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Case Report RRJoD

Panfacial Trauma: A Case Report

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Abstract

The majority of panfacial fractures are accompanied by concurrent organ damage. Panfacial fracture management is difficult and necessitates careful planning, sequencing, and sufficient understanding of the anatomy and management of the condition. In any trauma situation, the ABCDEs (airway, breathing, circulation, disability, and exposure) always remain the primary care priorities. Maxillofacial surgeons are essential in the early stabilization of fractures, the management of localized bleeding into the face, and the establishment of a definitive airway in specific circumstances. After the patient has stabilized and every systemic injury has been thoroughly assessed, the final course of treatment is typically initiated. Panfacial fractures require much more preparation in terms of treatment. This chapter provides a methodical explanation of the concept, covering everything from its philosophy and indications to its clinical results and adult management.

Keywords: Panfacial, trauma, submental intubation, bicoronal approach, Naso-Orbito-Ethmoidal (NOE)

INTRODUCTION

Facial fractures commonly involve the multiple subunits of the craniomaxillofacial skeleton. The severity of these injuries depends on factors such as the cause, impact force, pre-existing conditions in the patient, and other contributing factors. High-speed road traffic accidents and assaults are the primary causes of panfacial fractures and encompass a wide variety of fracture patterns, making it difficult to establish a precise definition of "panfacial fractures." Panfacial fractures, widely recognized as involving multiple facial bones, include fractures of the upper, middle, and lower thirds of the face, along with at least one fracture involving the condyle, palate, and fronto-naso-orbito-ethmoidal complex [1]. When there is involvement of the skull base or concurrent neurosurgical issues, it is referred to as craniofacial fracture. Managing these cases is highly complex because each presents a distinct pattern of injuries affecting both the hard and soft tissues. This necessitates a team-based approach as these injuries often occur in cases of polytrauma involving multiple bodily systems. Immediate definitive surgical intervention is warranted in cases of airway compromise, severe hemorrhage, large open wounds, significant ocular/orbital injuries, and concurrent surgical procedures. Maxillofacial surgeons aim to restore both form and function promptly.

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Panfacial trauma presents significant challenges for oral and maxillofacial surgeons. These cases involve fractures in the upper, middle, and lower thirds of the face, often accompanied by lacerated soft tissue. High-energy injuries such as gunshot wounds and motor vehicle accidents commonly cause facial trauma. Panfacial fractures account for approximately 4–10% of all facial fractures and are a leading cause of death among individuals under 40 years of age. If not managed properly, panfacial trauma can lead to functional and aesthetic facial

deformities, malocclusion, and difficulties in social interaction. Panfacial trauma typically involves fractures of various facial bones, facial deformities, enophthalmos, malocclusion, diplopia, and soft tissue injuries.

Case Report

A 32-year male trauma victim with Road Traffic Accident (RTA) sustaining blunt facial trauma was reported to our institute with bilateral periorbital ecchymosis, subconjunctival hemorrhage, and multiple facial fractures. Radiographic and three-dimensional CT images revealed a left mandibular parasymphysis fracture, right mandibular angle fracture, bilateral Zygomaticomaxillary Complex (ZMC) fracture, nasal fracture, and bilateral Le Fort I (Figures 1,2).

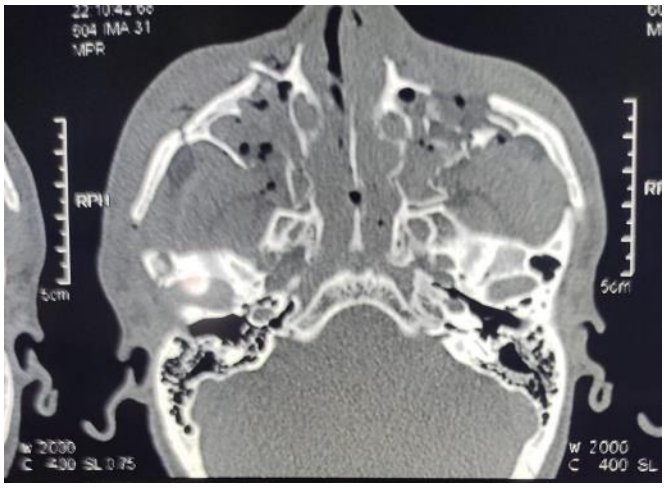

Figure 1. Axial CT scan view.

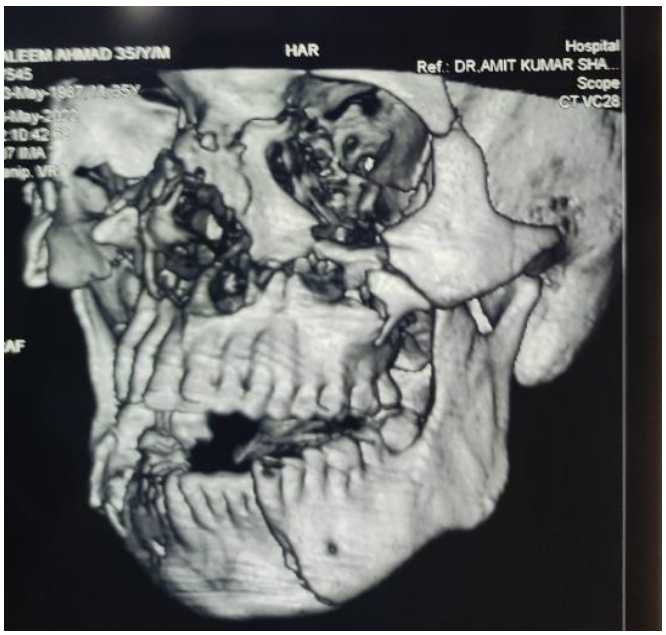

Figure 2. 3D dimensional CT scan view.

The patient was selected for submental intubation and underwent open reduction and internal fixation of the panfacial fractures through a combination of bicoronal and intraoral vestibular approaches in sequence. The first right ZMC and left infraorbital fracture were reduced, followed by a reduction of the zygomaticomaxillary and nasomaxillary buttresses. The next fracture of the left parasymphysis and right mandibular angle was exposed, reduced, and fixed (Figure 3).

Lastly, the nasal fracture was reduced, and stabilization was achieved using an extraoral nasal splint.

In this case, 3-0 Vicryl was employed for intraoral suturing, which was executed in layers. For extraoral suturing, 4-0 Vicryl and 5-0 Prolene were used. After recovery, the patient was transferred to the Intensive Care Unit (ICU) care unit. The patient's postoperative care and regular follow-up were diligently maintained, leading to the successful management of the case.

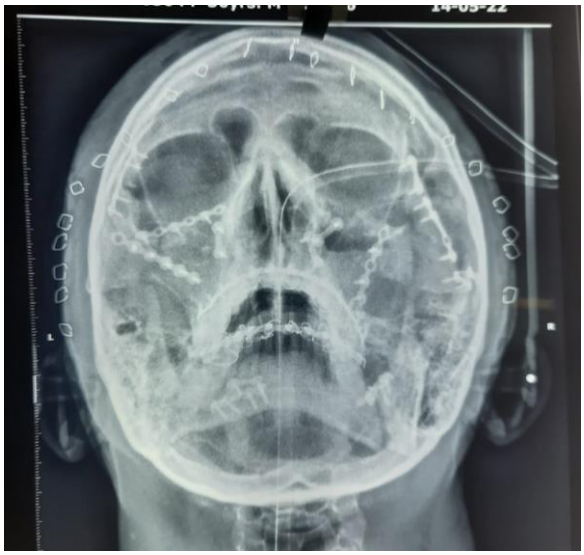

Figure 3. Postoperative Paranasal Sinuses (PNS) view showing fixation of the facial fracture using miniplates.

DISCUSSION

The management of facial fractures is highly intricate. A notable complication associated with panfacial fractures is the widening of the facial structure. Considerable literature exists regarding the optimal sequencing of treatments for facial fractures. Two classic approaches for managing panfacial fractures have been described as "bottom-up and inside-out" or "top-down and outside-in" [2]. Kelly et al. [3] proposed using reduction of the hard palate as a guide for mandibular reconstruction when the geometry of the dental arches is disrupted. Gruss et al. [4]. recommended reducing the zygomatic arch and malar projection to restore the "outer facial frame" before addressing the reduction of the nasoorbitoethmoid (NOE) or "inner facial frame." Tulio and Sesenna [5] advocated that the initial step should be to establish the condyles along the mandibular arch.

When concurrent fractures of the maxillary and mandibular arches occur, restoring occlusion and the three-dimensional relationship of the jaws becomes challenging. Manson and Glassman [6] recommended initially fixing the palatal fracture and then using the maxillary arch as a guide to restore the mandibular arch. Fracture patterns that frequently pose challenges include those involving the symphysis and parasymphysis regions, often accompanied by condylar fractures that cause retrodisplacement of the mandible and widening at these angles. In such situations, all fractures should be exposed before they are reduced and fixed. Pressure should be applied at the gonial angles to close any lingual gap, ensuring proper lower facial width, and achieving the correct anterior projection.

The naso-orbital region plays an important role in facial esthetics. Insufficient correction of the telecanthus, internal orbit, and inadequate skeletal support are the most frequent causes of surgical failure [2]. The "bottom-up and inside-out" approach enables stable reconstruction of mandibular fractures and establishes the mandible as the foundation for aligning the rest of the face, particularly when there is adequate dentition and at least one intact condyle. Occlusion is established by intermaxillary fixation (IMF), ensuring that the maxilla is positioned correctly.

The zygomaticomaxillary complex was initially reduced and stabilized to correct the anteroposterior and transverse facial dimensions. This allows for more accurate repositioning of the upper midface before fixation at the zygomatic buttress. The maxilla is then stabilized along the zygomaticomaxillary buttress to address the "inner facial frame" or the NOE complex, which is subsequently reduced and stabilized. The reconstruction of the internal orbit follows. During the final stage of panfacial trauma treatment, bone grafts or alloplastic substitutes are used to reconstruct orbital floors and nasal dorsum. The "top-down and outside-in" approach begins at the zygomatic region, where the frontozygomatic suture is reduced and stabilized. The zygomatic arch was properly reduced to avoid under-projection of the midface. The NOE complex was then positioned. Next, the maxilla was addressed, guided by the position of the zygomaticomaxillary buttress and piriform rim. Maxillomandibular fixation was performed. Reduction and fixation of mandibular condyle/symphysis/body/angle fractures are then performed. Subcondylar fractures can be treated with this approach. Neither of these techniques consistently achieved optimal results in any situation. Instead, an approach that progresses from known to unknown is generally more precise.

Submental intubation is a valuable technique for managing severe maxillofacial injuries and offers several advantages over traditional intubation methods.

Airway Management

- *Avoids nasal and oral routes:* Submental intubation bypasses the nasal and oral cavities, which can be crucial in cases where these structures are severely injured or require surgical repair.
- *Unobstructed surgical field:* By routing the endotracheal tube through a submental incision, surgeons have unobstructed access to the oral and nasal regions, thereby facilitating more precise and effective surgical interventions.

Improved Surgical Access

- *Enhanced visibility and access:* The procedure allows for better visualization and access to maxillofacial structures, thereby improving the quality of surgical care.
- *Facilitates complex reconstructions:* It is particularly useful in complex fractures and reconstructions, where traditional intubation may interfere with the surgical field.
  According to some authors, "panfacial trauma" refers to fracture patterns that simultaneously involve the midface and the mandible. Others define it as fractures that simultaneously involve the upper, middle, and lower faces. Thus, a universally accepted definition of panfacial trauma does not exist in the literature [7].
- Management of panfacial trauma involves sequential repair. Before beginning repair, the operator needs to restore the occlusal relationship. Once proper occlusion is achieved, the stability of midface buttresses and spatial relationships can be established. Airway management is crucial for facial fracture repair. Depending on the clinical condition and severity of trauma, an airway management strategy is chosen, which can include oral or nasal intubation, submental intubation, or tracheostomy.
- Different approaches for managing facial trauma have been proposed, such as the inside-out or bottom-up approach and the outside-in or top-down approach. In the inside-out approach, the maxillary-mandibular unit was reconstructed first to establish occlusion. Conversely, in the outside-in or top-down approach, the outer facial frame is established first [8].

CONCLUSION

The combination of concomitant injuries, higher patient morbidity, and functional impairment that frequently follow these injuries makes panfacial fractures difficult to treat. Management needs to concentrate on early and comprehensive assessment, prioritizing treatment (usually in stages) to maintain tissue viability and function, and supporting fractures if reduction and fixation cannot be completed promptly [9]. To properly plan and execute facial fracture reconstruction, attention must be paid to restoring the nasal, oral, and orbital cavities and volume, as well as the proper occlusal, vertical,

and horizontal relationships within the facial frame that support and shield important organs that make up the midfacial skeleton. Complex fracture patterns are caused by high-impact injuries on the midface. Treatment and diagnosis necessitate deep comprehension of the facial skeleton and an understanding of both functional and aesthetic deformities. Treatment aims to restore bone structure with the least degree of soft tissue disruption. Wide-area exposure procedures have given way to smaller, more covert incisions and miniplate fixation as methods of treatment. Subsequent advancements and enhancements in endoscopic methods could potentially reduce surgical access morbidity associated with intricate face damage [10].

Facial artery vascular injuries are uncommon aftereffects of acute facial trauma, with reported occurrences varying from 1.25% to 11% [11]. Facial artery vascular injuries are uncommon aftereffects of acute facial trauma, with reported occurrences varying from 1.25% to 11% [9].

Late vascular problems are typically caused by the establishment of pseudoaneurysms in the carotid artery branches. Pseudoaneurysms are artery outpouchings caused by trauma to the two innermost layers of tissue, the tunica intima and tunica media. The three layers may be affected by bleeding that is contained by a blood clot or results in the creation of a hematoma within the boundaries of the surrounding soft tissue, or the outermost layer, tunica adventitia, may be unharmed [12].

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