CASE REPORT

Management of Mandibular Symphysis Fracture with Open Reduction Internal Fixation (ORIF): Case Report

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ABSTRACT

Mandibular fractures, particularly those involving the symphysis, present significant challenges due to their impact on masticatory function and facial aesthetics. Management aims for anatomical reduction and stable fixation while minimizing complications. Case report highlights effective use of open reduction and internal fixation (ORIF) with two plates and screws, supplemented by intermaxillary mandibular fixation (IMF), for treating mandibular symphysis fractures. A 22 years old male presented with multiple facial fractures, necessitating surgical. Following evaluation, ORIF with two plates and screws, plus three weeks of IMF, facilitated healing and stabilization. Management considers alignment, stability, and occlusion. ORIF offers stability and precise reduction, promoting optimal healing, while IMF aids alignment maintenance during healing. This approach led to successful outcomes with minimal complications, emphasizing a multidisciplinary approach integrating surgical expertise and patient-specific considerations. ORIF with two plates and screws, supplemented by IMF, is reliable for achieving anatomical reduction and mastication with favorable outcomes.
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INTRODUCTION

Mandibular fracture is a condition of mandibular bone discontinuity caused by facial trauma or pathological conditions. A hard hit to the maxillofacial can result in a fracture of the mandible. Cases of mandibular fractures are quite common, although the mandible's resistance to impact forces is greater than that of other facial bones. The main etiological factors for mandibular fractures may vary in different countries. Data in developing countries shows that the most common cause is traffic accidents. In addition, mandibular fractures can also occur due to industrial or work accidents, household accidents, drunkenness and fights, or physical violence. The most common causes of maxillofacial fractures are traffic accidents (40–42%), falls, assault, sports and work injuries. The mean age of patients with mandibular fractures was 38 years for men and 40 years for women.

Men are primarily involved (5:1 ratio of men to women). Mandibular fractures can be classified in relation to their anatomical localization as follows: symphysis / parasymphysis (30–50%), body (21–36%), angle (15–26%), ramus (2–4%), condyle (20–26%), and coronoid process (1–2%) (1).

The management of facial bone fractures has undergone many changes along with the progress of the medical world. The diagnosis and management of mandibular trauma was first well documented by Costello in 1975. Along with the times, various mandibular fixation techniques have developed. Some cases do not require treatment with open reduction and internal fixation (ORIF), but only use maxillomandibular fixation or gunning type splints which function to maintain mandibular stability during osteosynthesis. The ORIF technique for facial trauma became known in 1975 (1).

The greatest force resultant in the mandibular impact occurs the greatest in the mandibular symphysis. In fractures in this area, it is necessary to apply 2 mini plates 4-5 mm apart to neutralize the torsional moment.

The biomechanical concept of the mandible is similar to that of a bow, where the strongest part is the mid

or symphysis part. While the weakest part is on the condyles on both sides. This corresponds to a class III lever with support on the condyle area, while the point of load is on the symphysis. Open reduction surgery for mandibular fractures should reposition of mandibular occlusion to prevent postoperative malocclusion, followed by stabilization by means of fixation such as plates, screws, and intermaxillary fixation to minimize any nonunion, malunion, or delayed union of the fracture segments. The purpose of this case report is to explain the principles of management of mandibular symphysis fractures in trauma patients using the ORIF technique using two plates and screws (1).

CASE REPORT

A 22 year old male patient came with complaints of bleeding from the mouth. The patient riding a motorbike as a passenger at high speed suddenly lost his balance that the patient hit another vehicle with his face hitting the asphalt first, 2 hours before admission. The patient wears a half-face helmet. The patient experienced fainting, nausea and vomiting, bleeding from the mouth and bleeding from the left nose. The patient was then taken to the Hospital Hasan Sadikin Emergency Department for further treatment. The patient has no history of alcohol intoxication. Initial assessment was carried out on the patient and found, Airway, Breathing, Circulation, Disability still clear and normal. General examination of the patient found an asymmetrical facial head, an abrasive wound, and a hematoma on the left cheek, a torn wound on the lower lip. Localized status on extra oral examination showed an asymmetrical face accompanied by several abrasive wounds in the facial region with a hematoma in the left cheek region. There is a laceration on the lower lip and chin area with irregular edges and muscle base. Intra oral examination found a laceration in the area of the lower lip at gingiva of teeth 12-22, and gingiva 35-42 with irregular edges, bone base. Examination of the teeth there is a dentoalveolar fracture of teeth 12-22 with avulsion of teeth 12-21; 35-42. Examination by palpation found discontinuities and crepitations in the maxillary, nasal and mandibular bones (Figure 1).

The supporting examinations carried out were laboratory examinations and head CT Scan. Hematological examination showed a hematocrit count of 38.6%, leukocytes 24.58/mm^3, and platelets 276,000/mm^3. Blood chemistry examination showed SGOT 31 u/L, SGPT 20 u/L, blood glucose at 92 mg/dL, Potassium 4.2 mEq/L. 3D head CT scan of the head found multiple discontinuities in the nasal bone region, bilateral zygoma, bilateral maxillary bones and mandibular symphysis (Figure 2). This patient was diagnosed with a nasal bone fracture; LeFort I fracture; mandibular symphysis and dentoalveolar fractures in the region of teeth 12-22 and 35-42 with avulsion of teeth 22-21 and 33-42, with laceration wound on the ower lip and gingiva of teeth 12-22, 35-42.The management of this patient was carried out in the surgical emergency room. This patient underwent wound cleaning, Tetagam injection, suturing extra- oral and intra-oral lacerations. The patient underwent alveolectomy and installation of maxillary and mandibular interdental wiring. Patients were given intravenous drugs including Ceftriaxon 2x1 gram IV, the analgesic Ketorolac 2x30 mg IV, and Omeprazole 2x40 mg IV. The patient was admitted to the hospital with a high-calorie, high-protein soft diet of 1,560 kcal/day. It is planned to do ORIF elective in general narcotics after the patient's general condition is getting better.

Figure 1. Clinical picture of extra oral face: A. Right lateral; B. Anterior aspect, abrasive wound on face; C. Left lateral; D. Left Zygoma Region, abrasive wound visible; E. Aspects of the inferior labii, visible lacerations; F and G, visible lacerations and dentoalveolar fracture of teeth 12-22 with avulsion of teeth 12-21; 35-42.
(Source: Personal documentation)

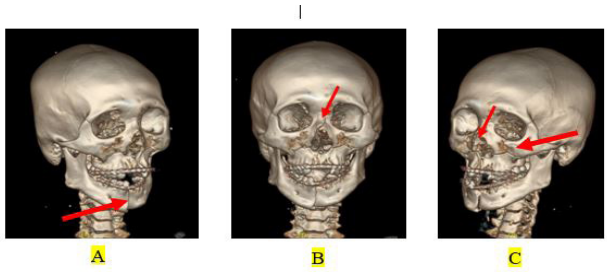

Figure 2. 3D CT scan of the head: A. Fracture of mandibular symphysis bone; B. Fracture of nasal bone; C. Fracture of bilateral zygoma bone;
(Source: personal documentation)

The patient has had an ORIF procedure using two plates and screws on a mandibular symphysis fracture, and the installation of IMF (Figure 3). The patient did not take special action for the maxillary and nasal fractures because good results were obtained after ORIF was performed on the mandible. It can be seen from the duration of the operation and on the first and second treatment days the occlusion was maximized and the facial proportions looked symmetrical. On the first day, IMF rubber was installed and on the second day, IMF was wired. IMF is maintained until the twenty-first day to obtain good results and it is hoped that there will be callus formation in the fractured mandibular symphysis area. The use of two plates and screws in patients with mandibular symphysis fractures (Figure

4), in combination with IMF for three weeks, succeeded in producing good occlusion results with minimal complications. Following the surgical procedure, the patient was kept under observation for 2 days to facilitate healing and perform exercises. At the one-week mark, a follow-up appointment was scheduled to assess functionality, and the patient commenced mouth opening and closing exercises. Subsequently, the jaw was re-immobilized until the occlusal bite was achieved. After 3 weeks, the intermittent mandibular fixation (IMF) was gradually removed, starting with the upper jaw followed by the lower jaw. This was due to the initiation of fine callus formation in the lower jawbone.

Figure 3. A. The fracture line is clearly visible; B. Installed two plates and screws in the fracture region of the mandibular symphysis; C. patient's occlusion (Source: personal documentation)

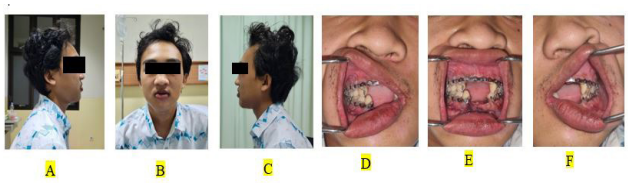

Figure 4. A. The profile photo after surgery: A. Rihgt lateral view; B. Anterior view; C. Left lateral view; D. Oclusion of the right side; E. Oclusion of anterior side; F. Oclusion of the leftt side (Source: personal documentation)

DISCUSSION

The management of this case begins with cleaning the wound and suturing intraoral and extra-oral by an oral surgeon. The first treatment is to clean the wound on the patient. Wound cleaning is done by irrigating the wound using normal saline or 0.9% NaCl to remove all debris and foreign bodies in the body to prevent infection. Suturing open wounds is the right way to achieve hemostasis (2).

The patient was given Lactate Ringer's infusion at a dose of 20 tpm. The purpose of giving intravenous fluids is to maintain hydration as long as the patient cannot receive fluids from outside the body and replace lost fluids to maintain the balance of the body's need for fluids. Then

Tetagam injection was performed as a tetanus prevention therapy in patients with new wounds.(2) Patients were given intravenous drugs including Ceftriaxone 2x1 gram IV, Ketorolac 2x30 mg IV, and Omeprazole 2x40 mg IV. Ceftriaxone is a 3rd generation cephalosporin which has a broad spectrum of activity compared to other generations. This drug is active against gram-negative bacteria including Enterobacteriaceae, and is also active against streptococci. Ketorolac is a strong nonselective cyclooxygenase (COX) inhibitor with analgesic effects occurring within 30 minutes and maximum effect reaching 1-2 hours and lasting 4-6 hours. Side effects that may arise include gastrointestinal bleeding, kidney disorders and liver dysfunction. Therefore, it is necessary to give ketorolac a gastroprotection to reduce the incidence of gastrointestinal bleeding, in which this patient was given Omeprazole. Suturing open wounds intra-oral and extra-oral in this patient is an emergency treatment performed (2,3).

Treatment with ORIF is generally an option for mandibular symphysis and parasymphysis fractures. Incision and dissection of the lower gingivobuccal sulcus exposes the fractured portion. Fixation of symphysis and parasymphysis fractures with miniplates and screws needs to pay attention to the patient's age, state of growth and development of teeth, anatomical shape, tooth germ, use of tools and healing period. The surgical technique was performed under general anesthesia via nasotracheal intubation. Arch bars are applied to the upper and lower teeth. The fracture is approached through an intraoral vestibular incision. The mucoperiosteal flap is lifted to expose the fracture line. The fracture line was repositioned using two titanium microplates and couplers. The first plate and the second plate are secured with screws tightened in each fragment. The stability of the fracture site was checked manually and ensured that the relationship between the upper and lower teeth was in good condition (4). ORIF uses two plates and screws in mandibular symphysis fractures, and IMF installation for 3 weeks or more to get better stomatognathic function and aesthetics (1). The use of two plates and screws in patients with mandibular symphysis fractures, in combination with IMF for three weeks has succeeded in providing good occlusion results with minimal complications (1,5). Clinicians in this case strongly recommended for the use of these principles and techniques in mandibular fracture management, given the nature of the case. It is also the preferred course of action if faced with a similar scenario in both clinical practice and hospital settings due to its ease and efficiency. Moreover, it comes highly recommended for enhancing chewing function and aesthetics, as the end result showcases facial symmetry.

CONCLUSION

Mandibular fractures, especially at the symphysis, are common occurrences. Treatment of mandibular symphysis fractures is straightforward if there is no displacement of the fragments. If there is displacement of the fragments, fragment reduction is performed first. Biomechanical principles should be considered when selecting treatment options. Benefits of open reduction

with internal fixation include eliminating mobility between fracture fragments and reducing the incidence of infection. The use of plates and screws reduces the likelihood of bone resorption, loosening of plates and screws, and fracture displacement. Plating and screw fixation provide rigid stabilization for oblique fractures of the mandible, aiding in reducing torsional forces at the symphysis and preventing complications. ORIF with repositioning using intermaxillary fixation screws have successfully restored aesthetic and masticatory functions.

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