Case report

Coinciding Realignment of Complex Zygomatic and Parasymphysial Mandibular Fractures Following Motor Vehicle Collision: A Case Report

ABSTRACT

Fractures of the mandible are the most common encountered injuries of the facial skeleton and are often the result of high-energy trauma. Zygomatic fractures, also frequent in maxillofacial trauma, can significantly compromise the symmetry of the face, ocular function, and masticatory mechanics. This report describes a case of a 25-year-old male who presented to the emergency department after being transferred from a primary care facility following a high-velocity motor vehicle collision. He sustained a classic "dashboard injury," leading to a closed, unstable right parasymphysial mandibular fracture accompanied by a zygomatic fracture. In this patient, malocclusion, restricted oral opening, right-sided periorbital edema and ecchymosis, and conjunctival hyperemia have been observed. The management of both fractures proceeded with closed reduction techniques that resulted in stable alignment and the restoration of normal occlusion. The postoperative course was uneventful; functional and aesthetic recoveries have been reached without complication. This case points out the importance of an early assessment and timely closed reduction in the management of combined mandible and zygomatic injuries for the optimization of outcomes.

Keywords: Maxillofacial trauma; Zygomatic fracture; Mandibular parasymphysial fracture; Operative management; Case report

1. INTRODUCTION

Because of their prominent position, facial fractures most commonly affect the mandible and the zygoma. Zygomaticomaxillary complex(please change this sentence ,begins with because)ZMC fracture is considered the second most common midfacial injury; it usually arises from road-traffic accidents among young men, followed by assaults, falls, and sports injuries. Classic "tetrapod/tripod" fracture patterns are produced due to the usual zygomatic bone fracture along four articulation points, where the zygomatic arch usually goes together with the infraorbital rim [1]. Infraorbital numbness, diplopia, pain, flattening of the cheek, periorbital bruising, subconjunctival hemorrhage, palpable step deformities, and trismus due to the impingement of the arch are common presentations. If not diagnosed promptly [2], complications of ZMC fractures may include early ones like retrobulbar hemorrhage and optic nerve injury, whereas later ones include diplopia, enophthalmos, chronic sinusitis, and infraorbital nerve dysfunction. The diagnosis involves detailed extraoral and intraoral examination [3]. Even though plain X-rays may be helpful, a multidetector CT scan represents the diagnostic standard of care because of its ability to provide highly detailed 3D assessment [4]. The system of Knight and North classification is widely used for the categorization of these fractures when treatment planning is needed. The Knight and North Classification (1961) is widely used to categorize ZMC fracture based on the direction of displacement and rotation, which aids in treatment planning (Table 1) [5].

Table 1: Knight and North Classification of Zygomatic Fractures.

Group	Description
Group I	Undisplaced fractures.
Group II	Isolated zygomatic arch fractures.
Group III	Unrotated body fractures.
Group IV	Medially rotated body fractures.
Group V	Laterally rotated body fractures.
Group VI	Complex fractures (comminuted).

Preoperative assessment of the eye is essential for ZMC fractures to record the vision and differentiate trauma-related deficits from surgical complications. Subconjunctival hemorrhage and diplopia are some of the signs that need to be documented for medicolegal purposes [6]. Depending on the severity of the fracture, treatment ranges from conservative management in nondisplaced fractures to isolated or simple fractures with closed reduction and unstable or comminuted fractures with open reduction and internal fixation using titanium plates [7].

The mandible is the most common facial bone to be fractured, next to the nasal bone, because of the increasing incidence of road traffic accidents, assaults, and falls [8]. Parasymphysial fractures are particularly important since bilateral injuries can threaten the airway and disturb occlusion [9]. Treatment aims to restore normal occlusion and function using conservative care, closed reduction, or open reduction internal fixation, depending on the displacement and stability [10].

2. CASE PRESENTATION

2.1. Patient Information and Mechanism of Injury: A 25-year-old male was referred to our emergency clinic from a primary health care unit following a road traffic accident. History from the patient and witnesses revealed that he was the front-seat passenger in a vehicle involved in a collision. The patient was unrestrained at the time of impact. Sudden deceleration caused his body to project forward, leading to a high-velocity impact of his face against the dashboard.

2.2. General Examination: The patient was alert and conscious with an admission Glasgow Coma Scale of 15/15. He was normotensive and afebrile. There was a patent airway with no evidence of distress, normal

respiratory rate, and symmetrical chest movements. Abdominal examination revealed a lax, freely mobile anterolateral abdominal wall that excluded thoraco-abdominal injuries. The extremities did not show fracture or neurovascular deficits.

2.3. Local Examination: Extraoral examination showed the presence of mild right hemifacial edema. Right periorbital oedema and ecchymosis were observed with red right eye. Hypoesthesia was detected infraorbitally indicating injury of the infraorbital nerve. Moreover, few interrupted sutures were present in the lateral aspect of the periorbital region. Other sutures were also have been used to restore the continuity of a chin wound about 5 cm, in addition to scattered multiple abrasions and contusions involving both the central and lateral facial regions. The patient expressed pain in the right infraorbital region with tenderness upon examination. Mild flattening of the right periorbital region was observed. Right red eyes with lacrimation were also presented (Figures 1,2).

Intraoral examination revealed reduced oral opening due to reduction of the volume of the Temporomandibular joint (TMJ) because of the depressed zygoma. A right parasymphysial mandibular fracture was detected which was stable and closed. The right central and lateral incisors were lost on both sides of the mandible; therefore, the fracture was finally diagnosed as a right parasymphysial, closed, unstable, type C fracture mandible. Furthermore, absorbable sutures (catgut) were observed in the oral vestibule securing a wound involving the mucosal covering of the mandibular gingiva and the lower lip (Figure 3). No associated wounds involving the tongue or other soft tissues of the oral cavity.

2.4. Ophthalmological consultation: the visual acuity was not affected. Orbital examination was free with no injuries or complications.

Figure 1. Interrupted sutures in the lateral aspect of the right periorbital region (1), periorbital ecchymosis and red eye (2), sutures chin wound (3). Anterior view.

Figure 2. Right periorbital ecchymosis (1) red eye (2), while the sutures have been removed. Lateral view.

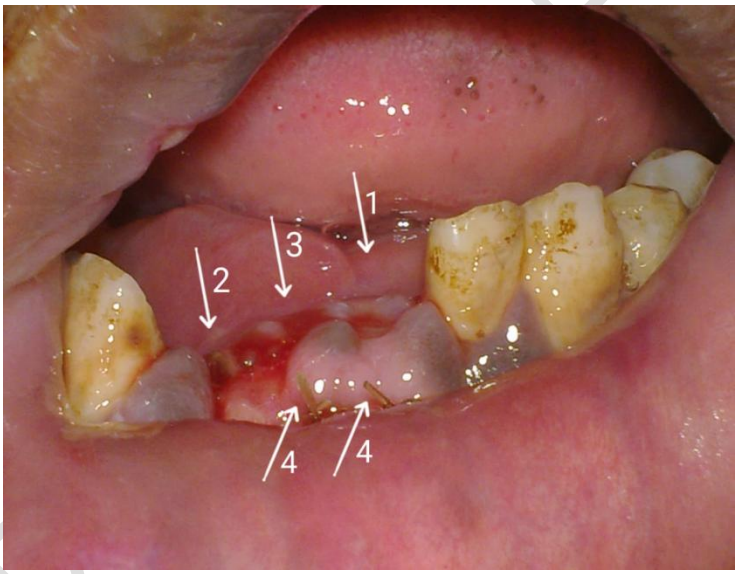

Figure 3: lost central incisor (1), lateral incisor (2), fracture line (3) and the ends of catgut sutures which were used to suture the intraoral wound (4).

2.5. Radiographical Assessment

Radiographic evaluation was done to confirm the clinical diagnosis. Panoramic X-ray, demonstrated the presence of a right parasymphysial, closed, unstable, type C fracture mandible (Figure 4). In addition, MultiDetector Computerized Tomography (MDCT) 3D cuts (both anteroposterior and lateral views) confirmed the presnsce of the right parasymphysial, closed, unstable, fracture mandible, lost right hemi-mandibular central and lateral incisors, fracture complex zygomatic fracture as well as compression of the mandibular condyle head by the zygomatic arch (figure 5,6A,6 B) reducing the oral cavity opening.

Figure 4: Orth-odontograph (Panoramic view) illustrating a right parasymphysial, closed, stable, fracture mandible (white arrow), lost right mandibular central and lateral incisors (red arrows) and reduction of the oral cavity opening manifested by reduced space in-between maxillary and mandibular molars on the right side (green arrow) in comparison to the left side.

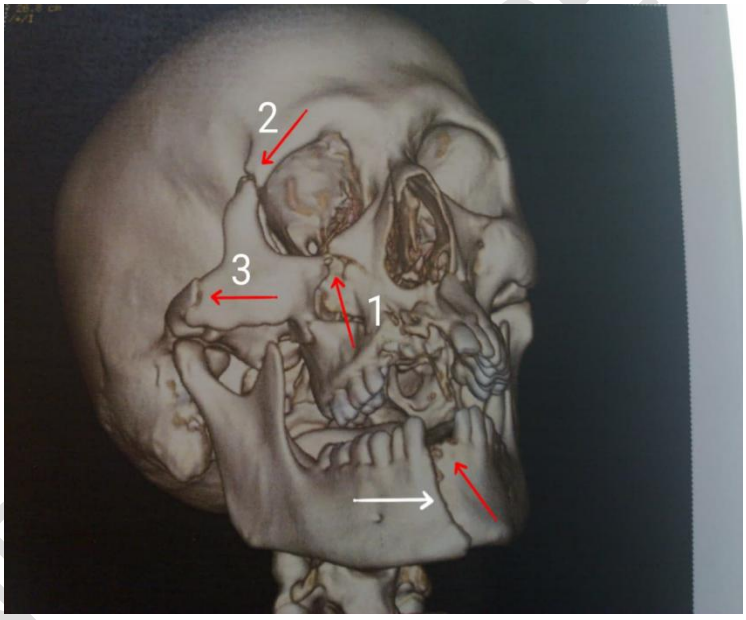

Figure 5: MDCT AP view illustrating the a right parasymphysial, closed, stable, fracture mandible (white arrow), lost right mandibular central and lateral incisors (red arrows) and fracture complex, fracture (orbital process (1), frontal process (2), temporal process (3).

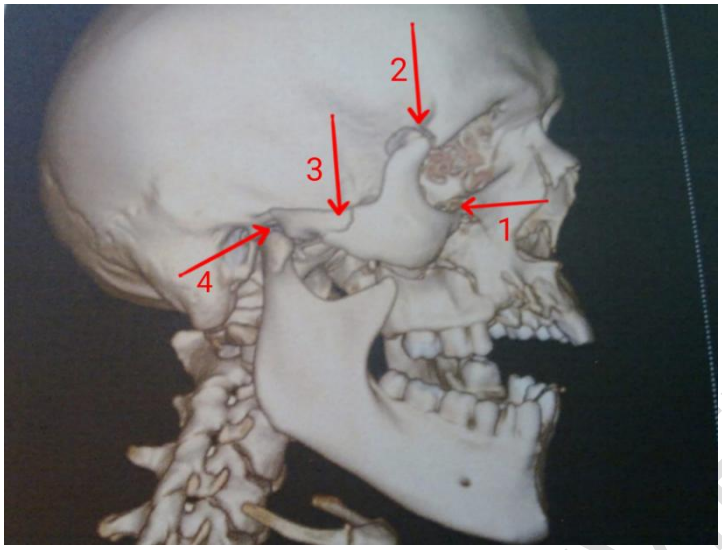

Figure 6 A: MDCT lateral view illustrating fracture complex zygomatic fracture (orbital process (1), frontal process (2), temporal process (3) and the comprised mandibular condyle (4).

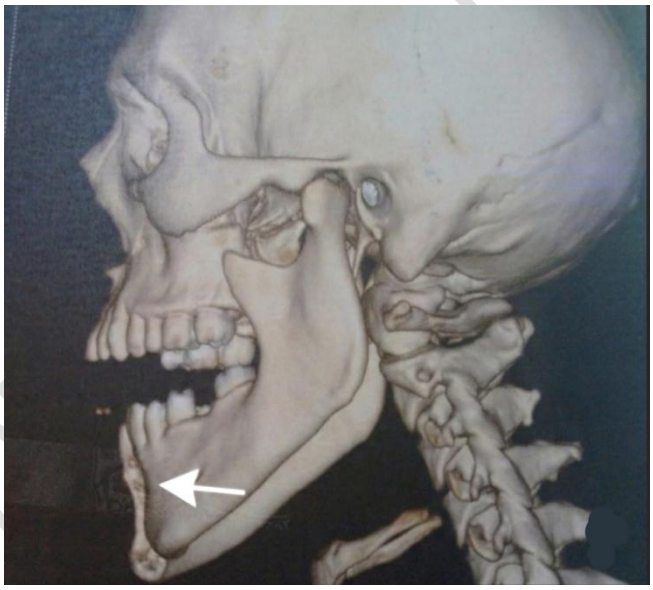

Figure 6 B: MDCT lateral view illustrating the a right parasymphysial, closed, unstable, fracture mandible (white arrow).

The decision was for simultaneous closed reduction fixation for both fractures.

3. Surgical procedure

3.1. Patient position: Supine with extended neck and head titled backwards by a billow (please clarify pillow or billow)beneath.

3.2. Anesthesia: General anesthesia was induced via nasotracheal intubation for free access to the oral cavity.

3.3. Securing the air ways: An oral pack i.e., a piece of gauze was inserted in the oropharynx securing the airways against aspiration by saliva and blood during the surgical procedure.

3.4. Procedure: Before starting our procedure, the sutures of the previously mentioned two sutured facial wounds were removed and fine cosmetic repair was done using thinner suture materials. The zygoma was closely reduced using a surgical hook (Figure 7) inserted below the lower border of the right zygomatic bone achieving both reduction of the fracture as well as releasing the trapped mandibular condyle. The hook was inserted through puncture incision at the lower border of the zygoma which was sutured after reduction using a single non-absorbable suture material (Figure 8). Due to the stability and minimal displacement of the zygomatic ZMC fracture, ORIF was not indicated which is uncommon situation in such type of zygomatic fractures.

Figure 7: Langenbeck bone hook 7.75″ 197mm [11]
https://surgical.saharan.co.uk/wp-content/uploads/2016/08/S45.12250.jpg

Figure 8: Single suture closure of the surgical approach done by the hook.

Using digital manipulation, the displaced parasymphysial fractures were anatomically reduced, verifying the restoration of proper occlusion and mandibular symmetry. Stainless steel arch bars were adapted and secured to the maxillary and mandibular dental arches using 0.5 mm trans-dental wires. IMF was achieved with elastic traction stretched between the hooks of the upper and lower arches in order to maintain the reduction (Figure 9). The used instruments used for closed reduction; arch bars, 0.5 mml(spell check) wires, wire holder and wire cutter are illustrated (Figure 10A, B, C, D).

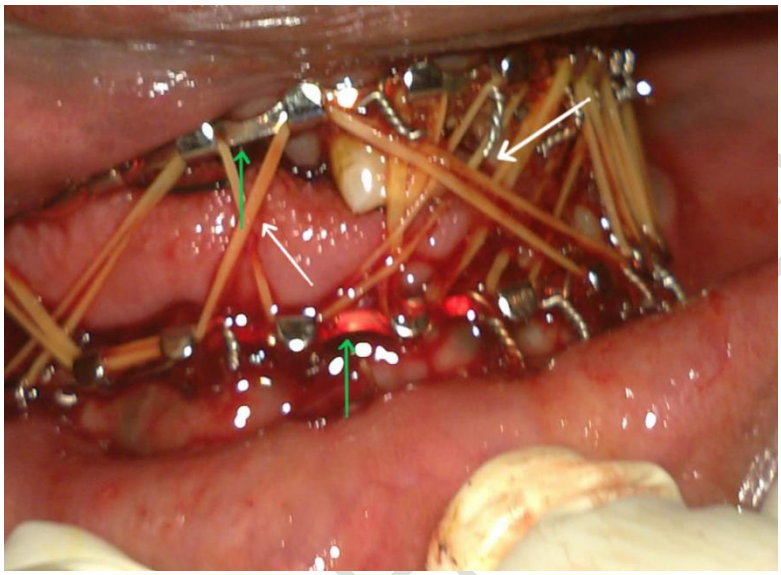

Figure 9: IMF; Arch bars (green arrows), Elastics (white arrow)

Figure 10A: Arch bars [12]
https://share.google/OXI1fRrzaOWokGeW0

Figure 10b: 0.5 mml wires [13]
https://share.google/KfMS8Konwkk0JTtvx

Figure 10c: Wire holder [14]
https://surtex-instruments.com/product/wire-ligature-cutter/

Figure 10d: Wire cutter [15]
https://www.gdcdental.com/product-wire-twister-1165.php

The oral pack was removed. Anesthetic reverse was administrated.
Operative-time: 30 minutes.

3.5 Follow-up and Outcomes

The patient had a smooth recovery. Oral fluids were started 4 h postoperatively using a 50 ml syringe through the retromolar space. A postoperative panoramic radiograph confirmed satisfactory alignment and normal occlusion.

During the postoperative hospital admiration(admission), the patient continued his oral feeding by the same maneuver with addition of blindered semisolids starting from the 2nd day. Furthermore, the patient was instructed for regular oral hygiene, avoid removal 0f the elastics as well as avoid leaning and sleeping on the right side guarding against the possibility of zygomatic immobilization even minimal.

The patient was discharged on the 5th postoperative day with no immediate complications. The patient was instructed to maintain oral feeding in the same maneuver, avoiding removal of elastic materials, maintaing regular oral hygiene and for attending scheduled follow-ups at the outpatients' clinic.

At the 2nd week of the postoperative period, the patient attended the outpatients' clinic, no complications were recorded. The elastics had been removed. One month later, the arch bars have been removed. The patient attended a monthly visit for 6 months, until bone healing was achieved with no complications neither recurrence, till he was referred to an orthodontic(spell check and why orthodontist for replacing the teeth) to replace his lost teeth.

4. DISCUSSION

Management of facial fractures depends on the location, displacement, and functional impact. Mandibular fractures can be treated with either closed reduction using intermaxillary fixation (IMF) or open reduction and internal fixation (ORIF) with plates and screws [16]. In this case, closed reduction was sufficient, as proper occlusion provided adequate stability, demonstrating that arch bars and elastic traction can effectively restore alignment in parasymphysial fractures [17]**.** Zygomaticomaxillary complex fractures, which often accompany mandibular injuries, require careful reduction to maintain facial contour, orbital integrity, and occlusion. Minimally displaced zygomatic fractures may be managed conservatively or with closed techniques, whereas displaced or comminuted fractures often

need ORIF [18]. Teeth and dental occlusion play a key role in achieving functional alignment, and careful management facilitates both immediate stabilization and future restorative procedures. This case illustrates that, with proper planning and technique, closed reduction can successfully restore both mandibular and zygomatic anatomy, occlusion, and facial aesthetics [19].

5. CONCLUSION

This case highlights the typical presentation and effective management of combined mandibular and zygomatic fractures in a young adult male following high-energy trauma. Comprehensive preoperative assessment, including clinical examination and advanced imaging such as multidetector CT, allowed accurate identification of fracture patterns and displacement. Timely intervention using closed reduction for the mandible and zygoma successfully restored dental occlusion, midfacial contour, and orbital alignment, while minimizing surgical morbidity. Early management is crucial to prevent long-term complications, including malunion, persistent malocclusion, enophthalmos, diplopia, infraorbital nerve dysfunction, and cosmetic deformities. The case underscores the importance of integrating functional, aesthetic, and dental considerations in the management of complex facial fractures to optimize both outcomes and patient quality of life.

COMPETING INTERESTS

The authors declare that they have no competing interests.

CONSENT (WHERE EVER APPLICABLE)

Written informed consent was obtained from the patient for publication of this case report and accompanying images. All procedures were conducted in accordance with institutional ethical standards and the Declaration of Helsinki.

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

This study was conducted in accordance with ethical standards and principles of the Declaration of Helsinki. Ethical approval was not required for this case report as per institutional guidelines; however, all procedures performed were in accordance with accepted clinical practices.

DEFINITIONS, ACRONYMS, ABBREVIATIONS

ZMC: Zygomaticomaxillary Complex

ORIF: Open Reduction and Internal Fixation

CT: Computed Tomography

CBCT: Cone Beam Computed Tomography

IMF: Intermaxillary Fixation

TMJ: Temporomandibular Joint

APPENDIX

NO ADDITIONAL DATA, MATERIALS, OR SUPPLEMENTARY INFORMATION ARE PROVIDED IN THIS STUDY.

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