

Initial Treatment of Mandibular Fracture: Serial Case

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Abstract: *Patients with mandibular fractures should be given to the possibility of airway obstruction that can be caused by shifting of the fragment of the mandible itself or due to intraoral bleeding that causes blood aspiration. The purpose of this case report is to explain the initial treatment of mandibular fractures. There were four cases of mandibular fracture reported with various locations of the fracture line. All cases of wound debridement were performed and temporary treatment of fixation and immobilization of fracture using interdental wiring erich bar. All four cases after initial treatment were stable, and there were no complications.*

Keywords: Mandibular fracture, interdental wiring, debridement

1. Introduction

Mandibular fracture is defined as damage of bone structure in the mandible^[1]. Mandibular fracture line usually lie in the area involved, such as fractures of the symphysis, parasymphysis, corpus, ramus, angulus, condyle and coronoid. The percentage of mandible fractures caused by trauma due to traffic accidents is 50.8%, falling 22.3%, fighting 18.8%, accidents at work 2.8%, accidents while exercising 3.7% and other accidents 1.6%^[2].

In patients with the trauma of mandible fractures, attention should be given to the possibility of airway obstruction that can be caused by mandibular fracture itself or due to intraoral bleeding that causes blood aspiration. The fall of the tongue toward the back, mucus, blood, vomiting, and foreign objects can block the airway^[3]. Shifting of mandibular fracture fragments results in malocclusion in the form of open bite or crossbite and difficulty in opening the mouth wide, which results in difficulty in controlling breathing and swallowing. This certainly requires immediate treatment^{[4],[5],[6]}.

The mandible is moved primarily by the pterygoid and masseter muscles, which form pterygomasseteric slings and temporalis muscles, which enter the coronoid process. The movement is held by the bite and suprahyoid muscle, which consists of geniohyoid, mylohyoid, and digastric muscles. The lateral pterygoid muscle, which attaches to the mandibular intra-articular surface, also contributes to the opening of the mandible. TMJ acts as a fulcrum and is loaded during mastication and occlusion. When a fracture of the mandible has happened, the opposing forces of the elevator and depressor create a zone of maximum tensile force at the superior limit and an area of lower maximum compression. In the symphyseal region, lateral traction of the masseter muscles and infrahyoid depressors creates torque moments, so, bilateral mandibular fractures can result in airway obstruction^{[4],[6]}.

Treatment of mandibular bone fractures requires certain considerations compared to other fracture treatments^[1]. The emergency treatment takes precedence. Treatment of mandibular fractures aims to restore occlusion and function and facilitate direct bone healing by adequate reduction and immobilization on the fractured site^[7].

The following case report aims to explain the initial management of patients with mandibular fractures using temporary fixation and immobilization devices to prevent further complications.

2. Case Report

2.1 Case 1

Seventeen years old male patient came to the emergency room at Hasan Sadikin Hospital Bandung with a complaint of bleeding from the mouth. The patient falls from the motorcycle when suddenly he stops, with the face hitting asphalt first. The patient did not experience a history of fainting, nausea, and vomiting.

There are swelling and hematoma in the left cheek region, facial asymmetry, and abrasive wound on the face (figure 1A). Lacerative wounds were also found in the gingival area 31-41 with irregular margins, malocclusions open bite (figure 2A).

The radiographic picture showed fractures of the symphysis and left angulus mandible (figure 1B). The diagnosis in these patients is symphysis and mandibular left angular fractures and laceration of the gingiva. Emergency treatment is done by wound debridement, intraoral suturing, Ernst wiring at tooth region 31-41, also interdental wiring using an erichbar at tooth's mandible region 37-47 (figure 2B).



Figure 1: (A) Face profile, there is swelling and hematoma on the left cheek region, facial asymmetry, and abrasive sores on the face. (B) X-ray of the head shows fracture lines in the symphysis and left mandible angle.



Figure 2: (A) Clinical features of malocclusion and post debridement (B) Interdentary wiring using an erichbar at tooth mandible region 37-47.

2.2 Case 2

A 20-year-old male patient presents with bleeding from his mouth. Approximately 12 hours before the patient was riding a motorcycle and fell with the state of his face that first hit the asphalt. The patient experienced a history of fainting but did not experience nausea and vomiting. There is a laceration wound in the tooth region 32-34 with an irregular edge and laceration wound in the gingival tooth region 14-21 and 31-41 with an irregular edge shape. Radiographic features show fractures on the zygoma, maxilla, and mandibular symphysis (figure 3). The diagnosis of this patient is the fracture of zygoma, maxillary, and mandibular symphysis and dentoalveolar fracture at tooth region 13-21 and laceration of the lower lip and gingiva. Emergency care which performed was wound debridement, extraction of teeth 13, 12, 11, 21, alveolectomy at the teeth region 13-21, suturing of the intraoral laceration and interdentary wiring using an erichbar in the maxilla of the tooth region 16-26 and the lower jaw at tooth region 36-46 (figure 4)

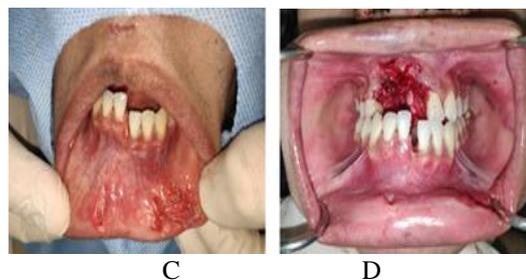


Figure 3: (A) Face profile, there is bleeding from the mouth. (B) CBCT of the head and face, there are fracture lines in zygoma, maxillary, and mandibular symphysis, (C) laceration wounds at the tooth region 32-34 and 31-41 with irregular edge shape, (D) laceration wounds of the gingival at tooth region 14-21 and malocclusion.



Figure 4: interdentary wiring using erichbar in the maxillary at tooth region 16-26 and mandible at tooth region 36-46

2.3 Case 3

A 69-year-old male patient came with bleeding from the mouth. Six hours before, he rode a motorcycle and crashed into a car and fell with his face hitting the back of the vehicle. The patient did not have a history of faint and vomit. There were edema and hematoma on the bilateral buccal mucosa. There was a laceration in the gingival region of teeth 11-12, 43-44, with an irregular side (figure 5A, B, C). Radiographic features showed horizontal fractures between the maxilla and the palate, nasal, right zygoma, right parasymphysis, left coronoid, and bilateral condyle (figure 6). The diagnoses made are Le fort I + nasal fracture, right zygoma, right parasymphysis, left coronoid, and bilateral condyle. Emergency actions taken are wound debridement, extraoral and intraoral suturing, erichbar interdentary wiring on mandible at regio 36-46 (figure 8).

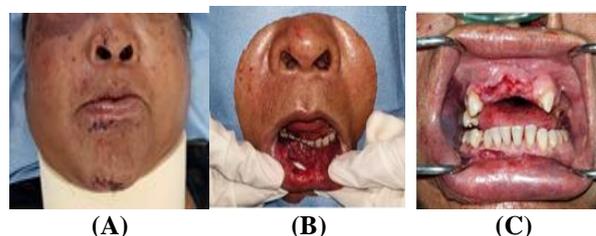


Figure 5: (A) Extraoral profile, (B) dan (C) There was edema and hematoma on the bilateral mucosa buccal, laceration in the gingival region of teeth 11-12, 43-44 with irregular side



Figure 6: CBCT Head and face showed horizontal fracture lines between the maxilla and palate, nasal, right zygoma, right parasymphysis, left coronoid and bilateral condyle.



Gambar 7: Erichbar interdigital wiring on mandible at regio 36-46

2.4 Case 4

A-22-year-old female patient came presently with complaints of bleeding from the mouth. One hour earlier, she was a motorcycle's passenger and fell down with the mouth hit the road first. The patient did not experience a history of fainting and nausea and vomiting. There was an asymmetrical face with edema on the left cheek and lacerations in the gingival region of teeth 42-43 with irregular edges (figures 8 and 9). Radiographic features showed fractures in the right mandibular parasymphysis and left mandibular angulus (figure 10). The diagnosis was established by dextra parasymphysis fracture and mandibular angular sinistra and vulnus lacerated at the region of the gingival teeth 42-43.

Emergency care performed was wound debridement, intraoral wound suturing, and interdigital wiring of the maxillary region of the tooth 16-26 and the mandible region of the tooth 36-46 (figure 11).



Figure 8: Extra oral profile from the side and front. here was an asymmetrical face with edema on the left cheek



Figure 9: laceration in the gingival region of teeth 42-43 with irregular edges and malocclusion



Figure 10: Panoramic radiograph. It showed fractures in the right mandibular parasymphysis and left mandibular angulus

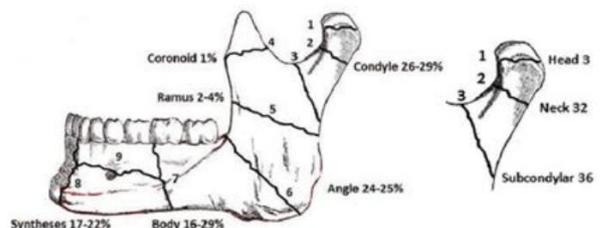


Figure 11: Interdigital wiring of the maxillary region of the tooth 16-26 and the mandible region of the tooth 36-46

3. Discussion

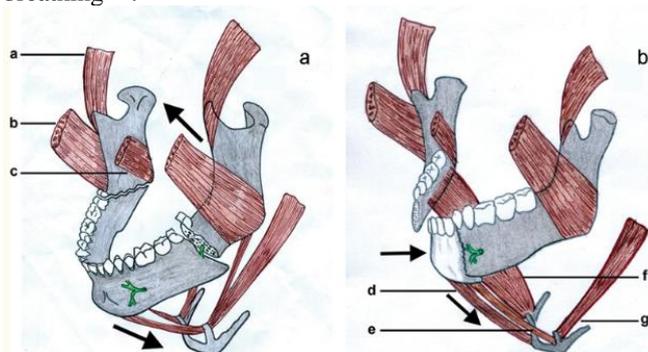
The gold standard for diagnosing mandibular fractures is a clinical examination accompanied by careful palpation of the area where the fracture is suspected. Clinical examination is equipped with radiography to confirm the diagnosis and planning of therapy. A panoramic x-ray is the main modality for the evaluation of mandible fractures^[2].

Classification of mandibular fractures can be divided based on the anatomic areas involved, such as symphysis, parasymphysis, corpus, ramus, angulus, condyle, and coronoid fractures. Mandibular fractures due to trauma often involve either one-sided or two-sided condyle fractures^{[2],[6]}.



Picture 11: Classification of mandibular fractures^[8]

In some types of mandibular fractures, bilateral mandibular fractures can cause airway obstruction. This fracture is closely related to the oropharynx and laryngopharynx and causes very limited ventilator function. In addition, superior and anterior hyoid muscle movements are important in pharyngeal deglutation. Geniohyoids are on the lingual side of the mandibular symphysis. The geniohyoid and thyrohyoid muscles are responsible for opening the upper esophageal sphincter. If the fragment is not repaired correctly, the movement of the hyoid muscles anterior and superior becomes limited and will cause difficulty in breathing^[9].

**Figure 12.** a. temporalis b. masseter c. medial pterygoid d. geniohyoid e. anterior digastric f. posterior digastric^[10].

Several risk factors specifically related to mandibular fracture can cause malunion or non-union. The most common risk factors are infection, poor positioning, lack of immobilization of fracture fragments, presence of foreign bodies, and unfavorable muscle traction in fracture fragments^{[10],[11]}.

Handling of mandibular fractures in the initial step is emergency following the ATLS (Advance Trauma Live Support) rules, consisting of initial examination or primary survey including airway or airway examination, breathing or breathing, blood circulation including shock treatment or circulation, handling soft tissue injuries and temporary immobilization and evaluation of possible injuries^[3].

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^[10]. Integration of the fracture is one of the main targets for successful treatment other than occlusion^[1].

In trauma patients with mandibular fractures, attention should be given to the possibility of airway obstruction that can be caused by mandible fracture itself or due to intraoral bleeding that causes blood aspiration^{[3],[6]}. In all these cases there is bleeding from the oral cavity so it is necessary to immediately treat the bleeding so that airway obstruction does not occur and shock due to a lot of bleeding. Temporary immobilization in all of these cases was immediately carried out by interdental wiring erich's arch bar so that the stable bone fragments were not pulled posteriorly that could interfere with breathing.

Erich's arch bar is one of the most commonly used arch bars. This arch bar is connected to a hook on the outer surface with a flat malleable stainless steel metal strip, making it more effective, faster, and easier when fixed. The bar is available in rolls. Bars are cut according to the length of the dental arch, and this will reduce injury to the soft tissue with prominent edges^{[12],[13]}.

Debridement treatment must be accompanied by lifting existing foreign objects. Debridement must include the edges of the wound, bone fragments, foreign objects that enter the wound, necrotic tissue, and if found a hematoma at the same time evacuated. Wounds in the cavity and face can develop into severe infections that spread to the brain can result in meningitis and brain abscesses if treatment is inadequate^{[5],[8]}. In all of these cases immediate debridement and suturing of the situation and treatment of the wound are used to prevent infection.

Efforts to deal with infections are closely related to the use of antibiotics, especially in open fractures. Patients should be given anti-inflammatory medication, and if there are unclean wounds, the administration of the tetanus vaccine needs to be considered^[10]. Emergency measures to prevent infection in all of these cases include injecting a serum anti-tetanus drug (ATS) or tetanus toxoid (TT) and 1 gram Ceftriaxone antibiotics.

Definitive treatment of mandibular fracture aimed to reposition the fracture segment into normal anatomic position (reduction) and keep it from moving with fixation. Furthermore, immobilization is used to stabilization fragment when healing process occurred. In the four cases above, the treatment of mandible fracture is fixation and immobilization with erichbar wiring^{[10],[14]}. On the simple mandible fracture are using closed reduction and temporary fixation, then normal occlusion can be reached as formed at case one.

Complications after repairing mandible fracture rarely occur. The most common complication in mandible fracture is infection or osteomyelitis, which can be caused by nonunion or malunion. Other complaints that can be occurred are a form of prolonged pain and discomfort in the temporomandibular joints due to changes in position and instability between the left and right temporomandibular joints. It does not only affect the temporomandibular joints, but the masticatory muscles and the muscles around the maxillofacial can also provide pain response^{[4],[15],[16]}.

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