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Case Report

Management of Multiple Fractures of the Parasymphysis and Angle of the Mandible

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Abstract:

Introduction: Mandibular fracture is a fracture that often occurs in maxillofacial trauma. Fracture locations most often occur in the parasymphysis region and combined angle- parasymphysis fractures. Multiple mandibular fractures usually cause facial asymmetry and are challenging to reduce. Fracture treatment must be carried out immediately to restore function and aesthetics. This case report aims to discuss managing multiple mandibular fractures in the angulus and parasymphysis regions of the mandible.

Case report: A 13-year-old male patient came to the emergency room at Hasan Sadikin Hospital with bleeding from the mouth caused by a two-wheeled traffic accident. Clinical and radiographic examination results revealed a fracture of the right para symphysis and left mandibular angle. The procedure carried out is Open Reduction Internal Fixation (ORIF).

Discussion: Mandibular fractures often occur, and the leading cause is usually caused by driving accidents. Clinical examination and radiographs are needed so appropriate treatment can be carried out. In this case, treatment involves open reduction internal fixation (ORIF) extra and intra-oral approaches. Installation of 2 mini plates each in the symphysis region and angle of the mandible.

Conclusion: Treatment for multiple fractures that occurred in the maxillofacial area, in this case, was internal fixation with open reduction (ORIF). The results of the treatment showed facial symmetry and normal chewing function.

Keywords: Trauma, mandibular fracture, angulus, para symphysis, ORIF

Introduction:

The mandible is part of the facial bones, which plays a vital role anatomically and functionally, including in mastication, speech, and aesthetics. The mandible is divided into horizontal and vertical segments. The vertical segment comprises the angle, ramus, condylar process, and coronoid. The horizontal segment consists of

basal and alveolar bones, which include the symphysis, para-symphysis, corpus, and alveolar processes.[1]

A mandibular fracture is a fracture that often occurs due to maxillofacial trauma because of its prominent and vulnerable position. [2,10] The classification of fractures based on anatomical location is in the symphysis, para-symphysis, mandibular body, angulus, condyle, and coronoid.[3] The most common locations in the mandible are the para-symphysis region (32.45%), mandibular body (27.8%), angle (14.56%), symphysis (11.9%), condyle (8.6%), coronoid (2.64%), and ramus (1.98%). [4]

According to Caesario et al. Maxillofacial fractures are more common in men than women, with a ratio of 5:1.[11] Based on research conducted at Hasan Sadikin Hospital, Bandung, in 2017-2020, the most common causes of mandibular fractures were traffic accidents (82.95%) and falls (9.25%). [1] Apart from that, other causes are violence, sports, and pathological fractures. [5] The type of trauma and etiologic factors are essential in determining the location of a mandibular fracture. The parasymphysis region is often affected by patients involved in

traffic accidents—the study conducted by Oruc et al. In 419 cases of mandibular fracture, the most common combination of fractures was angulus-parasymphysis.[7]

The diagnosis of mandibular fracture is based on history, clinical examination, and supporting examinations, including panoramic, posteroanterior, occlusal, submentovertex, computed tomography (CT), and CBCT radiographs [6]. In each trauma case, the patient's examination follows the ATLS rules, which consist of assessing the airway, breathing, circulation, and disability .[12]

Treatment for mandibular fractures includes conservative methods or closed reduction and surgery or open reduction and internal fixation (ORIF). Closed reduction is a method of returning fractured fragments without surgery, indicated for fractures with a fragment gap that is not too wide (<2 mm) and good occlusion. Open reduction is a surgical procedure, and the indication for open reduction is a displacement of the bone segment, such as in an angular fracture where the pull of the masseter and medial pterygoid muscles can cause distraction of the proximal segment of the mandible.[3] Mandibular fracture treatment aims to restore the anatomy and function of the mandible and the patient's aesthetic appearance .[8] The presence of a fracture can increase the risk of wound contamination from oral bacteria and can endanger the airway.[9] This case report discusses the management of multiple mandibular fractures, namely angular and parasymphyseal fractures, using the ORIF method.

Case Report

A 13-year-old male patient came with complaints of bleeding from the mouth. Approximately 10 hours before entering the hospital, the patient had a traffic accident involving a motorbike when the patient was riding a motorbike. The patient fell with his face hitting the asphalt first. History of wearing a helmet (-), history of unconsciousness (-), nausea and vomiting (-), bleeding from the mouth (+), bleeding from the ears and nose (-). Then, the patient was taken to the Regional Hospital, only given anti-pain medication and a head CT scan. The patient was then referred to the Hasan Sadikin Hospital Emergency Room for further treatment—history of alcohol poisoning **(-).** On extra oral examination, the face appeared asymmetrical (Figure 1). On intra-oral examination, lacerations were found on the gingiva of teeth 42-43 and 37 (Figure 2)

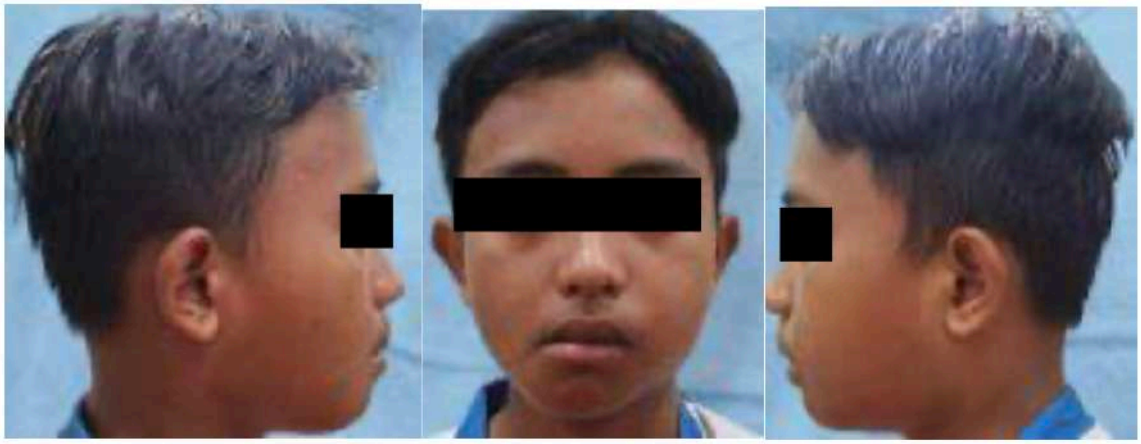

Figure 1: The patient's extra-oral condition on arrival showed facial asymmetry

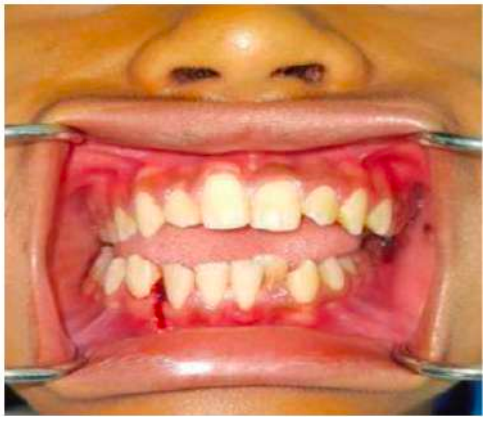

Figure 2: The patient's intraoral condition upon arrival was visible malocclusion.

The results of a head CT scan showed a discontinuity in the right para-symphysis of the mandibular bone and a discontinuity in the left corner of the mandibular bone (Figures 3 & 4). The treatment carried out on the patient's arrival is routine blood tests, Covid-19 screening, antitetanus serum (ATS) injection, Ceftriaxone 1 g, Ketorolac 30 mg, and Omeprazole 40 mg. In laceration wounds, necrotic tissue is removed, and stitches are given to close the wound. The patient then had an interdental wire (IDW) installed in the upper jaw region 16-26 and lower jaw 36-46 (Figure 5). The patient was then scheduled for further treatment in the form of Open Reduction Internal Fixation (ORIF) under general narcotics.

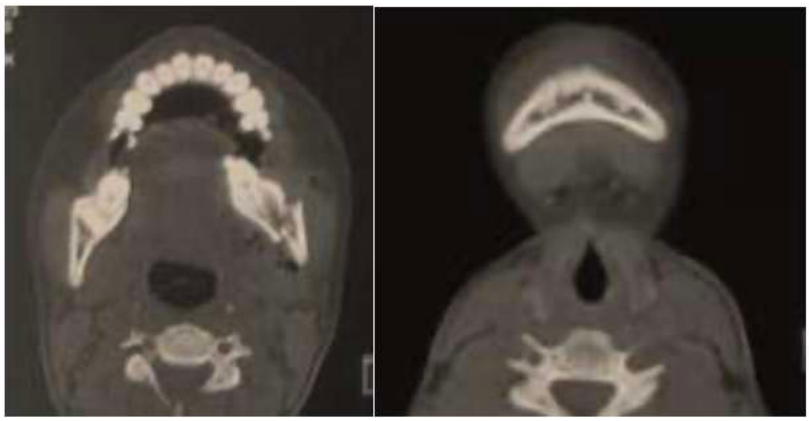

Figure 3: A CT scan of the head shows a discontinuity in the right para-symphysis of the mandibular bone and a discontinuity in the left corner of the mandibular bone.

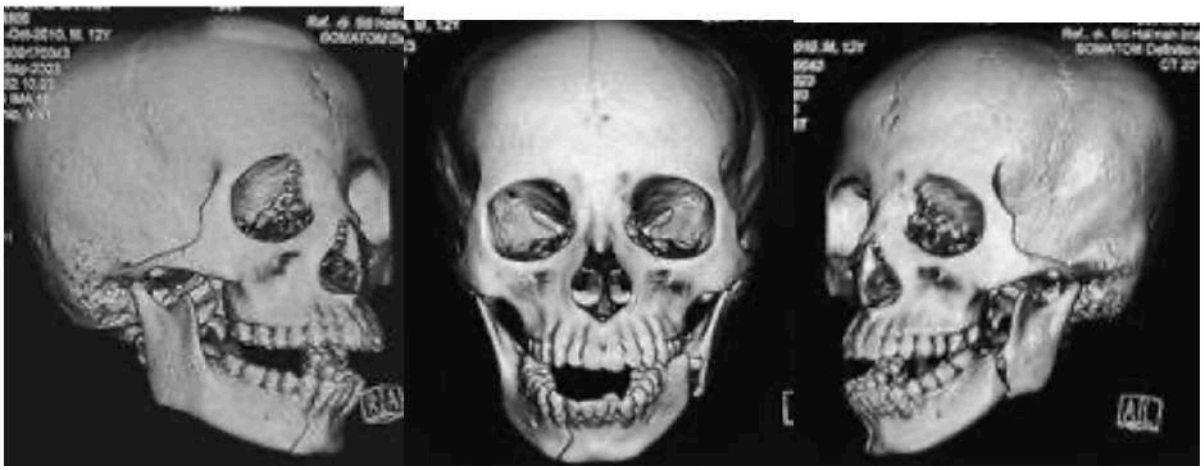

Figure 4: A 3D head CT scan shows a discontinuity in the mandibular bone's right para symphysis and discontinuity in its left corner.

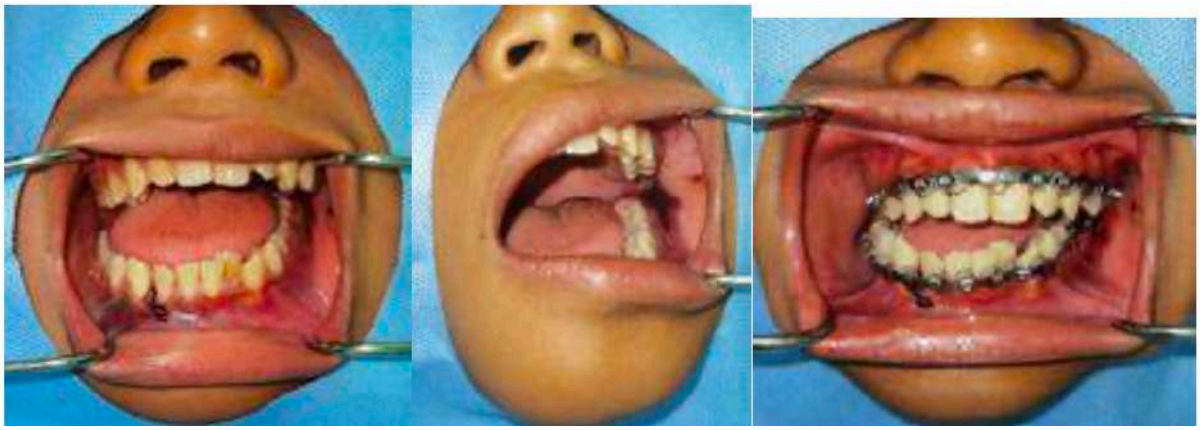

Figure 5: Post-initial management in the form of debridement, suturing, and installation of interdental wiring.

The operation first involves general anesthesia through inhalation, sedation and intravenous injection, intubation, and asepsis using 10% povidone-iodine both extra-orally and intra-orally, covering the patient's body with sterile cloth except for the surgical area and placing oropharyngeal gauze. Next, an extra-oral incision and dissection were carried out, reduction of the parasymphisis and mandibular angle fracture fragments, and installation of an Inion plate. The first plate is a five-hole Inion plate with one 0.6 mm screw and three 0.8 mm screws on the left angle. Then, the second plate was installed, namely the 5-hole Inion plate with one 0.6 mm screw and the second three 0.8 mm screws (Figure 6A-B).

The patient was then controlled again 7 days after surgery to have the extra-oral suture removed (Figure 7). The patient then came back for a follow-up 34 days after surgery to have the IDW removed on the upper and lower jaw (Figure 8).

To treat fractures of the right para symphysis of the mandible, an incision, and dissection are carried out on the mandibular vestibule, and the first plate is installed, namely a 4-hole Inion plate with four 0.6 mm screws and three 0.8 mm screws on the right para symphysis. Then, the second plate was installed, namely the four-hole Inion plate with four 0.6 mm screws. Next, intermaxillary fixation (IMF) was installed with wires on the upper and lower jaw (Figure 6). Finally, closure of the incision and suturing of the mandibular vestibule and left angle (Figure 6).

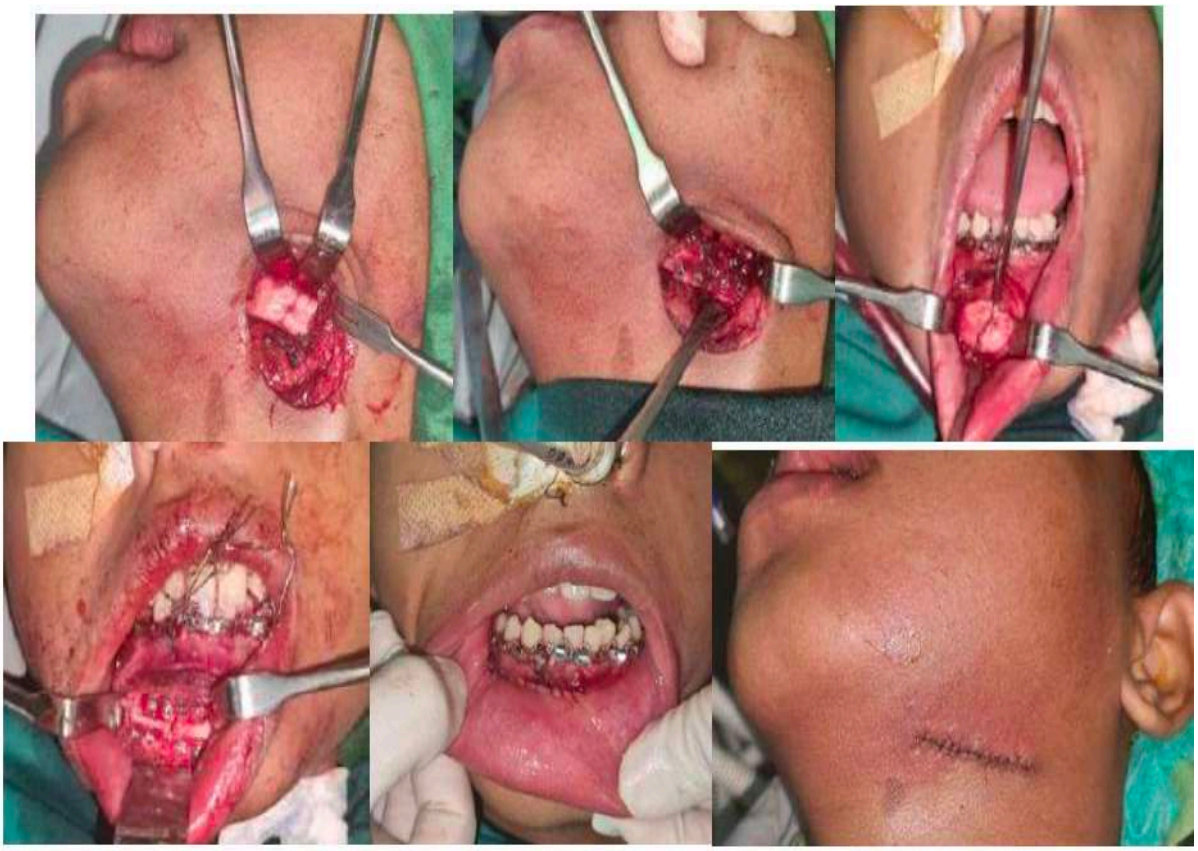

Figure 6: Open Reduction Internal Fixation (ORIF) operation process

The patient was then controlled again 7 days after surgery to have the extra-oral suture removed (Figure 7). The patient then came back for a follow-up 34 days after surgery to have the IDW removed on the upper and lower jaw (Figure 8).

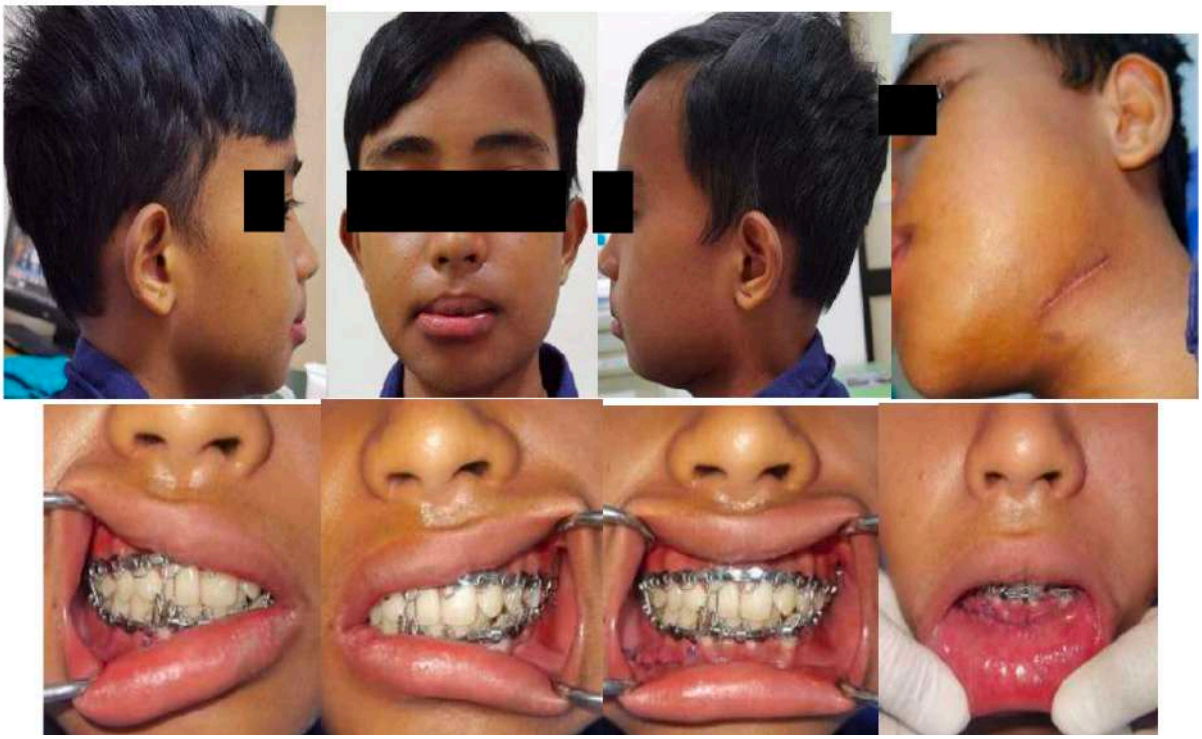

Figure 7: Control 7 days after surgery for suture removal

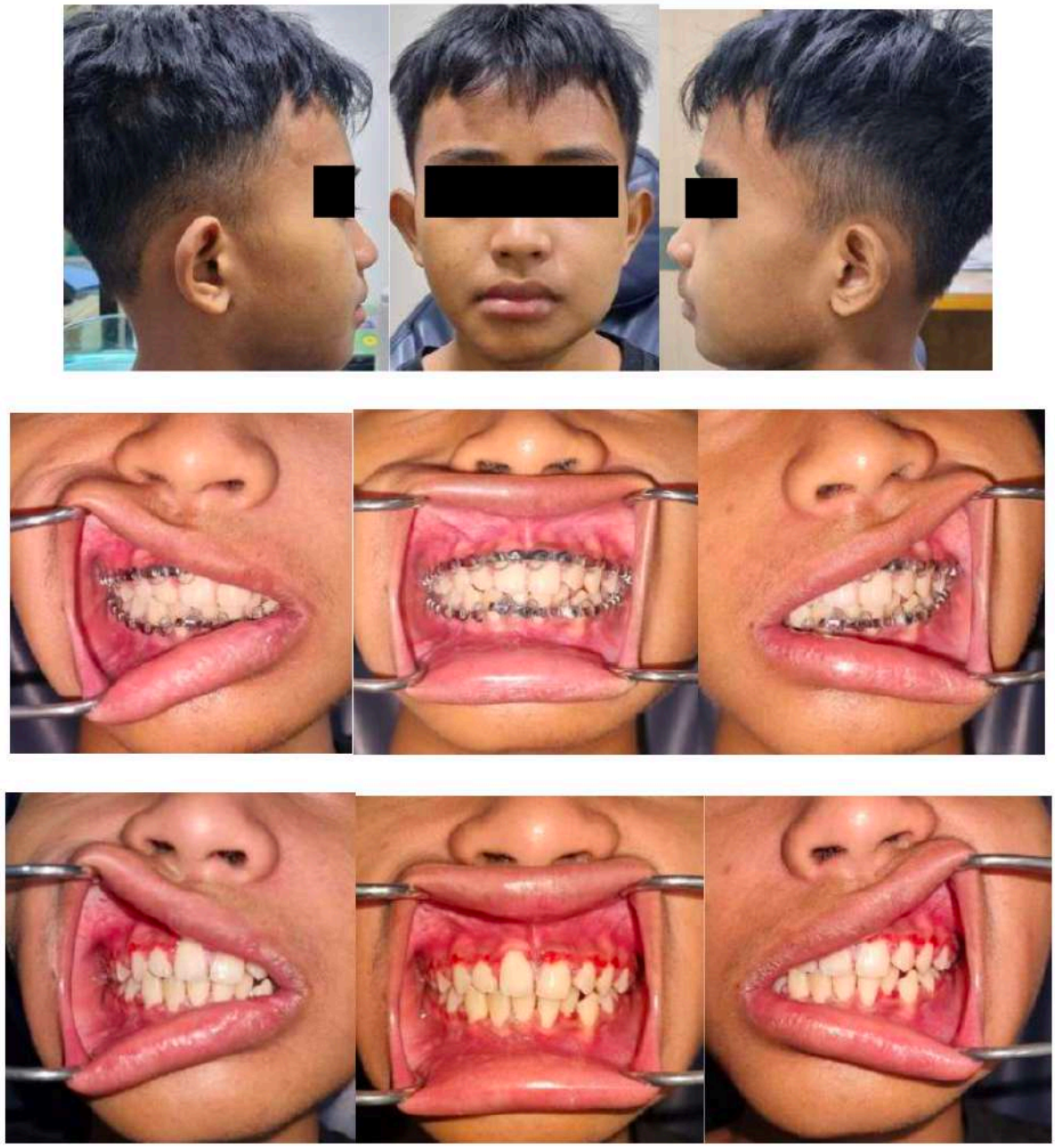

Figure 8: 35 days post-surgery, removal of Interdental wiring. The face appears symmetrical, and occlusion is normal.

Discussion

The mandible is a facial bone that often causes fractures.[9] The incidence of mandibular fractures is recorded at 15.5% to 59% of fractures in the facial area worldwide.[13] Mandibular fracture is a condition with discontinuity in the bone resulting from pathological conditions or trauma.[13] Driving accidents are one of the most common incidents where mandibular fractures occur. The patient came due to a motorbike riding accident in this case report. Mandibular fractures can spread to the mandibular body, condyle, mandibular angle, mandibular ramus, dentoalveolar area, coronoid process, symphysis, and para symphysis. This fracture can involve surrounding structures or tissue and can be classified based on the damage to the affected tissue, the action of the masticatory muscles, and its anatomical location .[14,15]

The mandibular areas where fractures occur most frequently are the para symphysis and the angle of the mandible.[4]

The gold standard for diagnosing a mandibular fracture is a clinical examination accompanied by palpation of the area where the fracture is suspected and panoramic radiography and CT scan are also carried out to confirm the diagnosis and the therapy that will be carried out. Patients with maxillofacial trauma need airway management because multiple maxillofacial fractures often cause airway obstruction, either by bleeding or shifting of fracture fragments. Mandibular fractures often involve airway obstruction, such as mandibular angle and bilateral mandibular fractures; if this happens, it is necessary to open the airway first.[16,17] Primary assessment of ABCDEs is essential in trauma care and identifies life-threatening conditions, in order, namely: (A) Airway maintenance and cervical spine control; (B) Breathing and ventilation; (C) Circulation and bleeding control; (D) Neurological deficit; (E)Environmental exposure/control. During the primary survey, clothing must be completely removed but still taken care of to prevent hypothermia.[18]

If the ABCDE evaluation has been carried out and has been resolved, management of the fracture is carried out to reduce or reposition the bone based on the anatomical area. Open reduction and internal fixation can be performed on mandibular fractures.[19] The surgical procedure is carried out so that the operator gets direct visualization and correct anatomy while reducing fracture fragments and restoring occlusion. Sometimes IMF (Intermaxillary Fixation)/MMF (Maxillomandibular Fixation) does not need to be done if the fixation is installed well. The hope is that the ORIF procedure will result in quicker healing of bone fractures in anatomical and functional form. Primary bone healing is expected by joining the fracture fragments and rigid fixation using plates and screws at the fracture area.[15]

In this case, ORIF was performed along with IMF based on a study that stated that post- operative IMF installation, including guiding elastics, can correct minor occlusal discrepancies and promote good bone healing.[20] The use of arch bars is prevalent in IMF, with stiff 24- or 26-gauge wire arch bars, stability can be achieved. However, installing the arch bar is time-consuming and challenging due to the limited work area and the many wire ends close to each other.[21,22] Healing of mandibular fractures with close reduction treatment using IMF usually takes 4-6 weeks until a callus forms.[22] The way to prevent infection in the wound area is by debridement, which is the process of removing foreign objects, smoothing the edges of the wound, and cleaning bone fragments that have entered the wound. Debridement and suturing of wounds aim to prevent foreign contamination and infection. Infection can be treated by administering antibiotics, especially for open fractures.[16,23] Analgesics, such as ketorolac, are recommended to relieve post-surgical pain, which can relieve mild-moderate pain.[24] To prevent infection, ceftriaxone and ATS (anti-tetanus antiserum) injections must be done.[16] Post-surgical complications include infection, where this infection will increase
the risk of nonunion and fibrous union in fractures; besides that, it can be due to unstable plate fixation or plate and plate fractures.[23]

Conclusion

In this case, open reduction and internal fixation (ORIF) are the treatments for multiple fractures in the maxillofacial area. The treatment results showed the symmetry of the return of masticatory function. Post-operative follow-up must be carried out to see the functional development of the fractured bone and accompanying complaints.

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