

Management of Multiple Fractures of the Maxilla and Mandible with Closed Reduction: A Case Report

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Abstract

Introduction: Multiple fractures are a condition where there is a discontinuity of the facial bones that include mandible, maxilla, nasal, zygoma, palate, frontal and orbital. Treatment methods of multiple fractures are either a closed reduction or open reduction.

Objective: To explain the management of multiple fractures of the maxilla and mandible using closed reduction.

Case: A 23 years old male patient came to the Emergency Department after getting involve in motorcycle accident. Patient came with bleeding from the mouth, as a result of falling and hitting his face on the asphalt. Floating right segmental maxilla with palate fracture, mandible symphysis fracture and malocclusion were identified. Patient also complained of pain and swelling at the region of fracture and lip along with lacerated wound at nasolabial, palate, lower lip and gingival.

Case Management: The lacerated area is then sutured both intra and extra orally followed by the application of closed reduction in maxilla and mandible with intermolar and interdental wiring at upper and lower jaw. Follow up visit was plan ten-month post treatment. The closed reduction method successfully fixating the multiple fractures of the maxilla and mandible, resulting in stabilization and healing.

Conclusion: The management of multiple fractures of the maxilla and mandible by using closed reduction method revealed centric occlusion and stability of maxilla and mandible.

Keywords: Multiple Fractures, Maxilla, Mandible, Closed Reduction.

Introduction

Multiple fractures has the highest incidence caused by traffic accidents, among them Le Fort I has percentage. Unlike previous studies that stated mandibular fractures are the most common multiple fracture due to traffic accidents among motorcyclists. The number of nasal fractures, unilateral fractures, Le Fort I and Le Fort II fractures, zygomatic and alveolar fractures, zygoma complex and Le Fort III fractures comes next after mandible fractures. In the study of Irma

et al, there are more multiple fractures than mandibular fractures. According to him, the most common etiology of maxillofacial fractures is traffic accidents, followed by accidents related in workplace such as, falling.¹

In maxillary fractures, mobility and malocclusion are the hallmarks. Occlusal disturbances are usually subtle, bilateral eyelid ecchymosis is usually the only physical finding. Early complications of maxillary fractures are usually

in the form of extensive bleeding and airway obstruction due to displacement of fracture fragments, edema, and soft tissue swelling. Facial appearance may also change (elongated, retrusive).²

In mandibular fractures the chief complaint are usually pain, abnormal occlusion, numbness in the distribution of the mental nerve, swelling, bruising, bleeding from the tooth socket, fractured or missing teeth, trismus, and inability to chew. Ecchymosis and swelling usually can be seen above the fracture site. Complications of mandibular fracture are infection or osteomyelitis which can lead to various other complications. Some of the cause of complications are infection, poor positioning, lack of immobilization of the fracture segment, the presence of foreign bodies, muscle traction on the fracture segment. Severe malunion of the mandible will result in facial asymmetry and impaired function.³

The goal of treatments is to restore the anatomy and function of the bones and soft tissues in the shortest time with the least risk. Treatment should be done as early as possible to get maximum results. The difficulty to obtain optimal results are usually repositioning the fragments into the correct anatomical position, good positioning between the two fragments during the healing period, and immobilization. The treatments require skills and accuracy to carry out each stage of repositioning, immobilization, fixation and mobilization properly. The benefit is, if successfully done, it can restore the patient's confidence and leaving no disability. This matter is causing a debate because the time of treating the fracture post accidents depends on many factors. In general, the sooner the wound is treated, the better the outcome. Research shows that the longer a wound is left open and untreated, the more likely it is to develop infection and malunion. The main consideration for treatment method is whether it is a closed or open fracture.

Treatment using intermaxillary fixation (IMF) or otherwise known as closed reduction since there is no direct opening and manipulation of the fracture area. The IMF technique most widely used is the use of the arch bar.⁴

Closed reduction refers to reduction of the fracture segments to their previous anatomic and functional position by manipulation without direct visualisation of the fracture. Healing of the bone occurs by secondary intention with callus formation. The ultimate goal of treatment is to re-establish the preinjury dental occlusion (bite), mandibular anatomy and jaw function of the patient. Closed reduction and maxillomandibular fixation may be performed using splints in the form of bonded orthodontic brackets, arch bars, direct wires or eyelet wires.^{3,4}

This case is considered a rare case, this paper report aims to provide information on how to successfully treat multiple fractures of maxilla and mandible using of the close reduction method using intermolar wiring and interdental wiring of the maxilla and mandible.

Cases

A 23-year-old male attended the Hasan Sadikin Hospital of Bandung complaining chiefly of with bleeding from mouth. About 6 hours prior to admission, when the patient was riding a motorcycle at Passomala Subang area, suddenly a motorcycle came from another direction and hit him caused he lost his balance then fell down with mechanism his face hit the asphalt first. There was no history of using helmet, unconsciousness, bleeding from nose, bleeding form ear and alcohol intoxication. There was nausea and vomiting, bleeding from mouth. Then the patient was brought to General Hospital at Subang area, but nothing was perform there and directly referred to Hasan Sadikin Emergency Department for further treatment.



Figure 1: Extraoral clinical examination showing facial asymmetry

Extraoral examination confirmed facial asymmetry, oedema and hematoma at forehead and lower jaw region (Figure 1). Lacerated wound at nasolabial region with 1x1x0,5cm in size, irregular edge, muscle based. Multiple abrasive wounds at facial region. Intraoral examination confirmed lacerated wound at lower lip region with 2x1x0,5cm in size, irregular edge,

muscle based. Lacerated wound at gingiva of teeth 32-42, 11 regions with 4x0,5x0.5cm in size, 1x0,5x0,5 cm in size, irregular edge, bone based. Lacerated wound at palate region with 3x0.5x0.5 cm in size, irregular edge, bone based (Figure 2 and 3) there was an anterior open bite with 3rd grade mobility at 32 tooth.



Figure 2: Demonstrating lacerated wound at lower lip, gingiva and palate, in addition to fracture with displacement in regions 32 and 33 and one overlapping mandibular incisor



Figure 3: Demonstrating lacerated wound at upper lip, gingiva and palate, in addition to fracture post debridement.

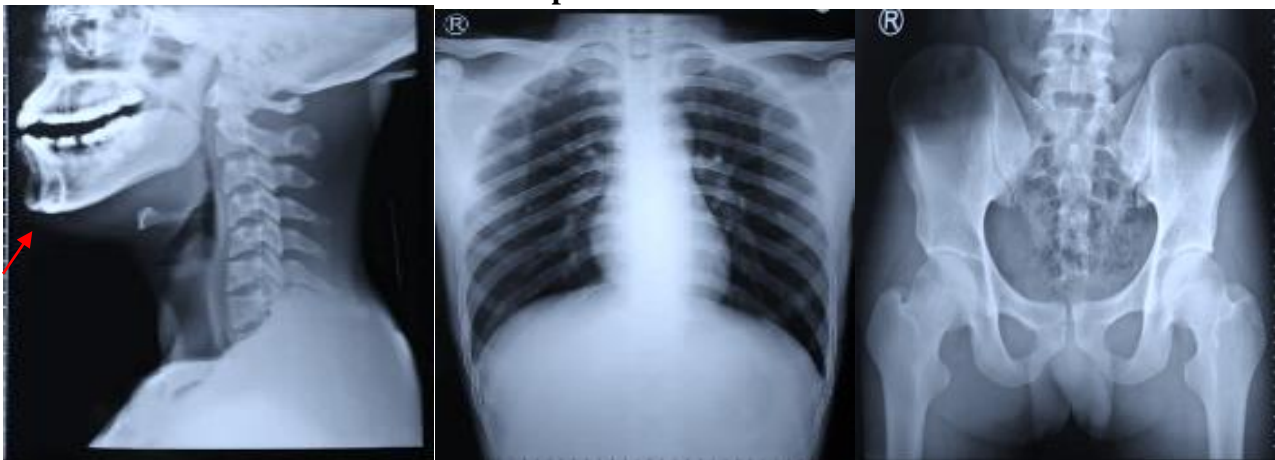


Figure 4: Cervical, chest, and pelvic - x ray of the patient is normal, Visible discontinuity of symphysis of mandible bone



Figure 5: Skull AP-Lateral X-Ray indicating discontinuity of symphysis of mandible bone.

The patient was diagnosed with right segmental maxilla, palate, mandibular symphysis and parasymphysis fractures. Management patient with closed reduction was performed using an intermolar wiring in the teeth 16 to 26 regions, interdental wiring at upper jaw 16-26 and lower

jaw 36-46 to reposition bone fragment during the first three days. During the subsequent three days, the traction direction was changed first to anterior and then to medial until the 20th day. The IMF was subsequently changed using wire in the anterior and posterior region up to the 34th day,

which was then replaced by elastic bands up to the 48th day. At that point, the IMF was removed, and the patient instructed to perform mouth opening and closing exercises in addition to

following a soft diet for the ensuing two weeks. On the 86th day, the subject presented no facial asymmetry (Figure 7) and normal occlusion (Figure 8).



Figure 6: Intraoral clinical examination demonstrating lacerated wound at lower lip, gingiva and palate, in addition to fracture post treatment.



Figure 7: No facial asymmetry



Figure 8: Intraoral clinical examination on 12th week showed normal occlusion without anterior and posterior open bite.

Discussion

This patient had an accident causing fractures in maxillary, palate and mandible regions. The maxillae have four processes: frontal, zygomatic, alveolar and palatine. The maxillae are designed to absorb the masticatory forces. The midface acts as a 'matchbox' located below and ahead of the brain. These fragile bones are surrounded by thicker bones of the facial buttress system responsible for strength and stability.^{7,8}

Factors that are considered in the selection of patient care are patient age, patient cooperation, duration of trauma, treatment, location of trauma, severity of trauma, condition of bone and periodontal tissue around the trauma. The associated palatal fracture could be any of the Hendrickson classification patterns.⁸ In this patient, the palate fracture was a para alveolar fracture.

In this patient, fractures occurred in the right segmental maxilla, palate and mandibular symphysis. Mandible as a single bone has many areas of weakness where the fracture is more likely to occur. Symphysis fusion of two bony halves of mandible occur in the symphysis at the age of 12 months, making them more vulnerable, fractures occurring within the area of the midlife of the mandible.^{5,6}

Mandibular fractures were treated with closed reduction and a course of prolonged maxilla

mandibular fixation. Therefore, anatomic reduction must be accomplished earlier and immobilization time should be shorter.⁷ The early healing of fractures occurs with significant subsequent remodeling under the influence of the forces of mastication.⁸ The recovery is good but the patient comes control not on time because the location of his house is far. We chose to perform closed reduction because it was sufficient to manage the fracture; therefore, we did not have to perform surgery in the operating room. In addition, closed reduction allows manipulation of the fracture segments from dental occlusion without direct visual access.^{3,4}

Indications for use arch bar in this case because cases is simple dentoalveolar fractures or where multiple toothbearing fragments in either jaw requires reduction into an arch form before intermaxillary fixation is applied. The wiring techniques are simple and rapid immobilisation of the alveolar segments utilising the teeth for support is used direct interdental wiring and Arch bars. Stabilisation with arch bars give the best form of immobilisation.^{5,6}

Handling of mandibular fractures in the initial step is emergency following the ATLS (Advance Trauma Live Support) rules and evaluation of possible injuries. The second step is definitive treatment of fractures. The goal of fracture management is to restore occlusion, mechanical strength of the fracture area, and achieve maximum normal masticatory muscle function.

Integration of the fracture is one of the main targets for successful treatment other than occlusion.^{6,9} In this patient the occlusion was normal.

Secondary examination in this patient survey was carried out by the principle of head-to-toe examination from head to toe, supporting procedures such as radiological and laboratory examination could be done on this occasion. The examinations included anamnesis, extra oral physical examination, head and oromaxillofacial, and intra oral examination which covered the status localist and supporting tissues surrounding the teeth. The intra-oral examination showed fracture lines at the multiple regions.¹⁰

Emergency management of oral and maxillofacial surgery in these patients include general maintenance of the accompanied complications, a careful clinical examination, x-rays proper interpretation, determination of the type and kind of fracture. Furthermore, the treatment of soft and hard tissue injuries was done. Closed reduction, fixation and immobilization of fractures were performed using intermolar wiring and interdental wiring (IDW). Simultaneous pain management and administration of antibiotics were administered. Administration of prophylactic antibiotics, bed rest with head elevation of 30 degrees were conducted in order to avoid circumstances that could lead to sudden increased intracranial pressure such as coughing, straining, and sneezing.¹⁰

Patients with a young age and the high level cooperation may good the management of post-surgical instructions causing the healing becomes faster. On the other hand, wound healing can be faster because it is supported by the presence of tissue vascularization and a good supply of blood vessels on the face. Moreover, with the process of growth and adaptability in young man, repair of the damaged tissue and recovery of orofacial function in young man are better than in the adults.^{10,11}

Fractures with minimal displacement of bone can be treated with closed reduction and open reduction.¹⁰ The most important factor in deciding whether or not a mandible fracture requires a surgical intervention is the status of the occlusion, which can be abnormal in more than 80% of mandibular fractures. The occlusion can be evaluated by asking the patient if his or her bite has changed since the injury. If this basic information cannot be obtained, examination of wear facets or assessing old dental records can be helpful. Determining the type of occlusion prior to trauma is important, because the subsequent goal of any surgical intervention will be to restore the preinjury occlusion, even if the preinjury occlusion was abnormal.¹²

Standard treatments that were used to repair mandibular fractures in this cases were non-surgical and referred to as MMF, and in most adults mandibular fractures require 4 to 6 weeks of stabilization by means of jaw wiring.¹³ In general, patients with nondisplaced or minimally displaced fractures may be managed conservatively through a combination of close observation, soft diet, analgesics, and activity precautions.¹⁴ In this patient closed reduction is released at 12 weeks due to consideration of mobility grade 2 in his teeth,

Management of multiple fractures in this case. Patient who chose the closed reduction method treatment had to be capable of cooperating on the basis of a regular follow-up schedule and to evaluate previous treatment results to ensure that no unintended movement changes occurred. Therefore, closed reduction method in this cases produced encouraging results and it could be considered as an alternative to the treatment.¹⁵

Metabolic management in patient after surgery is no complex. Special attention should be given to the calories, fluids and electrolytes management, as well as blood transfusions. Management of comprehensive patient after oral and maxillofacial surgery is very important for better patient healing.¹⁰

Conclusion

Management of multiple fractures with closed reduction in the emergency department requires special cautions, precise treatment and timely procedure. Management of right segmental maxilla, palate and mandibular symphysis fractures in man aged of 23 years old with the perfectly erupted permanent teeth using closed reduction provides good healing results.

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