



MANAGEMENT OF ORIF IN PATIENTS WITH MAXILLOFACIAL FRACTURES

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ABSTRACT

Introduction: A strong enough impact can cause fractures in the facial area. The most common cause of facial bone fractures is traffic accidents in two-wheeled motor vehicles. Most jaw and facial fractures occur in young men aged 16–40 years. **Case Report:** A 19-year-old male patient came to Dr. Kariadi Semarang Hospital, complaining of a choking bite when opening and closing the mouth after a single traffic accident. Extraoral examination showed facial asymmetry, subconjunctival bleeding dextra sinistra, palpable step off infra orbital region dextrasinistra, maxillary dextrasinistra, frontonasalis, mandibular symphysis region, and floating palpation of the maxilla. Intraoral examination showed a 1-finger mouth opening, an anterior bite open, vulnus laceratum anterior mandibular region of teeth 31-41 and superimposed segments of maxillary sinistra teeth 22-23. Open Reduction and Internal Fixation (ORIF) has been carried out with miniplates and screws as well as the installation of Interdental Fixation (IDW) and Intermaxillary Fixation (IMF). **Discussion:** The main principles of fracture management are infection control, fracture fragment reduction, fixation, and immobilization. Reductions must be made to restore function and aesthetics. The occlusion should be used as a guide, so that when occlusion is achieved, the mastication function also functions properly. ORIF is the gold standard in fracture management. **Conclusion:** Maxillofacial fractures can be caused by various traumas, they can occur alone or at the same time as other fractures. ORIF followed by IDW and IMF insertion may be a comprehensive treatment option in maxillofacial fractures to restore good bone occlusion, aesthetics, and fixation function.

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INTRODUCTION

A hard enough impact can cause fractures in the facial area. Fractures can occur in the tooth area alone or can involve the maxillofacial one. Le-Fort fracture is one of the fractures that covers 10–20% of facial fractures.¹ The etiology of maxillofacial fractures includes work accidents, traffic accidents, sports injuries, and injuries due to acts of violence. The most frequent cause of this fracture is a two-wheeled motor vehicle traffic accident. Most jaw and facial fractures occur in young men aged 16–40 years, and are dominant at the ages of 21 and 25.¹⁻³

Maxillofacial fractures are fractures that involve several facial bones such as the nasal, zygomatic, frontal, temporal, maxillary, and mandible bones. One of the fractures in the maxillofacial area is the Le-Fort Fracture.^{1,4,5} The classification of Le-Fort fractures

was first introduced by René Le-Fort in 1901.⁴ This fracture is divided into three based on the groove, i.e. the Le-Fort I fracture (horizontal) occurs horizontally along the maxillary bone above the tooth apex, separating the palatum durum from the upper face. These fractures can occur bilaterally or unilaterally. Le-Fort II (pyramid) fracture is a fracture that occurs in the mid maxilla which includes the nasal bridge, maxilla, lacrimal bone, orbital base, and inferior orbital rhyme. Usually Le-Fort II fractures occur bilaterally. Le-Fort III fracture (craniofacial disjunction) is a fracture that starts from the nasal bridge that extends posteriorly along the medial wall and orbital base. It then passes through the lateral orbital wall and zygomatic arch and spreads to the nasal septum and pterygoid plate.^{2,5}

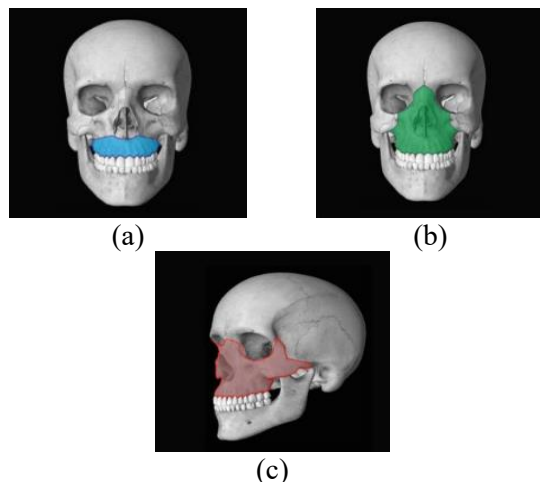


Figure 1. (a) Le-Fort I, (b) Le-Fort II, (c) Le-Fort III.

Le-Fort fractures can be associated with the occurrence of deformities of the nose and oral cavity after trauma. This can cause functional complications, such as impaired sense of smell, taste, malocclusion, and even aesthetics.^{6,7}

In addition to fractures in the maxilla, the mandible is one of the parts of the facial bone that often has fractures, followed by the nasal and zygomatic bones. Mandibular fractures can be classified based on their anatomical location, including symphysis or parasymphysis (30-50%), mandibular body (21-36%), mandibular angulus (15-26%), mandibular ramus (2-4%), mandibular condyle (20-26%) and coronoid process (1-2%). A mandibular symphysis fracture is a fracture that often occurs in the mandibular area.⁸ Fractures can be treated with a variety of approaches that require immediate attention and require intervention after an incident occurs.

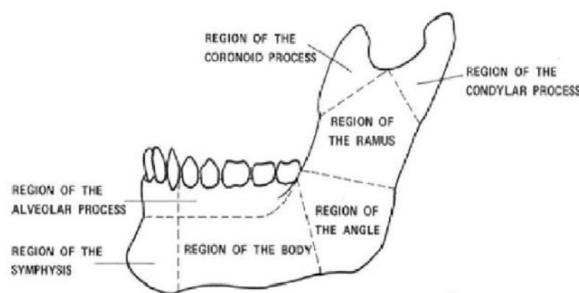


Figure 2. Classification of mandibular fractures.

Management of maxillofacial fractures must follow guidelines including initial definitive implementation, wide opening of fracture segments and anatomical repositioning with fixation of fracture segments on all sections. Various methods of treating fractures such as reduction and fixation can be performed depending on factors such as the patient's age, location and type of fracture, and the doctor's preference. Le-Fort fractures that occur can be dangerous and can be life-threatening.⁴ Therefore, understanding the management of maxillofacial fractures is important for dentists. This case report discusses the management of Open Reduction and Internal Fixation (ORIF) in the case of Le-Fort II fracture, nasal fracture, and symphysis fracture of a 19-year-old male patient after a traffic accident.

CASE REPORTS

A 19-year-old male patient came to Dr. Kariadi Semarang Hospital, complaining of a occlusal interference when opening and closing his mouth after a single traffic accident on his way to Dieng. The patient was riding as a passenger on a motorcycle driven by his friend. There is a history of bleeding from the nose and mouth, a malloclution bite, an open wound on the upper eyebrow, and a jaw that is difficult to open wide. There were no injuries to the legs and hands, and there were no double sights or blurring.

The general condition of the patient was sufficient, GCS 15, blood pressure 120/80 mmHg, pulse 84x/min, respiratory rate 20x/min, temperature 36.7°C. Extraoral examination showed facial asymmetry and bleeding of the subconjunctiva dextra sinistra, no battle signs and bloody otorrhea, palpable step off infraorbital region dextra sinistra, maxillary dextra sinistra, frontonasalis, palpable floating maxilla, palpable step off region of mandibular symphysis, but no palpable paraesthesia.



Figure 3. Extraoral photo of the patient. (a) Front view; (b) Downward; (c) Right lateral appearance; (d) Left lateral appearance.



Figure 4. Intraoral photo of the patient.

Intraoral examination showed a mouth opening of 1 finger, an anterior open bite, visible vulnus laceratum of the anterior mandibular region of teeth 31—41 and superimposed segments of the maxillary sinistra 22—23, no visible mandibular deviation, palpation of floating maxillary palpation, unstable

palpation of the mandible, palpation of the step off of the tooth region 31—41 and the dental region 22—23, as well as palpation of pressure pain.

CT scan examination showed fractures in the lateral wall of the right orbital rim, anterior and lateral walls of the right maxillary sinuses, anterior and medial walls of the left maxillary sinuses, bilateral nasal os, nasal septum, lateral wall of the left sphenoid sinuses, right zygomatic arch, mandibular symphysis, left maxillary os. In addition, there is also a right left frontal panhematosinus, a right-left ethmoid, a right-left maxillary, and a right-left sphenoid.

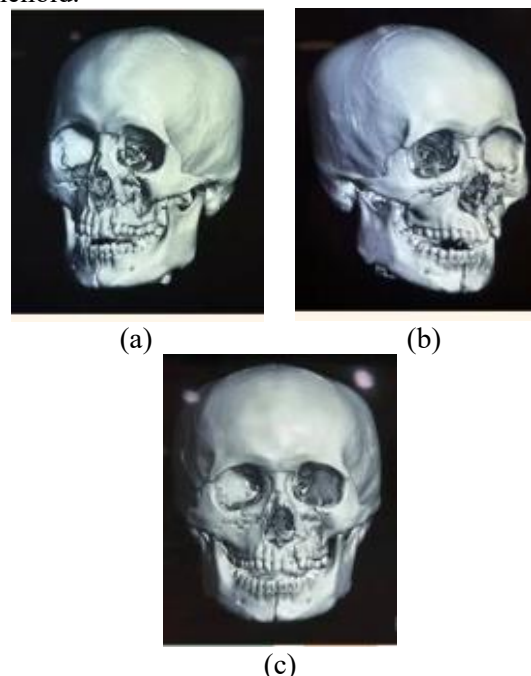


Figure 5. The patient's CT-Scan showed Le-Fort II fracture, nasal fracture and symphysis fracture. (a) Left lateral appearance; (b) Right lateral appearance; (c) Front view.

The patient was diagnosed with malocclusion et causa of Le-Fort II fracture, nasal fracture, and symphysis fracture. The treatments carried out include Open Reduction and Internal Fixation (ORIF) plating on the maxilla and mandible, Interdental Wiring (IDW), and Intermaxillary Fixation (IMF) with general anesthesia (GA). Furthermore, hematology examinations and clinical chemistry examinations were carried out with normal results.

The first action performed on this patient was the installation of IDW and IMF. The patient was placed in a supine position anesthetized GA with nasal intubation. Intraoral and extraoral betadine aseptis

was performed, followed by placement of an oropharyngeal pack. Then, vasoconstrictor injection was carried out and continued with the installation of IDW and IMF with the help of arch bars and 0.4 mm coil wire. After that, fracture exposure, bone reduction in the mandibular and maxillary symphysis were carried out, immobilization, and the installation of miniplates and screws. Next, irrigation the operating area with povidone iodine mixed with NaCl. Finally, bleeding control, suturing, and the installation of bandages in the postoperative area were carried out.

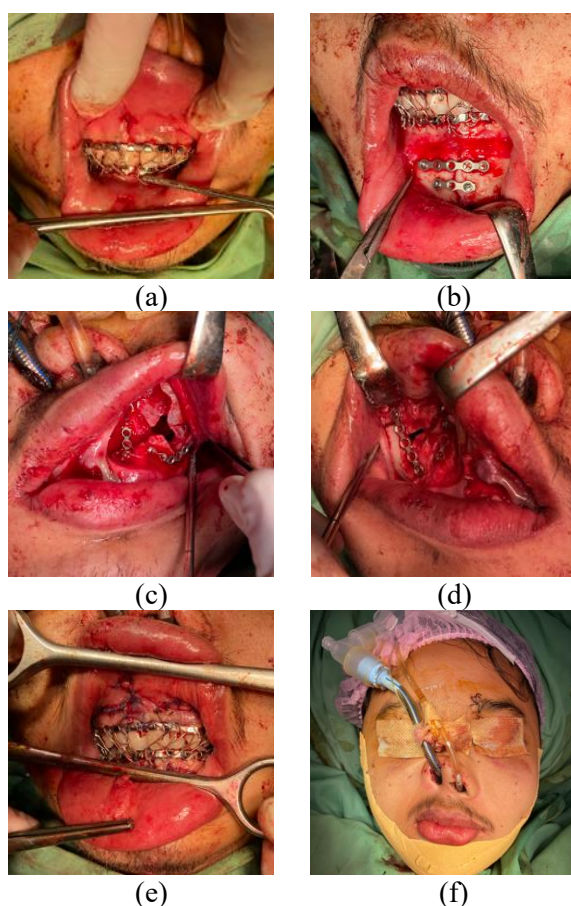


Figure 6. Intraoperative procedure. (a) IDW and IMF installation; (b) Installation miniplate and screw on the mandibular symphysis; (c) Installation miniplate and screw on the mid facial sinistra; (d) Installation miniplate and screw on the mid facial dextra; (e) The results of the suturing and installation of IDW and IMF; (f) Installation *compression bandage*.

Postoperative instructions given include a liquid diet through the Nasogastric Tube (NGT), avoiding impacts, spitting, hard gargling, 30-degree head up, maintaining compression bandages, and ice compresses on the left and right cheeks. The medication given to the patient was intravenous lactic ringer 1500 ml per 24 hours, ampicilin sulbactam injection 1.5 gr/8 hours, analgesics in the form of paracetamol 1 gr/8 hours of oral peroral, ketorolak 30 mg/8 hours intravenously, fentanyl 100 mcg, ondancetron 4 mg every 12 hours, dexamethasone 5 mg every 8 hours, and minosep 2x1 a day.

Follow up on the first day, the patient had no nausea, no vomiting, felt a little dizzy. The clinical examination showed that there was edema and no hyperemia in the extraoral area, there was no oozing in the incision wound, and there was IMF placement in the maxillary and mandibular regions, the postoperative wounds on the anterior maxillary and mandibular vestibules were well sutured.

Follow up 7 days postoperatively. The patient does not feel nausea and vomiting. Clinical examination showed minimal oedem, palpation was not palpable in pressive pain. No hyperemia appears, oozing on the incision wound, and active bleeding. IMF is attached in the maxillary and mandibular regions, and postoperative wounds are well stitched to the anterior vestibulum of the maxillary and mandibula. During this visit, stitches were removed in the anterior vestibulum of the maxilla and mandibula, as well as IMF.





Figure 7. Extraoral photo of the patient 7 days post-pandemic treatment. (a) Front view; (b) Downward; (c) Left side view; (d) Right side view.

Follow up 4 weeks after surgery, the patient had no complaints and was able to consume soft food. Clinical examination showed that the arch bar was in good condition and there was no pain. During this visit, the arch bar fixation was removed.

Follow up 6 weeks after surgery, the patient had no complaints and was able to eat freely. Clinical examination showed no presence of edema, occlusion was stable and there was no pressure pain. During this visit, an X-ray examination of the anteroposterior cranium was carried out to see the position of the miniplate and screw as well as the fracture line. There was an internal fixation attached to the structure of the maxillary os and the symphysis of the mandibular os in a good position, and there was a fracture gap in the corpus of the right side of the mandibular os.

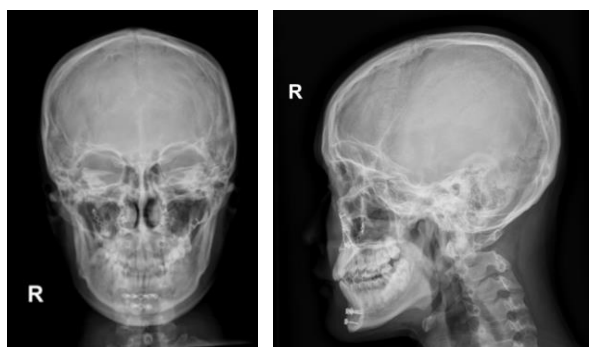


Figure 8. Photo X-ray Skull anteroposterior dan lateral.

DISCUSSION

In this case report, a 19-year-old male patient with a diagnosis of malocclusion et causa of Le-Fort II fracture, nasal fracture, and symphysis fracture was treated in the form of Open Reduction and Internal Fixation (ORIF) accompanied by the installation of

Interdental Wiring (IDW) and Intermaxillary Fixation (IMF). Based on the clinical examination, there are several symptoms such as malocclusion, bleeding in the eyes and nose, swelling, open wounds on the upper eyebrows, limited mandibular opening maximal interincisal distance equivalent to 1 finger width, open bite anterior, vulnus laceratum regio mandibular anterior teeth 31—41 and superimposition of the left maxillary segment in the region 22—23. In the study conducted by Chou, the common physical examinations found in cases of maxillofacial fractures included compressive pain (98%), nosebleeds (69%), nasal deviation (63%), maxillofacial bone depression (58%), swelling (31%), and facial abrasion/laceration (18%).⁶

In this case report, the 19-year-old patient whose cause of facial bone fracture was a traffic accident. Most jaw fractures occur in young men aged 16—40 years, and are dominant at the ages of 21 and 25. Possible reasons related to the high frequency of maxillofacial trauma at that age are related to sports activities, fights, violence, industry and the use of high-speed vehicles.⁶ Research by Chalya (2021) conducted on 154 patients stated that the most causes of maxillofacial trauma were traffic accidents (57.1%) followed by violence (16.2%) and trauma due to falls (14.3%).⁹ The incidence rate between the 3 types of Le-Fort fractures varies. Research by Xiao-Dong *et al* stated that of 241 patients with maxillary fractures (29%), of which 32 cases were Le-Fort I fractures (2.15%), 59 cases of Le-Fort II fractures (4.64%), 28 cases of Le-Fort III fractures (1.88%), and 122 cases involving other types of fractures (8.21%).^{10,11}

Le-Fort II fracture has clinical signs such as bilateral epistaxis, facial elongation, premature occlusion contact in the posterior tooth that causes anterior *open bite*, impaired chewing and speech. In addition, airway obstruction, emphysema due to air coming out of the paranasal sinuses, cerebrospinal fluid leakage, and paresthesia in both cheeks caused by orbital foramen injury can occur.¹

In patients with facial trauma, the diagnosis of fracture is clinically established and supported by radiographic examination. Maxillofacial fractures can be easily seen using craniofacial CT scans of coronal and axial cuts. CT scans make it easier to examine the orbital area. This radiographic examination is necessary to clarify the clinical diagnosis and support the location of the fracture in the maxillofacial area.^{5,7}



The diagnosis in this case was established by a clinical examination supported by a radiological examination, namely a CT scan of the head. From the results of the examination, fractures were found in the lateral wall of the right orbital rim, the anterior and lateral walls of the right maxillary sinuses, the anterior and medial walls of the maxillary sinuses, the lateral walls of the left sphenoid sinuses, the right zygomatic arch, the mandibular symphysis, and the left maxillary os. Additionally, panhematosinus was observed in the bilateral frontal, ethmoid, maxillary, and sphenoid sinuses.

The main principles of fracture management are infection control, fracture fragment reduction, fixation, and immobilization. Fracture management should eliminate the shift of the fracture fragment because excessive movement of the fracture can inhibit the formation of new bone and increase the risk of infection. Proper prophylactic antibiotics are sometimes necessary for good wound closure.¹⁰

Reductions must be done immediately and accurately to restore function and aesthetics. To achieve good reduction, occlusion must be used as a guide, so that when occlusion is achieved, the mastication function also functions properly. Delay in reduction will affect function, aesthetics, and will be more difficult if it is delayed for more than 10 days in the mandible and 3 weeks in the maxilla.¹²

This case report carried out Open Reduction and Internal Fixation (ORIF) with miniplate and screw on the maxilla and mandibula, Interdental Wiring (IDW), and Intermaxillary Fixation (IMF). ORIF treatment is the gold standard in the management of maxillofacial fractures. The installation of IDW and IMF aims to maintain bone stability to support the osteosynthesis process in fractured parts.¹³

There are several factors that can affect the selection of maxillofacial fracture management, including cost, patient desire, possibility of action at the hospital, doctor's decision, and operator skills.^{9,12}

Postoperative evaluation of this case was conducted on the first day after the ORIF with IDW and IMF, showing stable occlusion function, wire-fixed, and minimal hyperemi. On the seventh day, the removal of sutures in the anterior vestibulum of the maxilla and mandibula, as well as the IMF, is performed. Then in the 4th week the arch bar was removed. Further evaluation was performed at week 6 with an anteroposterior cranium X-ray examination

to see the position of the miniplate and screw as well as the fracture line. At this visit, it appeared that the patient's occlusion was normal and stable after the release of IDW and IMF 2 weeks ago.

Management of maxillary fractures usually involves direct exposure of the fracture, manual reduction and reconstruction of the facial buttresses to prevent lengthening or shortening of the face. The main goal of fracture management is to restore occlusion to the way it was before the injury, normal mastication function, and midfacial contouring and projection. Appropriate occlusion is the key to correct alignment. Stabilizing the maxilla is essential for restoring facial structure. The use of rigid internal fixations such as miniplates and screws provides better and effective stability.¹⁰

The movement of the fracture line after reduction and fixation can interfere with the healing process of the bone. This can lead to deformity. Therefore, immobilization must be carried out until the bone healing process is complete. Immobilization was carried out for 4–6 weeks for the mandibles and 3–4 weeks for the maxilla. Immobilization in this case was carried out with Intermaxillary Fixation (IMF) which was maintained until the 4th week.⁹ This technique is performed by immobilizing the mandible which is locked in the maxillary direction. This is done to achieve good occlusion. The prognosis of the case of maxillofacial fracture is good, if the repositioning and fixation of the fracture fragment correspond to the pre-injury anatomy.^{12,14}

CONCLUSION

Maxillofacial fractures can be caused by various traumas, they can occur alone or at the same time as other fractures. *Open Reduction and Internal Fixation* (ORIF) followed by installation *Interdental Wiring* (IDW), and *Intermaxillary Fixation* (IMF) can be a comprehensive treatment option in maxillofacial fractures to restore good bone occlusion, aesthetics, and fixation function.

CONFLICT OF INTEREST

The author states that there is no conflict of interest.

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