

Emergency Management of Palatal Bone Fractures - Serial Cases

Mohammad Wildan¹, Melita Sylvyana², Harmas Yazid Yusuf³, Endang Sjamsudin⁴

^{1,3,4}Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Padjadjaran, Bandung, Indonesia

²Department of Oral and Maxillofacial Surgery, RSUP Dr. Hasan Sadikin, Bandung, Indonesia

Abstract: Sagittal fractures of the palatal bone, whether in the midline or paramedian region, usually associated with Le Fort fractures, result in oronasal communication. Initial stabilization of this fracture prevents functional disorders and life-threatening situations, such as ongoing bleeding from traumatic nasal mucosa and regurgitation of nasal food that causes the risk of aspiration. The purpose of this case series is to provide emergency management education in palatal fractures. Two different cases of emergency patients reported on fractures of the palatal bone were treated with transpalatal wiring or intermolar wiring. The first case was a 17 years old male patient with multiple fractures of several middle facial third bones accompanied by palatal sagittal fractures. The second case was a 19 years old male patient with multiple fractures of several upper and middle third facial bones accompanied by palatal sagittal fracture. Palate and maxillary alveolar bone fractures together require reduction to form the maxillary transverse dimensions and optimal occlusion. this fracture is often treated before reduction at higher midfacial levels which allows the placement of MMF to guide the reduction in vertical support. The results of this case report show that fixation using transpalatal wiring is a far more time-efficient and cost-effective method for satisfying treatment use in emergencies.

Keywords: Palatal Bone Fracture, Transpalatal Wiring, Intermolar Wiring, Palatal Sagittal Fracture

1. Introduction

A palatal fracture was first introduced by Rene Le Fort in his paper on maxillary fracture in 1901¹. Palatal fractures present unique challenges for surgical skills in the management of midfacial fractures¹. This unstable fracture is often found in maxillofacial trauma patients. Often the palatal fracture is associated with other midfacial fractures. Palatal fractures are found in 8% -13.2% Lefort fractures and rarely found as a palatal fracture alone. Palatal fractures are found in the second to fourth decade, often dominated by the male sex. Patients with these fractures are most commonly caused by a history of accidents at high speed².

Palatal fractures must be enforced by several examinations, one of which is a clinical examination. There are typical clinical symptoms of this type of fracture, namely the presence of malocclusion if there is a dislocation of the fracture segment. The presence of ecchymosis in the palatal

soft tissue also indicates a suspected palatal fracture³. Besides, clinical signs can be ecchymoses in closed fractures and laceration of the upper lip or palatal mucosa, incisor loss, loss of occlusal relations due to fracture-dislocation. CT scans are done with thin sections, every 1.0 to 1.5mm, showing the fracture clearly². Clinically, palatal fractures can be classified into 6 types according to Hendrickson et al (Table 1). This classification can be an effective aid for understanding the pattern of fractures in the palatal bone⁴

Table 1: Palatal Bone Fracture Classification

Type 1 : Anterior and Posterolateral Alveolar
Type 2 : Sagittal
Type 3 : Parasagittal
Type 4 : Paraalveolar
Type 5 : Komplek
Type 6 : Transversal

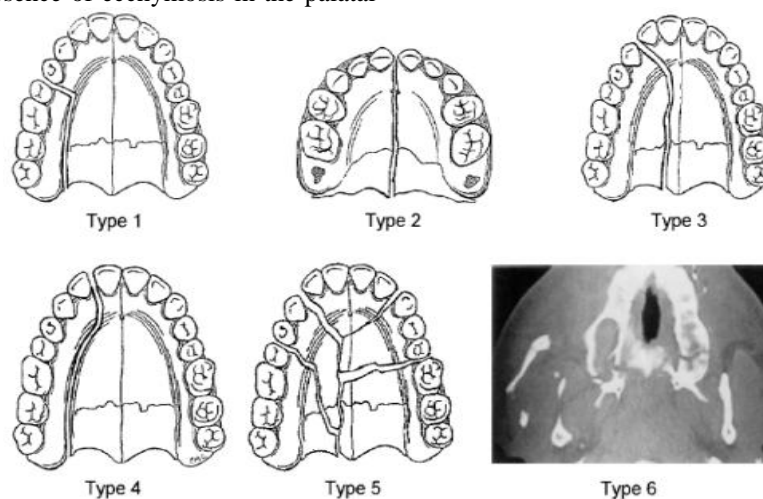


Figure 1: Palatal Bone Fracture Classification

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Palatal fractures are uncommon, and treatment in these fracture cases is still being debated. Treatment that can be done on palatal fractures can be in the form of wiring, internal fixation, or external fixation. Of the several treatments mentioned, there are complications in the form of wound complications found more in the treatment of premises using internal fixation, but has a good effect to reduce fractures. The most commonly performed method of palatal stabilization is closed reduction with the installation of transpalatal wiring techniques and internal fixation⁵.

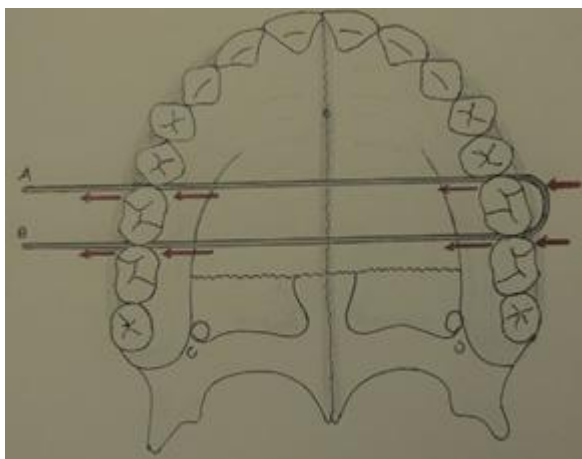


Figure 2: Transpalatal wiring Technique⁶

Some researchers have chosen fixation with a rigid plate, while others have reported successful treatment without using a rigid plate. Sagittal fractures and comminuted fractures require rigid fixation to reduce the width of the

maxilla; and additional stabilization is needed. Also, palatal repair without splint is very complex with prolonged intermaxillary fixation (IMF), causing stiffness in the temporomandibular joint⁷. This case report will present the management of emergency palatal fractures.

2. Case Report

Case 1

A 17-years old male patient complaining of bleeding from the mouth. Six hours before admission, when the patient was riding a motorcycle at medium speed at Cipaku area, suddenly a motorcycle came toward him and they collided, caused him fell with mechanism his face hit the asphalt first. History of using helmet (+) half-face, history of unconsciousness (-), nausea and vomiting (+), bleeding from mouth and nose (+), bleeding from the ear (-). Then the patient was brought to a Private hospital at Subang area and was performed skull x-ray and was referred to Hasan Sadikin Hospital Emergency Department.

At the primary survey, the patient's airway is clear with C-spine control, while the assessment of breathing, circulation, and disability is within normal limits. In the secondary survey, no significant abnormalities were found. In General Examination, there is an asymmetrical face, edema on the forehead, edema accompanied by hematomas in both periorbital regions, and found situational sutures on both eyelids with a size of ± 1cm.



Figure 3: Patient Profile Case 1

In Intraoral examination, there is a lacerated wound in the patient's palatal midline with a size of 4x0.5x0.5 cm, irregular edge, bone base and hematoma in the vestibular region of the teeth 12-21 and there is a 1/3 crown fracture in

teeth 12 and 11 with intact occlusion between the maxillary and mandibular teeth.



Figure 4: Intra Oral Case 1

The examination was continued with blood tests and radiographs. On examination of blood test results obtained anemic patients with Hb 12.3 g / dl accompanied by leukocytosis with 25,110 / mm³. On Cervical x-ray examination revealed a C4 vertebrae discontinuity. Examination of the head X-ray shows discontinuity of the nasal bone, right zygoma bone, right periorbita bone inferior, medial, and lateral aspects.



Figure 5: Cervical XrayCase 1



Figure 6: Schedel AP Lateral Xray- Case 1

In the emergency room, the patient is examined by several departments, including neurosurgery, orthopedic surgery, and oral surgery. The examination is carried out thoroughly and alternately to get the maximum diagnostic results and actions. The diagnoses that resulted from all examinations were Mild Head Injury, Anterior Skull based fractured, Closed fracture at right clavicle middle third oblique indisciplin Allman classification group I, Congenital fusion of Vt C4-C5, Fracture of nasal, Fracture of right zygoma, Fracture of right orbital rim, inferior, medial and lateral aspects, Fracture of the right maxilla, Fracture of palate Type II, Dentoalveolar fracture of teeth 11-12 with 1/3 crown fracture of teeth 11-12, Lacerated wound at palate region and Post situational suturing at both of eyelid region.

Comprehensive management can be carried out after all the results of the examination are carried out and the diagnosis

is established. The management in emergencies includes administration of oxygenation using a simple mask of 4L / min, observation of vital signs and awareness, immobilization with arm slings, administration of ATS TT injection, administration of ringer lactate maintenance fluid 19 gtt/minute and administration of injection drugs such as ceftriaxone, ranitidine, and ketorolac. The patient is debrided with a saline solution until the wound is clean from the contamination of impurities. The lacerated wound at the patient's palate is then sutured by first approaching the midline palatal fracture using a transpalatal wiring. After the fracture approaches, the lacerated wound can be closed with interrupted sutures. Interdental wiring of the maxillary teeth as a basis for immobilization of fractures in the 1/3 bone of the face and dentoalveolar fractures. After all, actions are taken, the patient is put into an inpatient room to observe the

actions that have been taken and prepare for the Open Reduction Internal Fixation surgery.

Case 2

A 19y.o male patient came with bleeding from the mouth. ± 5 hours before admission, when the patient was riding a motorcycle with the medium speed at Buah Batu area, suddenly the patient hit a tree caused he lost his balance and fell with mechanism his face hit the asphalt first. History of using helmet (+) half face. History of unconsciousness (-), nausea and vomiting (-), bleeding from mouth (+), bleeding from the nose (+), bleeding from the ear (-). Then the patient was brought to Private Hospital at Turangga area and performed injection Tetanus Toxoid and situational suturing

at the lower lip. Then the patient was referred to Hasan Sadikin Emergency Department for further treatment. History of alcohol intoxication (+).

At the primary survey, the patient's airway is clear with C-spine control, while the assessment of breathing, circulation, and disability is within normal limits. The resulting level of awareness of GCS 14 with E4M6V4. In the secondary survey examination, no significant abnormalities were found. In General Examination, there is an asymmetrical face, edema, and hematoma in the left periorbital, multiple abrasives in the facial region.

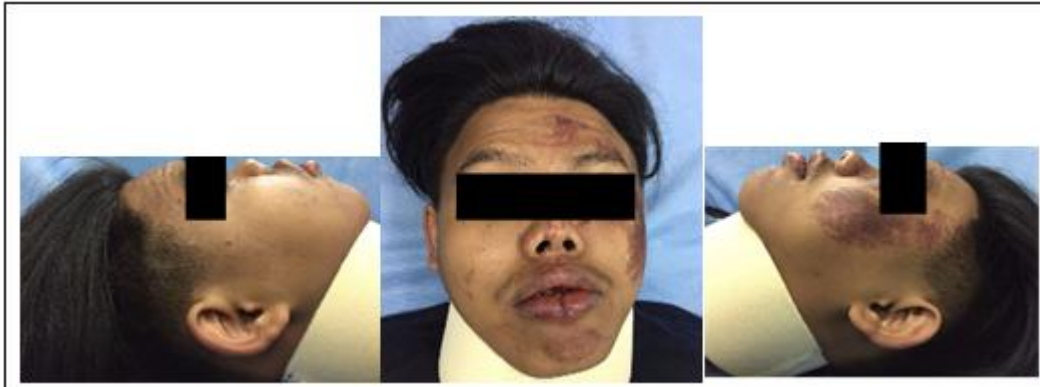


Figure 7: Patient Profile Case 2

In the Intraoral examination, there is edema of the upper and lower lip. There is a lacerated wound in the gingival tooth 32-41 with a size of 2.5x0.5x0.5 cm irregular edge, bone base. Lacerated wounds were also found in the palatal area

with a size of 4x0.5x0.5 cm irregular edge, bone base. There were avulsions of teeth 31 and 32 and mobility grade 2 of tooth 41 There was an open bite on the right anterior.



Figure 8: Intra Oral Case 2

On blood test examination, there was a leukocytosis with 31,430 and an increase in hematocrit was 51.7% and an increase in SGOT of 39 U / L. On chest, cervical, pelvic, FAST ultrasound examination, the results are within normal

limits. On head X-ray examination and 3D CT scan, there were frontal bone discontinuities, lateral aspect rhythmic orbit, nasal bone, bilateral zygoma bone.



Figure 9: Schedel AP Lateral and Cervical Xray Case 2

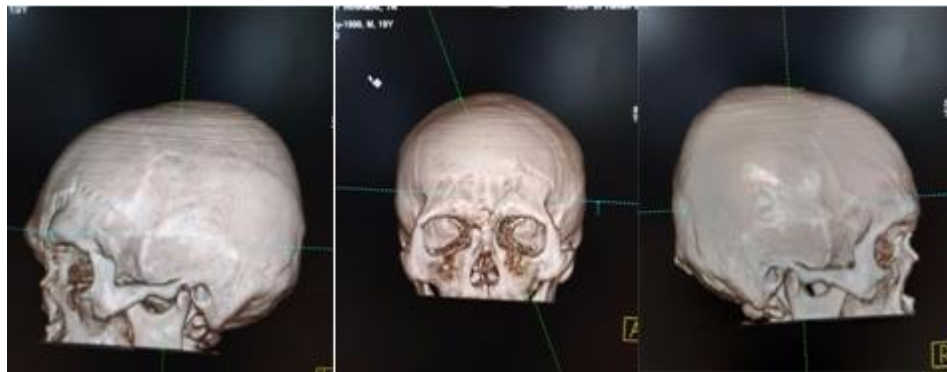


Figure 10: 3 D CT Scan- Case 2

Comprehensive management can be carried out after all the results of the examination are carried out and the diagnosis is established. Management in emergencies includes observation of consciousness and vital signs, Head-Up 30°, complete blood test examination, PT APTT, trauma series radiology examination, NaCl infusion fluid 0.9% 1500 cc / 24 hours, administration of tetagam injection, dental alveolectomy 31 and 32. The patient has debrided the wound with a saline solution until the wound is clean from the contamination of impurities. The lacerated wound at the palate is then sutured by first approaching the midline palatal fracture using transpalatal wiring or intermolar wiring of tooth 16 to tooth 26. After the fracture fragment approaches, the lacerated wound can be closed with interrupted sutures. The patient was then interdental wiring of the upper and lower jaw teeth. After all, actions are taken, the patient is put into an inpatient room to observe the actions that have been taken and prepare for the Open Reduction Internal Fixation surgery.

3. Discussion

Palatal bone is one of the important bones of the middle face which provides support and assistance in determining the width and architecture of the face. Middle facial fractures are common, but fractures of the palatal bones are much rarer. Palatal fractures rarely occur separately but are found in less than 10% of patients with middle facial fractures. Simplifying the classification of palatal fracture types by Hendrickson et al (Table 1), has been an effective aid for understanding fracture patterns².

The diagnosis of the two series cases above has the same type of palatal sagittal fracture. Based on the classification of palatal fractures can also be referred to as type 2 palatal fractures. Fractures on the sagittal palatal can be determined

based on clinical examination, namely the presence of laceration in the midline of the palatal mucosa and the presence of malocclusion in the patient. This is in line with what was conveyed by Mohammad regarding the clinical signs of a palatal fracture, namely the presence of malocclusion if there is a dislocation of the fracture segment, as well as the ecchymosis of the soft palatal tissue also showing a suspected palatal fracture³.

Fractures on the hard palate associated with the presence of malocclusion and wound complications⁴. Sagittal fractures of the maxilla or palatal, whether in the midline or paramedian region, usually associated with Le Fort fractures 1, 2, produce oronasal communication. The initial stabilization of this fracture prevents functional disorders and life-threatening situations, such as continuous bleeding from traumatic nasal mucosa and regurgitation of nasal food that causes the risk of aspiration. Palatal fractures are rarely a single diagnosis in patients with craniofacial trauma⁸

Posterior fragments from palatal bone fractures generally tend to be lateral discharges. To restore pre-traumatic occlusion, the treatment of this type of fracture is to push back the fragment by the transverse force and maintain stability. Although open reduction and rigid fixation are mainly used to achieve the anatomic reduction of maxillary fractures, the stabilization obtained in the thin bones of the maxilla in the pyriform hole and the maxillary support may sometimes not be strong enough to resist the forces that will cause malrotation and disinclination of the palatoalveolar segment. As a result, several additional methods to prevent widening of the palatal dome, such as intermaxillary fixation, transpalatal wiring or intermolar wiring, dental splints, palatal plates are inevitably applied to achieve additional stability and occlusion adjustment⁹.

In both cases, the treatment was carried out with transpalatal wiring to stabilize the fractured palatal bone. The transpalatal wiring or transmolar technique is a very simple, effective, fast, and non-invasive conservative treatment for the management of sagittal fractures of the maxilla or palatal¹. This technique can be done in the emergency room or in the outpatient room⁶. The purpose of this treatment is to direct the strength in the transverse direction to reduce fragments that are moved medially¹⁰. This technique results in direct closure of oroantral communication, a close approach of the lacerated palatal mucosa, prevention of nasal regurgitation of semisolid liquid foods, and better sound quality. Transpalatal or intermolar care does not inhibit intubation procedures to secure the airway. This reduces the need for palatal dome fixation and can be left in the oral cavity for 2-3 weeks until a temporary stabilization of the fragment is cracked⁶. Although less rigid than a fixation with plates and screws, this technique can achieve good results in terms of bone union and occlusion¹⁰.

The transpalatal wiring technique also has several disadvantages¹⁰, of which are

- a) Increase the risk of damage to teeth
- b) Applying metal wires around the neck of the tooth and keeping it tight for a relatively long period can result in trauma to the periodontium, the danger of tooth avulsion and crown fracture, and can exert orthodontic forces leading to extrusion of the teeth.
- c) Post-action inconvenience
- d) During the period of transpalatal wiring, the patient will complain of discomfort due to the strength of the traction or ongoing traction, which can also be from the presence of foreign objects in the mouth. Foreign objects in the form of wire will also interfere with oral hygiene and interfere with tongue mobility.
- e) Cannot be used in edentulous patients

4. Conclusion

The results of this case report show that fixation using transpalatal or intermolar wiring is a much more time-efficient and cost-effective method for satisfying the treatment of palatal sagittal fractures for use in emergencies. To achieve the best treatment results and minimize the potential for morbidity, special techniques must be chosen according to the individual needs of the patient, depending on the traumatic condition, anatomic location, and tolerance of the patient.

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