

Surgical Management of 2/3 Facial Neglected Fracture: A Case Report

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Abstract

Maxillofacial fracture is a trauma that often occurs in patients with multiple trauma and can be life-threatening. Maxillofacial fractures can be considered consequential injury and accompanied by fractures of the skull base because they can result in death, severe morbidity, facial deformities, and functional limitations. More than 80% of trauma patients present in an emergency with a head injury.

Case report: A 15-year-old male patient came with complaints of limited upper and lower jaw movement. The patient had a history of a traffic accident two months before coming to the hospital with decrease of consciousness, GCS 13. Clinical examination revealed deformity of the middle 2/3 of the face and mandible, malocclusion with an open bite in the anterior and posterior left mandible.

Discussion: Fracture of 2/3 of the face is a complex case that requires surgical management. Reposition of fracture fragment if not treated immediately will cause the formation of misplacement soft callus or osteogenesis that cause malunion. The placement of the plates is adjusted to the vertical and transverse buttresses as well as Champy's principle to obtain maximum fixation so that the position of the bones can withstand the movement of the facial muscles. If surgical treatment is delayed then maximal deformity and surgery will become more difficult to achieve results.

Conclusion: Surgical management of maxillofacial trauma patients will give maximum results if reconstructive treatment is carried out immediately. Delay is a challenge for clinicians to restore facial function and aesthetics.

Keyword: 2/3 facial fracture, Neglected fracture, Malocclusion, ORIF

Introduction

Maxillofacial fracture is a trauma that often occurs in patients with multiple trauma and can be life-threatening. Maxillofacial fractures can be considered consequential injury and accompanied by fractures of the skull base because they can result in death, severe morbidity, facial deformities, and functional limitations. Any part of the face may be affected, the eye with its muscles, nerves and blood vessels may be injured which can cause visual disturbances, diplopia, displacement of the eyeball and eye socket bones can be fractured due to a strong blow.^{1,2}

More than 80% of trauma patients present in an emergency with a head injury. Head injuries are open and closed injuries that occur due to skull fractures, cerebral concussions, cerebral bruising, cerebral lesions and subarachnoid, subdural, epidural, intracerebral, brain stem lesions.³

Cerebro spinal fluid leak indicates a torn dura mater, but on the other hand, not all fistulas or torn dura cause cerebro-spinal fluid leakage. Skull fracture is divided into three types, these are anterior fossa fracture, middle fossa fracture and fracture posterior fossa. fractures of the frontal, ethmoid, and sphenoid bones cause rhinorrhea on anterior fossa fracture.^{4,5}

A CSF rhinorrhoea occurs when there is a fistula between the dura and the skull base and discharge of CSF from the nose. A spinal fluid leak from the intracranial space to the nasal respiratory tract is potentially very serious because of the risk of an ascending infection which could produce fulminant meningitis.^{5,6} CSF leaks have been associated with about a 10% risk of developing meningitis per year. CSF fistulae persisting for > 7 days had a significantly increased risk of developing meningitis. Treatment decisions should be dictated by the severity of neurological decline of GCS 13 during the emergency period and the presence/absence of associated intracranial lesions. The timing for surgery procedure must be decided with proper handling and strategy.⁴

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The maxillofacial region is divided into 3 parts; the first part is the upper face (upper face), which if a fracture can occur includes the frontal bone and frontal sinus. The second part is the middle face (midface), divided into the upper and lower parts. Upper midface fractures of Le Fort II and Le Fort III and/or fractures of the nasal bone, nasoethmoidal or zygomaticomaxillary complex, and orbital floor.^{1,7} The Le Fort I fracture is a fracture of the lower midface. Meanwhile, the third part of the maxillofacial region is the lower face, which is a fracture that occurs in the mandible.⁷ The goal of treatment for severe facial trauma is 3D reconstruction with face projection before traumatic accident as well as form and function restorations.^{8,9}

Prevention of complications of maxillofacial trauma can be done by doing a more thorough and complete examination as well as consultation to other relevant department. The timing for surgery procedure based on CSF leaks closing which is spontaneously within 7 to 10 days. The aim of writing this case study is to provide scientific information on surgical procedure of 2/3 facial neglected fracture.⁶

Case Report

A 15-year-old male patient reported initially presenting with a chief complaint of loss of consciousness and injuries to the head and face due to a motorcycle accident with mechanism his face hit the handlebar first, then referred to Emergency Department Hasan Sadikin Hospital Bandung West Java for emergency procedure two months ago. The patient was treated with oxygen and fluid administration, GCS observation, and administration of analgesic and antibiotics drugs. Meanwhile, from the oral surgery department, Debridement extra and intraorally, followed by suturing of lacerated wounds and fixation of the upper jaw with arch bar wire from teeth 17 to 27 and 37 to 47. Treatment planning ORIF was scheduled for elective surgical procedure in Hasan Sadikin Hospital Bandung West Java after CSF leaks is closed.

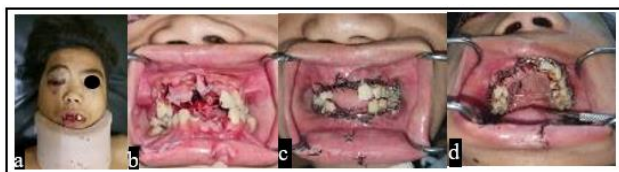


Figure 1: (a) Clinical examination showing asymmetry over right side of face because of the trauma. (b) Intraoral examination showing avulsion of tooth 13-21, 32-42 (c) Intraoral photograph shows emergency treatment We performed primary suturing for the laceration and application of erich arch bar from 17-27 and 36-46 (d) Application of intermolar wiring

Then the patient came to oral and maxillofacial surgery department for elective surgical procedure with chief complain difficulty to close his mouth. Clinical findings

found an open bite, malocclusion, functional impairments, and aesthetic. Complete blood count, chest x-ray, panoramic x-ray, 3D head CT scan were obtained for surgical preparation. The Patient was diagnosed with neglected fracture of the mandible body with Le Fort II fracture, right tetrapod zygoma, and type 1B palate fractures.

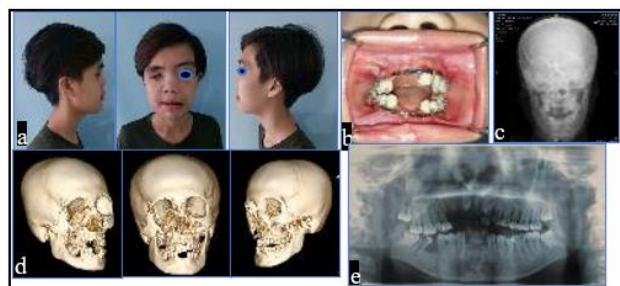


Figure 2: (a) Clinical examination showing asymmetry over right side of face. (b) Intraoral clinical examination shows avulsion of tooth 13-21, 32-42, arch bar 17-27, 36-46. (c) Skull X-ray shows fracture body of mandible. (d) 3D head ct scan shows fracture of right zygoma, right sphenozygomatic suture, comminuted medial and lateral wall, right posterior maxilla, complete fracture body of mandible. (e) Panoramic x-ray shows fracture body of mandible

The patient underwent surgical procedure 2 month later after emergency treatment. Open reduction with internal fixation was done by placing 2.0 mm and 1.5 mm miniplates. An intraoral incision was made 30-35 mm at vestibulum of teeth 15 -23 region. An extraoral incision was made 15 – 20 mm at border of mandible adjacent to fracture area. The reconstruction and anatomical



Figure 3: (a) Exposure body of mandible fracture. (b) Reduction and stabilization of fracture with 2.0 mm plate according champy's law. (c) wound closure with nylon 5.0 sutures at border of mandible region (e) Exposure of right maxilla fracture, intra oral approach with incision at vestibulum region (f) Reduction and stabilization of fracture with 1.5 mm plate according transverse and vertical buttress. (g) wound closure with silk 4.0 at vestibulum region

Repositioning of the fragments with plates and screws was placed adjacent to mandible and maxilla contour with 10mm and 8mm screws perpendicular to the plate

according to buttress and Champy's principle. The incision was closed after irrigating the surgical site and checking for bleeding. The vestibulum was closed with interrupted 4.0 silk sutures and border of mandible with 5.0 nylon sutures.

Discussion

Oral and maxillofacial fractures can assume complex forms related to its origin mechanism, the most common causes are traffic accidents, assaults, work-related injuries, sporting accidents and falls.³ Classifications, pathophysiology, and biomechanics of facial fractures are described in the literature as the current approaches to fracture reduction and fixation. Rene Le Fort classifies maxillofacial fracture into three major group as Le Fort 1, Le Fort 2, and Le Fort 3.¹⁰ The decision to choose whether the open or closed technique in Le Fort fractures is dependent on the mobility of the maxilla and severity of maxillary displacement results in malocclusion. There are two principal therapeutic approaches to these fractures: conservative and surgical.¹¹ The main goal of treatment is to restore the underlying bony architecture to its preinjury position as noninvasively as possible with minimal residual aesthetic and functional impairments.¹² The pattern of maxillofacial fractures should be addressed in two section, first is anatomy and buttress system of facial bone and second is mechanism and pathogenesis of facial injury.^{3,13}

Delayed treatment of facial fracture leads to complication as well as chronic pain, sensory abnormalities, facial disfigurement, trismus, malocclusion, dental and speech disabilities, and ophthalmologic disability such as eye disfigurement, visual loss, diplopia, and retrobulbar hematoma.² In this case, treatment planning was scheduled after the CSF leaks was closed means the patient will undergo inadequate healing process such as malunion fracture fragments.

Clinicians will be faced with challenge to restore both function and aesthetic from this patient. In cases with neurosurgical conditions or underlying medical disease, surgical manipulation may be difficult, and the success rate of the surgery may be lowered due to the delay in treatment. Fracture sites start to heal spontaneously 10 to 14 days after trauma without immediate management.^{4,6}

It is generally accepted that fracture reduction is difficult or impossible in delayed cases even with the maximal force possible with an extractor. Such delayed cases may require surgical loosening of the bony fragment by refracturing previous fracture sites with an osteotome or plugging up the defect area using graft. In this case there is difficulty in performing reduction because of malalignment of the fracture line. After obtained sufficient mobility then the fragments were fixed using miniplates and screw.

In this case, the patient was diagnosed with neglected fracture body of mandible with Le Fort II fracture, Right tetrapod zygoma fracture, and type 1B palate fracture, based on diagnosis above can be concluded the

treatment choice was based on the analysis of complete clinical and radiographic examination, considering the possible sequels, both aesthetic and functional. radiography images show pattern of trauma mechanism both maxilla and mandible. In this case we present a surgical treatment of fracture with microplate of the right maxilla and body of mandible. Vestibulum and border of mandible incision was made to achieved a better vision on surgical site with periosteal dissection until the fracture site exposed. With buttress system of the midface, the plate placed on fragments adjacent to transverse and vertical buttress nasomaxillary and posterior part of alveolar process of maxilla with 7 screws. The mandible plating used Champy's principle to maintain fragments fixation.

The buttress system of the midface is formed by the strong frontal, maxillary, zygomatic, and sphenoid bones and their attachments to one another. The central midface consists of several fragile bones that easily "crumple" when subjected to strong forces. These more fragile bones are surrounded by the thicker bones of the buttress system, which provide structure and absorb the forces applied to the face.^{3,13,14} These include the medial nasomaxillary buttress and the lateral zygomaticomaxillary buttress. Three horizontal buttresses interconnect and provide support for the vertical buttresses: the frontal bone and supraorbital rims (frontal bar), the nasal bones and inferior orbital rims, and the maxillary alveolus. These vertical and horizontal bony bolstering in the face absorbs the energy of traumatic force. This serves to protect the more vital intracranial contents from damage during trauma action–reaction of opposing forces.

The action is externally applied force that causes the bones to fail under tension created by inward bending. Factors influencing the action are: (1) Degree of force related to velocity of the head, traumatic agent, or both in combination; (2) Direction of the force; (3) Duration of the force; (4) Point of application of force; (5) Mass and cross sectional area of the offending agent. The reaction is influenced by (1) The inherent resistance and the elasticity of the midface component; (2) The ability of the neck to bend to help absorb momentum that would otherwise be completely absorb by the face.¹⁵ Surgical management of maxillofacial fracture is aimed at proper reestablishment of these facial buttresses in order to restore at height width, and projection of the face.

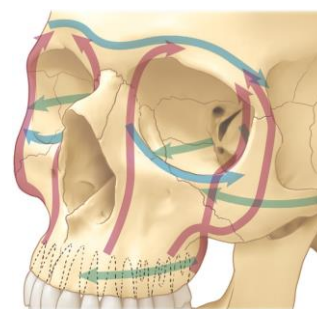


Figure 4: Horizontal buttress of facial skeleton and Vertical buttress of facial skeleton.¹⁶

Champy's principal was used to achieved better outcome to restore normal active movements of the skeletal unit during process of bone healing. The case we present using these principals to achieved that, with 2.0 mm straight plate placed along the mandible. Physiological movements of jaw produce forces of tension along the alveolar border and forces of compression along the lower border of the mandible. These forces produce flexion of the body of the mandible, which is maximum at the angle region and minimum at the premolar region.^{17,18} The plates are thus placed in a biomechanically favourable zone, known as the tension zone, which lies just below the apices of the teeth roots.

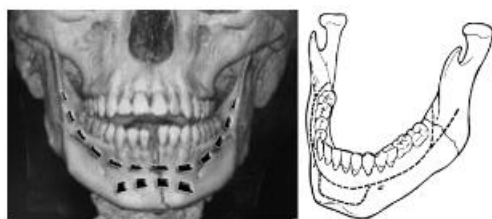


Figure 5: Champy's ideal line of osteosynthesis in mandible^{18,17}

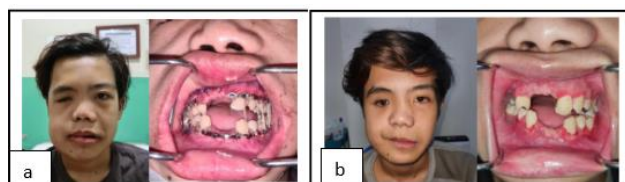


Figure 6: (a) Post operative day 1st (b) Post operative day 53th

Conclusion

2/3 facial neglected fracture defined as discontinuity of facial bone structures that are not handled or handled correctly, resulting in a terms of delay in treatment usually followed by aesthetic and functional impairments. In cases that have neurosurgical conditions or underlying medical diseases, surgical manipulation may be difficult, thus the success rate of the surgery may be decreased due to the delay in treatment. Whenever possible, fractures of the facial bones should be reduced at the earliest possible time after the injury to restore optimally function and minimize late skeletal and associated soft-tissue deformity.

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