

Case report:

Outer Table Frontal Bone Fracture: When Need Surgical Intervention?

Adam Mohamad¹, Irfan Mohamad¹, Khairulzaman Adnan², Syed Yusoff Alzawawi Syed Abdul Fattah²

Abstract

Frontal bone fracture is a common facial bone fracture which commonly involved the outer table part. Most of the time outer table fracture is treated conservatively. However, when there is involvement of orbital wall fracture, as well as entrapment of extraocular muscle, surgical intervention via open reduction and internal fixation is needed. We described a case of outer table frontal bone fracture with left orbital roof fracture complicated with superior rectus muscle entrapment which was successfully treated via open reduction and internal fixation.

Keywords: Frontal Bone, Fracture, Open Reduction Internal Fixation, Orbital Roof

*International Journal of Human and Health Sciences Vol. 02 No. 03 July'18 Page : 167-169
DOI: <http://dx.doi.org/10.31344/ijhhs.v2i3.49>*

Introduction

Frontal sinus fracture consists of 5-15% of all facial trauma¹. It is a common encounter in emergency setting². Out of all craniocerebral trauma, comminuted fracture involving both inner and outer table of frontal sinus occurrence is 0.7-2.1% of the cases¹. In general, any postponement in the treatment of frontal sinus fracture can leads to various sequelae such as acute and chronic sinusitis, mucocele, mucopyelocoele, osteomyelitis, meningitis as well as brain abscess³. Orbital rim is the least common injury associated with frontal bone fracture⁴. It is thought that the frontal bone is the strongest of the craniofacial skeleton, thus disruption in this region indicates that the force of injury is likely due to high velocity⁵. Should management of fracture delayed or inadequate, it will result in serious complication such as enophthalmos, restriction in ocular motility, cosmetic and functional problem that will complicate the future treatment later⁶.

Case report

A 30-year-old Malay gentleman was referred by ophthalmology department at day 22 after a motor vehicle accident (MVA). He presented with

swelling at left upper eyelid and eyebrow with restriction movement of upward gaze direction. He was a motorbike rider where he collided with a car. He claimed to wear helmet at the time of injury. Post trauma, he sustained loss of consciousness and regained consciousness few hours later. He also presented with retrograde amnesia, swelling over the left eye and laceration wound over the left parietal bone region. He had no history of shortness of breath, vomiting, chest and neck pain neither even post trauma abdominal pain. He was initially diagnosed as left orbital roof fracture with laceration wound over the left eyebrow and lateral part of canthus which not involving the lid margin. During his follow up at ophthalmology clinic, patient complaining of worsening blurred vision on the left, associated with persistent swelling of the left eyebrow. Vision test revealed reduction of left visual acuity which is 6/12, while the right visual acuity was normal 6/6.

On examination, patient was alert and conscious. His vital signs were stable. Healed wound visible clinically at the left parietal region (Figure 1). Apart from that, there was mechanical ptosis on the left upper eyelid and restriction eye movement

1. Department of Otorhinolaryngology-Head & Neck Surgery, School of Medical Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia
2. Department of Oral Maxillofacial Surgery, Hospital Sultan Haji Ahmad Shah, Jalan Maran, 28000 Temerloh, Pahang.

Correspondence to: Adam Mohamad, Department of Otorhinolaryngology-Head & Neck Surgery, School of Medical Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu and Department of Otorhinolaryngology, Hospital Tengku Ampuan Afzan, 25100 Kuantan, Pahang, Malaysia. Email: persona522115@gmail.com

upon upward gaze. Otherwise, no abnormality detected at the right eye. Intraoral examination revealed poor oral hygiene.

Computed tomography (CT) scan of orbit revealed comminuted fractures involving anterior wall of left frontal sinus extending to the roof and lateral wall of left orbital wall (Figure 2 & 3). The fractures also showing entrapment of the superior rectus muscle and impingement of the left eye globe (Figure 4). Apart from that, air pocket was seen at the right sclera of left orbit. He underwent reduction and reconstruction of left orbital roof via existing healed wound under general anaesthesia (Figure 5). Upon follow up two weeks later, his condition improved with no more restriction of eye movement.



Figure 1: Mechanical ptosis on the left upper eyelid and restriction of eye movement upon upward gaze (Day 22 post injury).



Figure 2: Comminuted fractures involving anterior wall of left frontal sinus extending to the roof and lateral wall of left orbital wall (arrow).



Figure 3: 3-D reconstruction image of the fractured site (arrow).



Figure 4: sagittal view showing the fractures causing entrapment of the superior rectus muscle and impingement of the left eye globe (arrow).

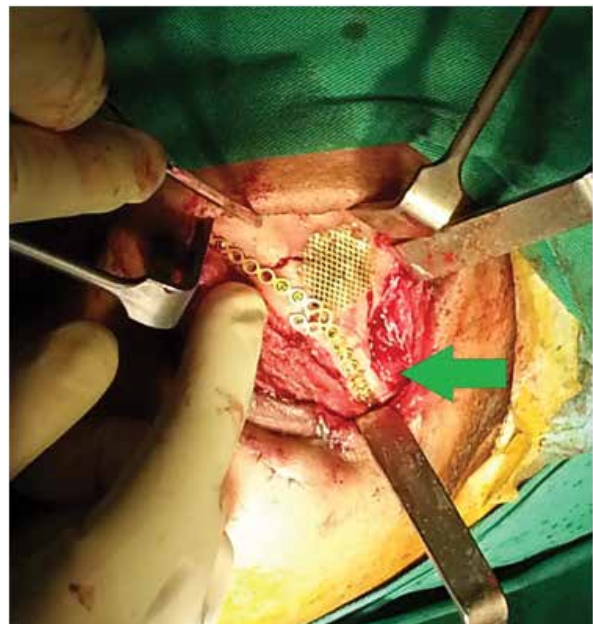


Figure 5: Bony segments immobilized and fixed with plates, screws and mesh (arrow).

Discussion:

There has been a controversy associated with the diagnosis and repair of frontal sinus fractures⁷. Rohrich and Hollier in 1992 had created graduated anatomic algorithm for the treatment of frontal sinus fracture based on the fracture displacement, frontal recess involvement as well as presence cerebrospinal fluid (CSF)⁸. They recommended non-displaced fracture should be left untreated, non-complicated anterior table displacement together with aesthetic deformity should be treated by fragment reduction and stabilization, sinus obliteration when fractures involved damage to the frontal recess and lastly cranialization should be used to treat comminuted, displaced outer and inner table fractures, especially the one with persistent CSF leak and associated frontal recess involvement⁸. In our case, the patient successfully underwent fragment reduction and stabilization, as well as sinus obliteration as the fracture involves the frontal recess.

Historically, the evolution of treatment involved the orbital wall has undergone significant change in the past century, varies from closed reduction, external fixation and Kirshner wires were all used until open reduction with internal wire fixation introduced in 1940s and soon became widely applied by the year 1950s⁸. Later, rigid fixation to craniofacial fracture management was adopted into treatment of orbital injuries. It is recommended that, frontal bone injuries involving the orbit are best approached using coronal incision for limited injury or the laceration if present. Apart from

that, the decision to use bicoronal approach is decided not only by the severity/ degree of frontal region injury, but also by degree of injury to naso-orbitoethmoid and zygomatic complex regions⁶. In this case, the incision was made at the pre-existing healed laceration wound.

In cases of more complex injuries involving inner table frontal sinus exploration is required, however there has been different opinion regarding either cranialization or obliteration⁶. Cranialization of the sinus is recommended for extensive injuries such as dural tears, brain parenchymal injuries and CSF leakage⁶. Involvement of orbital roof fracture on the other hand, is associated with higher rate of ocular injury including globe rupture and optic nerve injury⁴. In our patient, he had some degree of restriction of eye movement on upward gaze preoperatively due to impingement of the fractures causing entrapment of the superior rectus muscle, which successfully released intraoperatively. Forced duction test after the operation done shown no more restriction of the movement.

Conclusion:

Management of frontal sinus fracture depends on the severity of injury and involvement of frontal recess. Surgical intervention rather than conservative management is the best treatment option when there is associated orbital wall fracture especially when present of extraocular muscle entrapment, as early treatment might prevent early and late sequelae such as ophthalmoplegia, acute and chronic sinusitis, mucocele, mucopyelocele, osteomyelitis, meningitis as well as brain abscess.

Reference:

1. Kalavrezos N. Current trends in the management of frontal sinus fractures. *Injury*. 2004;35(4):340-6.
2. Ioannides C, Freihofer HP, Friens J. Fractures of the frontal sinus: a rationale of treatment. *British Journal of Plastic Surgery*. 1993;46(3):208-14.
3. Gonty AA, Marciani RD, Adornato DC. Management of frontal sinus fractures: a review of 33 cases. *Journal of Oral and Maxillofacial Surgery*. 1999;57(4):372-9.
4. Antonyshyn O, Gruss J, Galbraith D, Hurwitz J. Complex orbital fractures: a critical analysis of immediate bone graft reconstruction. *Annals of Plastic Surgery*. 1989;22(3):220-35.
5. Wallis A, Donald PJ. Frontal sinus fractures: a review of 72 cases. *The Laryngoscope*. 1988;98(6):593-8.
6. Manolidis S, Weeks B, Kirby M, Scarlett M, Hollier L. Classification and surgical management of orbital fractures: experience with 111 orbital reconstructions. *Journal of Craniofacial Surgery*. 2002;13(6):726-37.
7. Disa JJ, Robertson BC, Metzinger SE, Manson PN. Transverse glabellar flap for obliteration/isolation of the nasofrontal duct from the anterior cranial base. *Annals of Plastic Surgery*. 1996;36(5):453-7.
8. Rohrich R, Hollier L. Management of frontal sinus fractures. Changing concepts. *Clinics in Plastic Surgery*. 1992;19(1):219-32.
9. Gerbino G, Roccia F, Benech A, Caldarelli C. Analysis of 158 frontal sinus fractures: current surgical management and complications. *Journal of Cranio-Maxillofacial Surgery*. 2000;28(3):133-9.