difficulties arise in achieving accurate reduction and fixation of fractured fragments, especially when there is a complete loss of anatomic references or occlusal relationship [11]. Earlier, closed reduction was considered the treatment of choice as it preserves vascularity to comminuted fractured fragments and prevents secondary infections. Advances in surgical treatment and the availability of robust internal fixation devices have made ORIF the treatment of choice in managing comminuted mandibular fractures [4,11].

A few case reports have been published in the literature regarding complex degloving facial injuries [Table/Fig-5] [1,12-14]. In the current case report, ORIF was performed for the mandibular fracture followed by IMF (closed reduction) for one month. The patient in the current report was not willing to undergo surgery for the midface due to minimal displacement, so closed reduction was planned to treat the midface fracture. Minimally displaced Le Fort fractures can be reduced with the IMF [15]. Meticulous multiple-layered suturing was performed for the degloving soft-tissue injury. After three months, there were no complications, and the patient was satisfied.

S. No.	Authors	Areas involved in injury	Management of injuries
1.	Olateju OS et al., [1]	Soft-tissue injuries involving lower and middle thirds of the face, tongue and lower posterior part of the neck Le Fort I fracture	Emergency tracheostomy Interosseous wiring for bony fractures Debridement and suturing of soft-tissue wounds
2.	Sarkar DF and Dutta D [12]	Degloving injury over the right-side of face involving the cheek, oral commissure, lower eyelid, external auditory canal and temporal scalp. Fracture of the ramus of mandible on right-side	Fracture was reduced and fixed with a 2.0 mm titanium miniplate system Soft-tissue defect over the right-side of the face was reconstructed using a split-thickness skin graft harvested from the left thigh region of the patient
3.	Moon P [13]	Hemifacial degloving injury of right-side of the face extending from temporal region of scalp, upper and lower conjunctiva, and cheek to upper and lower lip. Fracture of right condyle of mandible, right zygomatic arch comminuted fracture, fracture of right zygomatic-frontal buttress, right zygomatic-maxillary buttress, nasal bone fracture and fracture alveolar process of maxilla	Open Reduction and Internal Fixation (ORIF) of maxillofacial fractures Debridement and suturing of soft-tissue wounds
4.	Jadhav NC et al., [14]	Full thickness facial laceration with degloving of whole of nose, upper lip, right lower eyelid and right cheek Comminuted fracture of nasal bones with nasal septum exposed	Fractured nasal bones stabilised with 22G stainless steel wires Debridement and suturing of soft-tissue wounds
5.	Present case report	Full thickness facial laceration with degloving injury of lower lip extending till chin region Minimally displaced fracture of frontal bone on right-side, minimally displaced Le Fort II fracture with communited parasymphysis fracture of mandible	ORIF of mandibular fractures Closed reduction of midface fractures Debridement and suturing of soft-tissue wounds

[Table/Fig-5]: Study of the case reports published in the literature [1,12-14].

CONCLUSION(S)

Facial degloving injury associated with multiple maxillofacial fractures is a complex reconstructive challenge. It requires a properly planned staged approach. Prevention of necrosis and infection by meticulous surgical debridement, and early single-stage primary reconstruction and repair of the vital soft-tissues provide good functional recovery and aesthetic outcomes with excellent results.

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