

Emergency Treatment of Multiple Fractures of Maxillofacial Bone: Case Report

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Abstract: Multiple fractures of maxillofacial bone due to trauma require immediate treatment because it may cause fatal airway bleeding and obstruction by foreign objects or dental and bone fragments. The purpose of this case report is to describe emergency treatment in multiple fractures of maxillofacial bone cases due to trauma. Case report: Three patients had physical trauma in the maxillofacial area with multiple fractures affecting nasal bone, maxillary bone, zygomatic bone, mandible bone, and alveolar bone associated with soft tissue injury. Emergency treatment includes treatment of bleeding, debridement, as well as fixation and transient immobilization of fracture fragments using interdental wiring with Erich arch bar. Conclusion: Emergency treatment in these three cases may prevent airway bleeding and obstruction because the fracture fragments were maintained to prevent movement or shifting and to prevent worsening of maxillofacial fractures condition.

Keywords: emergency treatment, multiple fractures, maxillofacial bone, Erich arch bar

1. Introduction

Trauma affecting maxillofacial area involves injuries in soft tissues and bones constructing the maxillofacial structure. Those bones are nasoorbital bones, zygomaticomaxillary bones, temporal bone, and mandible bone [1]. Retrospective data at Oral and Maxillofacial Surgery Clinic I Cluj-Napoca showed the incidence of zygomatic complex fracture of 43.06%, nasal bone fracture of 19.75%, alveolar bone fracture of 8.54%, orbital bone fracture of 30%, Le Fort II fracture of 6.94%, Le Fort III fracture of 6.23%, anterior maxillary sinus wall fracture of 5.16%, and Le Fort I fracture of 3.02%. Fractures of maxillofacial bone may occur without shifting of fracture fragment or movement of extended fracture fragment, associated with significant morphological change, impaired function, and cosmetics [2].

Complications may happen in maxillofacial trauma, either after the accident or after treatment. This depends especially on the extent of the injury, late management, false diagnosis, incorrect treatment plan, poor treatment, wrong choosing of fixation tools, inexperienced surgeon, and incapability in seeking help from other specialists. The purpose of a surgeon in trauma treatment is to return the condition of the patient into former anatomy and function before the accident, although in some cases they did not meet the expectation [3].

In several studies, malocclusion is the most common complication, followed by facial deformities, impaired temporomandibular joint (TMD), and neurological symptoms [4]. Complications after maxillofacial fracture surgeries were found in about 6.6%. The most commonly found complication was malocclusion (25%) and bone exposure (24%). Malocclusion and malunion (7%) occur as a result of poor reduction and fixation. Intermaxillary fixation plays an important role in overcoming this type of

complication. The risk of malocclusion and malunion was higher in patients who failed to adapt to the intermaxillary fixation. Late treatment associated with other factors may also increase the risk of infection and nonunion [5].

Diagnosis and management of maxillofacial trauma are challenges, especially in polytraumatic treatment in the emergency department [6]. Treatment of maxillofacial trauma includes facial bone fracture in the head and neck area, dentoalveolar trauma, and soft tissue damage [5]. Maxillofacial trauma is commonly accompanied by trauma in other organs, such as the head, spine, and upper or lower extremities that it increased the morbidity and the length of duration of treatment [5]. Early emergency treatment of maxillofacial trauma was crucial for preventing more severe complications and lowering morbidity and mortality. The purpose of writing this case report is to describe and evaluate the emergency treatment of multiple fractures of the maxillofacial bone.

2. Case Report

Case 1

A 30-year-old male patient came to the emergency department of Hasan Sadikin General Hospital with a chief complaint of bleeding from his mouth. About 22 hours before, the patient had a motorcycle accident, crashing with another motorcycle at high speed. When he fell from his motorcycle, his face hit the asphalt road first. The patient did not have a history of syncope and nausea or vomiting. From the extraoral examination, the face looked asymmetrical with edema and hematoma in orbital and right cheeks area and subconjunctival bleeding in the right orbital area (Figure 1). From the intraoral examination, the laceration wound appeared in the upper lip area with an irregular edge, 3 cm long, and muscle-based (Gambar 2). Occlusion showed anterior open bite malocclusion. Radiographic images

showed fracture line appearance in the right zygomatic bone, both condyle bones, and parasymphysis of mandible bone (figure 3). The diagnosis of this case was multiple fractures of the right zygomatic bone, both condyle bones, and parasymphysis of mandible bone. Emergency treatment undertaken was overcoming bleeding, wound debridement, intraoral suturing, and transient fixation of mandible bone with Erich arch bar wiring in mandible region 37-47 (figure 2).



Figure 1: Asymmetrical face, edema, and hematoma in orbital and right cheeks area



Figure 2: Intraoral images, laceration wound in the upper lip area with irregular edge, anterior open bite malocclusion, and transient fixation of mandible fracture



Figure 3: Radiographic images showed fracture line appearance in right zygomatic bone, both condyle bones, and parasymphysis of mandible bone

Case 2

A 25-year-old female patient came to the emergency department of Hasan Sadikin General Hospital, with a chief complaint of bleeding from her mouth and nose. About 5 hours before going to the hospital the patient fell while riding a motorcycle with medium speed, when another motorcycle suddenly came to her from the opposite direction and hit her, making her lose her balance and fell with the mechanism of her face hitting the pavement first. History of wearing a helmet (+), history of syncope (-), nausea and vomiting (-), bleeding from mouth and nose (+) bleeding from ears (-). From the extraoral examination, there were swellings and hematoma in the right orbital and chin regions, laceration wounds in the right cheeks region with a size of 1.5x1.5x1 cm and irregular edge (figure 4). From the intraoral examination, there was a laceration wound at dental vestibulum 33-44 sized 4x2x1 cm with irregular edge and

laceration wound at dental gingiva 13-22 sized 3x1x0.5 cm, posterior open bite malocclusion (figure 5). Radiographic images showed the appearance of the fracture line at the nasal bone region, right and left zygomatic, maxillary, and parasymphysis of the mandible (figure 6). Diagnoses of this case were multiple fractures of the nasal bone, right and left zygomatic, maxillary, parasymphysis, and fracture of dentoalveolar region 31-41 at the mandible. Emergency treatment performed on this patient was overcoming bleeding, wound debridement, intraoral suturing, and transient fixation of fractures of the mandible and maxillary bones with Erich arch bar wiring (figure 6).



Figure 4: Extraoral clinical manifestations, swelling, and hematoma at the right eye and chin regions, laceration wound at the right cheeks region



Figure 5: Intraoral clinical manifestations, there was a laceration wound at dental vestibulum 33-44, and laceration wound at dental gingiva 13-22 with posterior open bite malocclusion

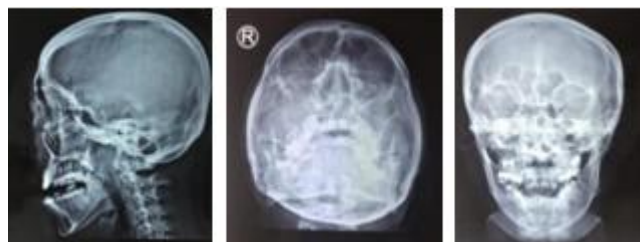


Figure 6: Skull x-ray and Water's x-ray radiographic images, radiographs showed that there was a fracture line at the nasal bone region, right and left zygomatic, maxillary and parasymphysis



Figure 7: After emergency treatment, debridement, wound suturing and transient fixation with Erich arch bar at the maxillary and mandible

Case 3

A 23-year-old male patient came to the emergency department of Hasan Sadikin General Hospital with a chief

complaint of bleeding from his mouth. The patient fell from a building of ± 10 meters in height while working at a building construction site and fell with the mechanism of the face hitting the ground first. The patient had a history of syncope for ± 1 hour. From the extraoral examination, there were swelling and hematoma at the left cheeks region, asymmetrical face with an abrasive wound on the face (figure 7). From the intraoral examination, there was a laceration wound at the upper lip region and gingiva region 21-25, 32-42 with irregular edge, and open bite malocclusion (figure 8). Radiographic images showed a fracture line at inferior orbit, left zygomatic, maxillary, and dentoalveolar fracture at dental 32-42,41 with a segmented dentoalveolar fracture at dental 32-42 and dental avulsion 41 (figure 9). Diagnoses of this case were multiple fractures of the left orbital bone, temporal, left zygomatic and maxillary bones. The emergency treatment performed was wound debridement, intraoral extraoral suturing, transient fixation using Erich arch bar wiring at the region 15-25, and mandible 34-44 (figure 10).



Figure 8: Extraoral clinical manifestations showed edema and hematoma



Figure 9: Intraoral clinical manifestations showed malocclusion



Figure 10: Radiographic images showed a fracture line



Figure 11: Transient fixation using Erich arch bar wiring at the maxillary region 15-45, dan mandible 34-44

3. Discussion

According to several studies, in developed countries, an assault was the main cause of facial fracture, followed by motor vehicle accidents, exercise, and industrial accidents. The most common cause in poor developing countries was traffic accidents followed by assault and other reasons, including war [6,7]. The first and second cases of this report showed that the cause of the trauma was a traffic accident, while in the third case was caused by a work accident. Even though the causes were different, this physical trauma gives rise to severe maxillofacial fracture affecting some bones forming the face.

Multiple fractures affecting the maxillofacial bone may become life-threatening if it is not immediately treated. Fracture in this facial region may cause bleeding that may obstruct the airway through the nose or mouth. The maxillofacial area comprises of organs performing important functions, such as breathing, speaking, chewing, seeing, smelling so that special attention must be given if facial trauma happens. Besides blood, foreign objects entering the mouth, detached tooth, and shifting of maxillary or mandible bone fragments may obstruct managing breathing. The principles of Advanced Trauma Life Support (ATLS) must be applied for early evaluation of all maxillofacial injury victims as in this trauma patient [6].

In maxillofacial trauma, airway evaluation is an important part of clinical evaluation. Upper airway obstruction may be caused by bleeding, edema, unfavorable or comminuted fracture, and foreign objects, such as a denture. Clearing the airway must be taken care of before the evaluation / other treatments as written in ATLS guidelines. Clinical and radiographic examination are the gold standards in diagnosing, planning, and managing maxillofacial fractures. [7].

After clearing the airway and taking care of breathing problems, attention must be given to the circulation. Maxillofacial injury is very susceptible to massive bleeding, and life-threatening bleeding varying from 1.4% to 11%. One of every ten complicated facial fractures bled significantly. In most cases, bleeding may be controlled easily, but in some severe epistaxis cases ranging from 2% to 4% of all facial trauma, emerging from a maxillary artery, causing difficulty in controlling bleeding [8]. In these three trauma cases, the blood came out of the nose and mouth. These three may be taken care of with pressure, suturing, electrocautery, nasal pack application, reducing fracture fragment mobility manually, balloon tamponade, and in severe cases with angiography followed by transarterial embolization or in several other cases with the direct external carotid artery [8,9,10].

Emergency treatment of Oral and Maxillofacial Surgery in these three patients include general treatment of the associating complications, thorough clinical examination, precise Rontgen image interpretation, deciding the fracture type. Treatment was conducted as soon and fast as possible with minimal intervention to the upper jaw to prevent more severe bleeding and persistent leakage of cerebrospinal fluid if a cranial base fracture occurs and to prevent infection

either in maxillofacial area or meningitis. Soft tissue and hard tissue treatment with debridement, performing reduction, fixation, and transient fracture immobilization using Erich arch bar wiring, pain management, and antibiotic administration simultaneously [11].

In these three cases, treatment of soft tissue injury comprises of irrigation with normal saline and removing small foreign debris to prevent infection. Necrotic tissue was then detached conservatively using sharp debridement while maintaining as much soft tissue as possible, especially in a facial special area. Wound closing must be optimal soon after the patient is stable. Closing in 12 hours period, or ideally in 6 hours, lowering infection rate, improving cosmetic results, and preventing swelling that may remove facial wrinkles. The wound could not be closed if there were too much tension on the wound or if more complex closing was needed [10,12]. Some small injuries on the face may be managed effectively using simple suturing in the emergency department. If the evaluation of wound closing was possible to achieve through suturing, it will produce optimal cosmetic by bringing the wound edges close and parallel as accurate as possible. The tissue must be closed or sutured layer by layer and cartilages or bones exposed were closed with soft tissue [10].

Fixation and transient immobilization in all of these cases were soon undertaken using Erich arch bar wiring so that the unstable bone fragments did not impair breathing. Erich arch bar wiring is the most commonly used intermaxillary fixation method before using the ORIF method [13]. Erich arch bar is stainless steel that can be formed or manipulated, making it effective, faster, and easier when it is fixed [14]. Before plates and screws were developed for facial fracture fixation, most of the maxillofacial fractures were treated almost exclusively with closed reduction using intermaxillary fixation. Erich arch bar wiring was considered as the gold standard method of intermaxillary fixation for it supports occlusal stability better than other available methods. The time needed for intermaxillary fixation was about four to six weeks, and the intermaxillary fixation method must be stable during this period [13].

On the other side, in several clinical situations, such as unstable or doubted bone fractures with ORIF quality, intermaxillary fixation must be performed longer after surgical procedure. The use of Erich arch bar wiring showed better results when a longer intermaxillary fixation was needed. However, a recent study has reported some weaknesses of the use of Erich arch bar wiring, such as long surgical duration, braces injury, high plaque index, periodontal damage, dental movement in a lateral and extrusive direction [13,14]. Transient IMF is the most important component to reduce and stabilize fracture so that it achieves dental occlusion [6]. Several IMF techniques have been developed from time to time, but Erich arch bar has been relied on for maxillofacial fracture treatment up until now since World War I [15].

4. Conclusion

Multiple fractures of maxillofacial bone due to physical trauma require special fast and precise treatment for it may

be life-threatening. Basic principles in the management of maxillofacial trauma in the emergency department are maintaining the airway and overcoming the bleeding. Emergency treatment of maxillofacial trauma that may be conducted after the patient is stable includes wound debridement, wound closing, transient fixation immobilization of fracture fragment to prevent the return of bleeding and airway obstruction. The use of Erich arch bar wiring for fixation and immobilization of maxillofacial bone fracture fragment was very effective to perform in the emergency department.

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