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Case Report

A paradigm in panfacial fracture treatment to improved dental occlusion☆

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ABSTRACT

Introduction: The prevalence of maxillofacial fractures is rising due to increased road traffic accidents, necessitating prompt and effective management, especially in cases of panfacial fractures. The primary objective in treating such fractures is to restore occlusion and stabilize midface buttresses and pillars.

Case report: This article presents the case of a 56-year-old male who sustained panfacial fractures following a road accident, exhibiting symptoms including facial pain and nosebleeds. The treatment involved the use of arch bars for dental occlusion. Post-operative recovery was complicated by silent aspiration, successfully managed with a tracheostomy. After one month, the patient showed symmetrical facial features with no abnormalities.

Conclusion: It is crucial to weigh the benefits and limitations of Maxillomandibular Fixation in relation to the specific fracture types. This case underscores the potential of arch bars in improving outcomes for patients with complex facial fractures.

Introduction

The maxillofacial skeleton is particularly susceptible to trauma and fractures due to its prominent position and complex structure [1]. Panfacial fractures, which involve the upper, middle, and lower regions of the maxillofacial skeleton, require immediate and effective management. High-energy impacts to the head can significantly increase the risk of concurrent injuries to critical areas such as the orbits, brain, and spine [2].

The management of panfacial fractures poses a significant reconstructive challenge. Treatment objectives include restoring the premorbid dental occlusion, promoting proper healing of bony fractures, maintaining adequate mouth opening, and achieving these goals with minimal morbidity and cost [2,3]. A key aspect of managing panfacial fractures is re-establishing the occlusal relationship, which involves accurately positioning the occlusion and the mandibular-maxillary unit in relation to the skull base. This approach facilitates the restoration of spatial relationships and the stabilization of midface buttresses and pillars [3,4].

In this article, we present a case of a panfacial fracture treated with the integration of arch bars to improve dental occlusion,

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highlighting the benefits and considerations of this approach in complex maxillofacial trauma management.

Case report

A 56-year-old male was involved in a motorbike accident. He was struck by another motorcycle attempting to overtake a car, causing him to be thrown and impact his face on a road divider. Despite wearing a half-face helmet, he remained conscious but experienced significant pain in his cheek, lip, and left eye area, along with bleeding from his nose and mouth. He was initially transported to Krakatau Hospital for facial surgery but was referred to Cipto Mangunkusumo General Hospital (RSCM) due to difficulties with intubation (Fig. 1).

Upon assessment at RSCM, the patient was conscious, cooperative, and oriented, with a Glasgow Coma Scale score of 15. Clinical examination revealed generalized facial edema, bilateral lagophthalmos (2 mm in the right eye, 1 mm in the left), orthophoria, and a visual acuity of 3/60. Subconjunctival bleeding was noted in the left eye, along with malar depression in both nasal regions. The right maxilla showed edema, crepitus, and a floating sensation, while the mandibular area exhibited lacerations and crepitus. Intraoral examination revealed anterior and posterior open-bite malocclusion, with a laceration near the right lip and a separation of the palate. Laboratory results indicated leukocytosis (15,500/mm^3). A pre-operative CT scan revealed bilateral Le Fort type I fractures, septal fractures, bilateral condyle fractures, a mandibular symphysis fracture, and zygomatic fractures (Fig. 2).

The operation involved multiple specialties, including ENT Plastic Reconstruction, ENT Larynx Pharynx, Oral-Maxillofacial Surgery, and Anesthesia, requiring submental intubation. The Oral-Maxillofacial Surgery Division initiated maxillomandibular fixation (MMF) with arch bars, followed by dental procedure including debridement and extraction of the left central maxillary and mandibular incisors due to indication of Le Fort I fracture. Additionally, the right maxillary lateral incisor and right maxillary canine were intruded and, due to extensive damage we extracted. The left maxillary central incisor was avulsed. Tooth vitality of the remaining undisturbed teeth was found to be normal on physical examination. Following this, open reduction internal fixation (ORIF) of the mandible using plates and screws (numbers 8, 10, and 12). Arch bars were secured with wires to maintain occlusion during reconstruction.

Once occlusion was achieved, an incision was made from the preauricular region, and blunt dissection revealed fractures in the left condyle region, where two plates and screws (numbers 6 and 8) were installed. The same procedure was performed on the right condyle. ENT Plastic Reconstruction then performed open reduction internal fixation of the maxilla with miniplates, with the arch bar locked in place using wires. Incisions were made from the gingivobuccal mucosa to the maxillary periosteum, followed by mucoperiosteal flap elevation. Multiple plates and screws (numbers 4, 5, and 6) were used to stabilize comminuted fractures in the maxilla and zygoma (Fig. 3).

Five days post-operatively, the submental anesthetic tube was removed, and a tracheostomy was performed due to silent aspiration and sputum retention. Eighteen days later, the tracheostomy cannula was accidentally dislodged by the patient. Fortunately, the patient's condition remained stable, and there was no desaturation. The patient was treated in the ICU for 25 days. On the third post-operative day, the wire fixation was removed due to airway issues and poor oral hygiene, but the arch bar was maintained until six weeks post-operatively.

One month and eight months after surgery, the patient's face appeared symmetrical, with no facial edema or malocclusion, and no abnormalities were found in either eye (Figs. 4 and 5).

Fig. 1. Clinical photos of the patient before surgery.

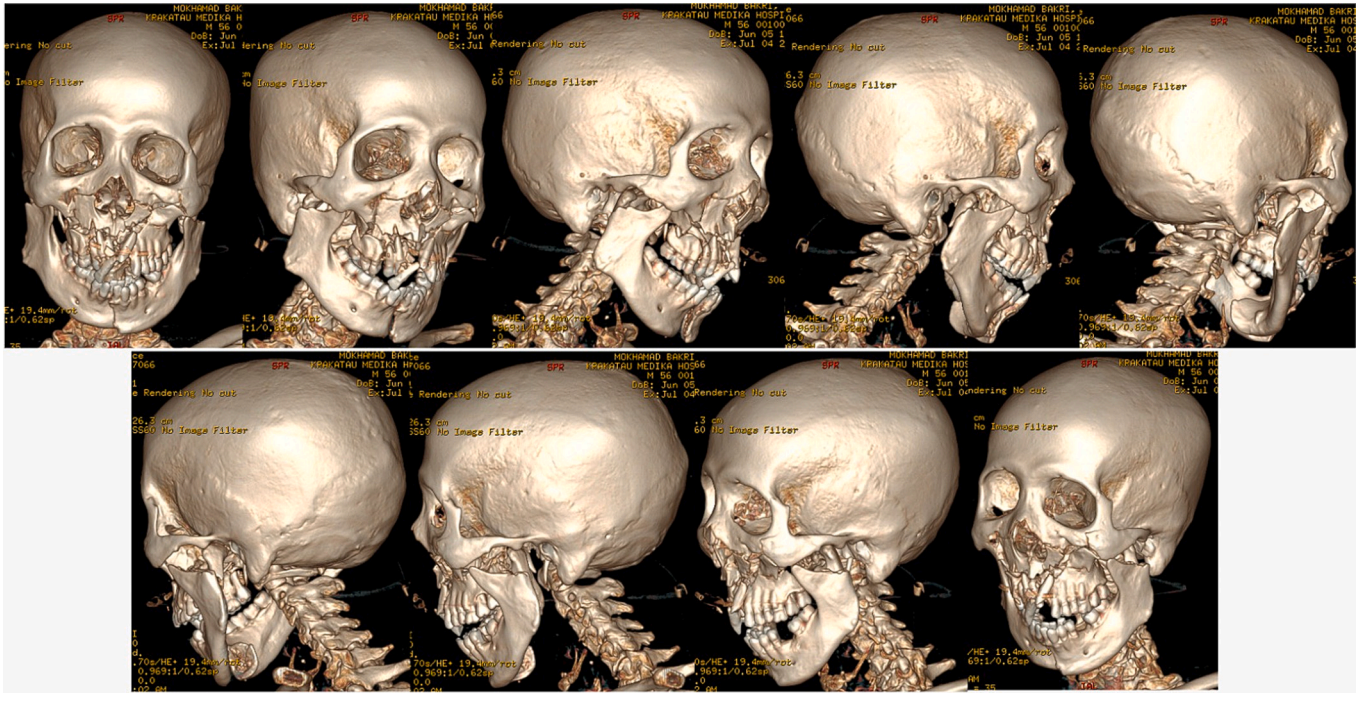

Fig. 2. Pre-operative CT-scan.

Fig. 3. Post-operative CT-scan.

Discussion

This case report highlights the common clinical features of panfacial fractures, such as difficulties in mouth mobilization, diffuse pain, and generalized swelling. A critical aspect of managing such fractures is the restoration of tooth occlusion, which is essential for proper chewing function. In this case, successful reconstruction was achieved through open reduction internal fixation with miniplates, supported by an arch bar for occlusion restoration.

Fig. 4. Clinical photos of patient 1 month after surgery.

Fig. 5. Clinical photos of patient 8 months after surgery, showing the use of dental prosthetics.

Maxillomandibular fixation (MMF) aims to restore pre-traumatic occlusion, either intraoperatively or postoperatively [5]. Two commonly used methods of MMF include intermaxillary screws (Gilmer's method) and arch bars (Dingman's method). Intermaxillary fixation (IMF) stabilizes mandibular or maxillary fractures by attaching wires and screws, while arch bars are stiff bars or wires used to stabilize teeth and implants, aiding in fracture healing. Arch bars, often considered the gold standard in MMF, serve various purposes, including temporary stabilization of fragments in emergencies and long-term fixation in cases of alveolar crest fractures and avulsed teeth. Their efficacy and superior occlusal stability make them the preferred method [4,6].

Several meta-analyses have reported no significant differences between arch bars and IMF in terms of occlusal stability during the trans- and postoperative periods, as well as plaque index [5,7]. However, Fernandes et al. noted advantages of screws, including shorter installation and removal times, as well as a lower puncture risk compared to arch bars. Regarding iatrogenic injuries such as loss of tooth vitality and sensitivity, tooth morbidity, and root damage, arch bars pose a lower risk compared to IMF screws. The findings should be interpreted cautiously due to the low quality of studies and high heterogeneity in several analyses [7].

We acknowledge the limitations in our study. First, follow-up radiographic imaging, such as CT scans, was not conducted, which restricts our ability to assess post-treatment outcomes comprehensively. Additionally, the extraction of damaged teeth prevented us from evaluating their vitality, although the remaining undisturbed teeth exhibited normal vitality on physical examination. Lastly, we did not have access to dental radiology to assess the pulp condition of these teeth. These limitations have been addressed in detail in the limitations section of the manuscript.

Conclusion

In conclusion, the integration of arch bars in the treatment of panfacial fractures demonstrates significant benefits in terms of occlusal stability and fracture healing. This case underscores the effectiveness of using arch bars in combination with open reduction internal fixation with miniplates to achieve optimal functional and aesthetic outcomes. While both arch bars and IMF screws have their merits, arch bars remain the preferred method for many clinicians due to their superior stability and lower risk of iatrogenic injuries. Future studies should focus on long-term outcomes and the application of these methods to different types of panfacial fractures to further refine treatment protocols and improve patient care.

CRediT authorship contribution statement

Dini Widiarni Widodo: Writing – original draft, Funding acquisition, Conceptualization. **Mirta Hediyati Reksodiputro:** Data curation. **Fateha Putri Hakim:** Data curation. **Syahrial Marsintha Hutauruk:** Visualization. **Eky Nasuri:** Validation, Supervision. **Raden Ayu Anatriera:** Resources. **Regina Talitha Rosa:** Writing – review & editing. **Deta Hamida:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tcr.2025.101125.

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