ABSTRACT

Introduction: Bilateral mandibular angle fracture is a rare fracture of the mandible. Objective: This case report describes the treatment of bilateral mandibular angle fracture. The intended results were restoring occlusal relation that was dislocated due to trauma. Case: A 50-year-old female patient was referred to the Department of Oral and Maxillofacial Surgery, Hasan Sadikin Hospital. The patient’s main complaint was trauma to the face after falling from her bicycle. Clinical and radiographic examination revealed fractures on both angles of the mandible. Case management: Early emergency treatment was performed according to Advanced Trauma Life Support (ATLS) principle. After the patient’s condition was stabilized, elective surgery was conducted to return a previously dislocated occlusion due to trauma. Conclusion: This case concludes that open reduction is more recommended for bilateral mandibular angle fracture due to difficulties obtaining normal occlusion with closed reduction.

KEYWORDS angle, bilateral, fracture, mandible, trauma

Introduction

The most common maxillofacial fracture is in the mandible region. The mandible is important in maintaining the airway, speech, mastication, and deglutition. The mandible is the largest and strongest facial bone. However, it is a frequently experienced fracture, usually 2 to 3 times more often than a mid-face fracture. The reason could be that anatomically, its position is prominent, thus increasing the chance of exposure to a blow or impact.

Anatomically, the weakest mandibular region is the subcondylar, mandibular angle, and mental region. The atrophied mandible has weaknesses in many places, but the mandibular angle and mental region are most common to fracture. Several studies stated that there was a correlation between the frequency of mandibular fracture and anatomical region. Subcondylar fracture is more frequent in children, while angle fracture is more common in adolescents and young adults.

In terms of definition, a mandibular fracture is the disconnection of the continuity of bone structures in the mandible. Clinical and radiographic examinations are needed to establish the diagnosis of mandibular fracture. Clinical examination is performed by carefully palpating the maxillofacial region, followed by a radiographic examination for diagnosis and treatment planning. Panoramic imaging is the main modality to evaluate mandibular fracture. According to a study, mandibular fracture occurred in around 70% of patients with a facial injury. In the literature, facial bone fracture is divided into mandibular and midfacial, mandibular, and other facial bone fractures. Studies reported that 15% of patients with facial fractures had a mandibular fracture. Mostly, mandibular fracture stands alone but may also involve two or more locations in the mandible. Due to its unique anatomy and the magnitude of impact during trauma.

A study indicated that the pattern of mandibular fractures is multifactorial. The affecting factors include direction and extent of the strength, the thickness of soft tissues, and the characteristics of the mandible, such as density and bone mass. According to Olson et al., mandibular angle fracture contributes to 24.5% of all mandibular fractures. Following condyle, the angle of the mandible is the second most common region prone to fracture.
The two most frequent causes of mandibular angle fracture are motor vehicle accidents and fighting.\textsuperscript{3,4} There are two main reasons why the angle of the mandible is associated with fracture. First, there is a thinner cross-sectional area compared to the surrounding segments. Second, there is a third molar that weakens this region, especially if impacted.\textsuperscript{9,10}

Mandibular angle fracture is the second most frequent emergency case in hospitalization and has the most history of complications.\textsuperscript{4} Mandibular angle fracture is the most complex facial fracture because of high complication frequency and difficult surgical access.\textsuperscript{3,5,7} A case reported that infection and non-union are the most common complications after internal fixation of this fracture.\textsuperscript{4} Although many studies have investigated this problem, there is still a debate on the ideal fixation for fractures of this region.\textsuperscript{4}

### Case Report

A 50-year-old female patient was accompanied by her family to the Emergency Room at Hasan Sadikin Hospital with chief complaints of bleeding from the mouth. Approximately 7 hours earlier, the patient had an accident when she fell while on a bicycle in the Kota Baru Parahyangan area, Bandung. Based on the history, it is known that when the patient was riding a bicycle in the Kota Baru Parahyangan area, the patient suddenly felt dizzy and then lost her balance so that she fell with her face hit the asphalt first. After the accident, the patient did not experience fainting, nausea and vomiting, bleeding from the nose and ears. Then the patient was taken to the local hospital emergency room, where the wounds were cleaned, and X-rays of the head and feet were carried out. After that, the patient was immediately referred to the ER RSHS for further management.

From the primary survey, it was found that A: Clear with C-spine control, B: Symmetrical shape and movement of the chest, symmetrical Vesicular Breath Sound, respiration 20 times per minute, C: Blood pressure 130/90 mmHg, pulse 84 times per minute, D: Assessment of head injury classification with Glasgow Coma Scale GCS15 (E4M6V5) was a mild head injury. Pupils are isochoric round diameter 3 mm left equal to right, no light reflex disturbance and no paresis found. The secondary survey found oedema and fracture in the left wrist region. Generalized examination found positive skin turgor, facial asymmetry, oedema and hematoma in the left periosteal region, left zygoma, right buccal regions, and lacerations in the mental region measuring 2.5 × 1 cm in the muscle base (Figure 1). The conjunctiva is not anaemic, and the sclera is not icteric. Jugular venous pressure did not increase; submandibular lymph nodes were not palpable, chest shape and movement were symmetrical, no cracking and wheezing was found, regular heart sounds, a flat abdomen, normal bowel sounds, warm acral limbs, and capillary refill time less than 2 seconds.

Intraoral examination showed a laceration on the lower lip, measuring 0.5 × 0.5 cm at the base of the muscle. A laceration in the gingival region of tooth 11 measuring 0.5 × 0.5 cm and gingiva region of tooth 31 measuring 0.5 × 0.5 cm at the base of the bone (Figure 2). Furthermore, laboratory examination was done and the results are obtained; Hb: 11.9 g/dL; Ht: 35.3%; Leucocyte: 20,100/mm\(^3\); Erythrocyte: 4.11 million/\(\mu\)L; Thrombocyte: 253,000/mm\(^3\); RBC: 188 mg/dL; Na/K: 142/3.5 mEq/L. The result of the imaging examination is normal chest X-rays normal cervical images. Plain AP and lateral head and water’s radiograph shows a line with a right and left angular (Figure 3).

From the results of physical and supporting examination performed in the Oral Surgery department, the patient was diagnosed with bilateral mandibular angle fractures, left inferior orbital fractures, left arch fractures of the zygoma, dentoalveolar fractures in regions 11-12, 32-41 accompanied by tooth avulsion 11-31, mobility grade II on teeth 12,32,41, vulnus laceratum at the mental region, lower lip, and gingiva teeth 11,31. The diagnosis of the neurosurgery department in this patient was a mild head injury. In contrast, the orthopaedic department’s diagnosis in this patient was closed fracture at left tibial plateau Schatzker type VI Tcherne type II and closed fracture at left superior pubic rami undisplaced.

Before emergency management is carried out according to operational procedures, an explanation is made to the patient and family about the stages of treatment then the patient’s family signs a letter of approval for medical action. For emergency management performed in the ER, the patient was given 23...
drops/minute (macro drip) of Ringer Lactate infusion, Anti Tetanus Serum injection. In addition, patients were given 30 milligrams of Ketorolac analgesics and H2 blockers in the form of 50 milligrams of Ranitidine and were given 1 gram of broad-spectrum antibiotics, Ceftriaxone.

Wound cleaning was done using 0.9% NaCl. The extraoral wound was sutured using nylon 6.0 thread, and the intraoral wound was sutured using silk thread 4.0 (Figure 4a). Finally, immobilize the jaw using Inter Dental Wiring Arch bars of teeth 17-27 and teeth 37-47 in preparation for surgery (Figure 4b). Intraoral cleaning and extraoral wounds were treated using chloramphenicol ointment during the inpatient room. Additional supporting measures before surgery are panoramic x-rays and 3-dimensional head CT scan. Panoramic X-rays showed fractures in the angular of the right and left mandible extending to the left mandibular parasympysis. Meanwhile, a 3-dimensional head CT scan shows a right and left mandibular fracture, a left zygoma fracture, and an inferior aspect of the orbital rhyme fracture (Figure 5).

Figure 4 (a) Extra and intra oral suturing (b) Interdental wiring

Figure 5 3-dimensional and head CT scan and panoramic

The definitive management of open reduction and internal fixation (ORIF) is the treatment of mandibular angle fractures performed in general narcotics with an extraoral approach, an extra-oral incision is started in the right mandible, after obtaining the right occlusion, fixation is carried out by placing a 4-hole miniplate and screw in the right mandible (Figure 6). Then an extraoral incision was continued in the left mandible, and a 5-hole miniplate and screw were attached to the left mandible (Figure 6). Then, suturing the incision area is performed to close the surgical wound.

The patient was fully conscious on the following day, and MMF rubber was placed to obtain a stable occlusion (Figure 7). The second day after surgery, a stable occlusion was obtained. The patient was discharged with the prescribed antibiotic Ciprofloxacin 500 mg tablets 2 times a day and 400 mg ibuprofen tablets 2 times a day. The patient is also prescribed mouthwash to maintain intraoral hygiene.

Figure 6 Installation of the miniplate and screw

Figure 7 Installation of the maxillomandibular fixation rubber

Discussion

Early mandibular fracture management principle is emergency care, such as airway, breathing, blood circulation, including shock management, soft tissue wound treatment, temporary immobilization, and evaluation on the possibility of brain injury. The second step is a definitive fracture treatment, i.e., closed and open reduction/reposition of fractured fragments. The possibility of airway obstruction associated with mandibular angle fractures, although uncommon, highlights the need for adequate management of this type of fracture. Airway management of patients with maxillofacial trauma is complex and crucial because it can dictate a patient’s survival. However, securing the airway of patients with maxillofacial trauma is often extremely difficult because the trauma involves the patient’s airway and compromised breathing. Therefore, airway maintenance with immediate cervical spine control is a priority when assessing and managing trauma patients, as recommended by the Advanced Trauma Life Support concept for managing patients who sustained life-threatening injuries. Management of maxillofacial injuries is mainly required in the case of impending upper airway compromise and/or profuse haemorrhage. In this patient, the first step was performed according to the ATLS principle.
and indicated that this patient’s condition was within normal limits.

After the emergency condition has passed, the oral surgeon must provide full attention to examining occlusal relation to evaluate anterior or posterior open bite, teeth examination, paresthesia of the mental nerve, and the existence of trismus. The mandible is also palpated to detect bone fracture and deviation from the midline. This patient had fractures on the left and right angle region, and there was an anterior open bite.

Based on history taking and physical examination, the attending physician should establish a diagnosis with the help of adjunctive examination. This can be done through panoramic, CT scan, or radiographic examination. Radiographic evaluation is needed to determine fracture in the bone, teeth, or the presence of teeth within the fracture line, and the relation between alveolar nerve and the inferior border of the mandibular line and fracture. Proper history, physical, and radiographic examinations are needed to establish the diagnosis and suitable treatment planning for all mandibular fractures. Radiographic examination performed on this patient was AP lateral, panoramic, and 3D CT scan of the head and found fracture lines on both sides of the mandibular angle, fracture on the inferior orbital rim, and left zygoma. There was no sign of root fracture or alveolar bone fracture. Thoracic and cervical radiographs were also performed when the patient first came to the emergency department, and the results were within normal limits.

Definitive/elective treatment of the mandibular angle is not an emergency measure for multiple trauma patients. Elective treatment can be postponed for more than 72 hours. Some studies showed an insignificant difference in postoperative complications between patients given elective measures before and after 72 hours. Other than that, proper antibiotic administration before surgery is recommended to prevent complications or postoperative infection. In this patient, an ORIF definitive measure was performed under general anaesthesia, and she was given 1 g of ceftriaxone for prophylaxis. For this case, the extraoral approach was used for ease of access on fixation by using a miniplate and screw.

In this case, we also found the presence of third molars, which predispose to fracture of the mandibular angle. The high prevalence of lower third molars in mandibular angle fractures makes this issue relevant in oral and maxillofacial surgery. Mandibular fractures within the tooth-bearing areas and communication with the oral cavity via the periodontal ligament can foster infection. In addition, any tooth in the fracture line could be susceptible to pulp necrosis, root surface exposure, root fracture, subluxation, or avulsion. Hence, teeth in this situation should be removed. Other indications for the removal of a tooth in the fracture line are partially erupted third molars with pericoronitis or cystic areas and teeth preventing the reduction and plating of the fractures.

On the other hand, it has also been stated that teeth in the fracture line can be left in place if certain prerequisites are met, such as early treatment with a stable splint or by functionally stable osteosynthesis. Several recent studies support the preservation of teeth in the line of mandibular fractures in cases where antibiotics are used prophylactically, and miniplates are used in open reduction techniques. Furthermore, the tooth involved may often be of great value in repositioning the fracture segments, favouring plating. Some recent studies have shown that the percentage of patients developing a postoperative complication is lower for those in whom the third molar is retained.

There is an increased risk of postoperative complications when a tooth is removed.

In contrast, other studies have shown no difference. In this case, the third molars were not extracted because the presence of these teeth did not interfere with reducing the fracture fragments. There were no visible cystic lesions in the periapical tooth, and the patient had been given prophylactic antibiotics and performed open reduction.

The current treatment protocol for angle fracture includes rigid fixation with postoperative maxillomandibular fixation (MMF). It aims to provide adequate stability to achieve bone fusion, both functionally and physiologically. Several authors had written on the treatment of mandibular angle fracture, and the results showed that extraoral open reduction and internal fixation using AO/ASIF reconstruction plate and internal fixation with a single miniplate (Champy technique) had minimal complication. Interdental wiring arch bar was placed in this patient before elective treatment for temporary fixation. Extraoral open reduction was performed on this patient under general anaesthesia. Miniplate and screw were placed on the right and left mandible for fixation. Maxillomandibular fixation was performed a day after surgery using rubber. In this case, the placement of miniplate for angle fracture followed the Champy law. According to Champy, a compression plate is not needed because of a natural compression line along the inferior border of the mandible. Miniplate with fixation screw placed on the outer cortex facilitates the operator to place the plate on the lower border or subapical of the mandible. Therefore, mandibular angle fracture can be managed well with a single plate placed as near as possible to the apical border of the teeth.

Conclusion

Bilateral mandibular angle fracture is a rare case. However, its treatment is the same as in general mandibular fracture. Open reduction is more recommended because the normal occlusion is difficult to achieve with closed reduction. Postoperative follow-up is needed to evaluate posttreatment results and can be a reference for managing mandibular angle fracture in the future. Placement of plates in mandibular fracture cases must comply with the Champy law to obtain adequate plate stabilization.

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Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

References


