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Case report

Frontal bone fractures - a report of three different methods of fixation: a case series

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ABSTRACT

Frontal bone fractures are rare and occur in only 5-12% of maxillofacial traumas and have a relatively low incidence if compared to the remaining types of fracture involving the cranio-maxillofacial region. The fact that the frontal bone is more protected from traumatic events by both the prominence of the nasal pyramid which protects the naso-orbital region and the frontal bone higher resistance to mechanical impacts could attribute to this.

Keywords: Craniofacial injuries, Frontal bone fractures, Reconstruction, Skull fractures

INTRODUCTION

Frontal bone fractures are rare and occur in only 5-12% of maxillofacial traumas and have a relatively low incidence if compared to the remaining types of fracture involving the cranio-maxillofacial region.[1] The fact that the frontal bone is more protected from traumatic events by both the prominence of the nasal pyramid which protects the naso-orbital region and the frontal bone higher resistance to mechanical impacts could attribute to this. Frontal bone fractures offer significant challenges to surgeons and the treatment paradigm has been debated for many years. Acute concerns include protection of intracranial structures, identification of associated injuries and control of cerebrospinal fluid (CSF) leakage.[1,2] The aesthetic forehead contour is also an important consideration in repair. Past surgical modalities that removed the anterior bony frontal surface left life-long disfiguring defects and have been largely replaced by techniques that leave a smooth contour without visible scars. The frontal sinus is in close proximity to several intracranial structures. The posterior wall forms the anterior wall of the cranial vault and the floor of the frontal sinus contributes to the anterior superior roof of the orbit.

CASE REPORT

Over a period of 4 months from January 2015 to April 2015, ten male patients with frontal bone fractures reported to the Department of Plastic, Reconstructive and Oral and Maxillofacial Surgery. All ten patients gave an alleged history of RTA (fall from bike without helmet). One patient panfacial trauma that included the midface and the mandible and three with associated supra orbital rim fractures.

The coronal incision was used in all ten patients to gain access to the fractured frontal bone. The incision was placed 5-7 cm behind the hairline of the individual and extended inferiorly to the level of the auricular helix. A

wave like incision design was used as the scars would be less noticeable especially when the hair is wet. Furthermore, this incision allows for an accurate re-approximation during closure.

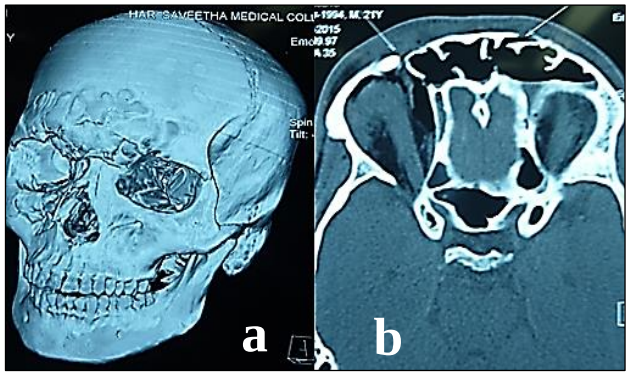

Figure 1a and 1b: CT picture showing fracture of the frontal sinus (a) 3d; (b) axial view.

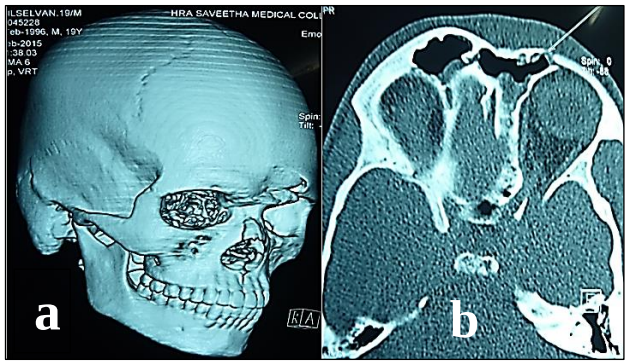

Figure 2a and 2b: Depressed fracture Lt. Frontal bone (a) 3d; (b) axial view.

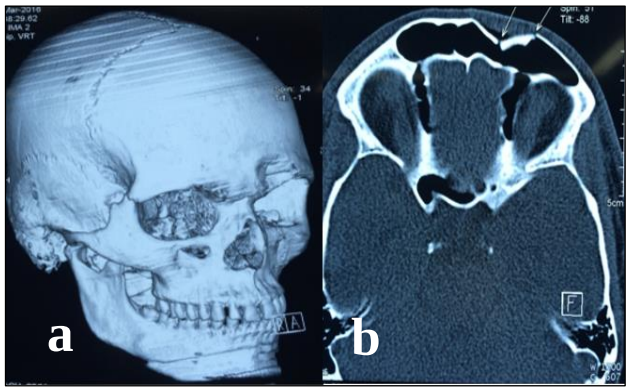

Figure 3a and 3b: Depressed fracture Lt. Frontal bone and supraorbital rim (a) 3d (b) axial view.

Fractured segments were repositioned after removing infected sinus lining and fixation was done in three different techniques. In four patients after reduction of the fractured fragments, fixation was done with mini plates and screws, in another three patients the fractured fragments were removed, wired together extra corporally and fixed in position with wires.

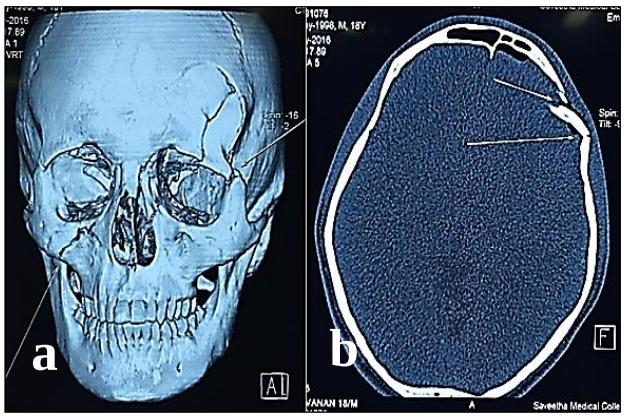

Figure 4a and 4b: Depressed fracture Lt. Frontal bone with frontozygomatic region (a) 3d; (b) axial view.

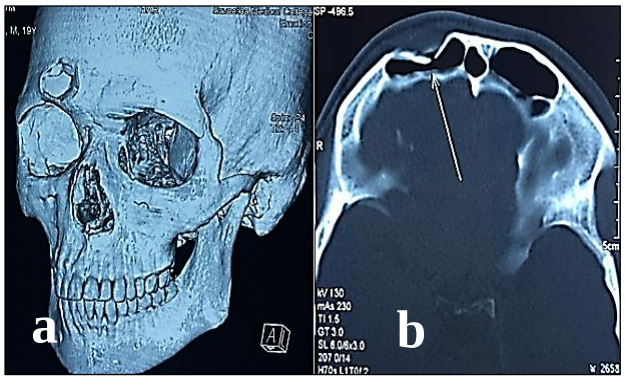

Figure 5a and 5b: Depressed fracture Rt. Frontal bone (a) 3d (b) axial view.

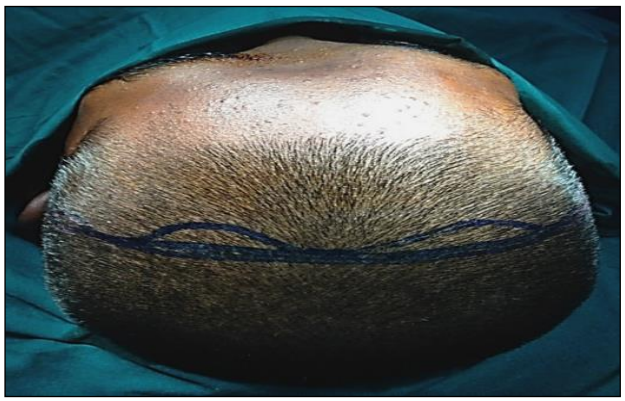

Figure 6: Marking of the coronal incision.

In three of the patients a titanium mesh was used to re-contour the defect along with the bone fragments and fixed with screws. Care was taken to address the correction and contour of the supra orbital rims associated with the frontal bone fractures.

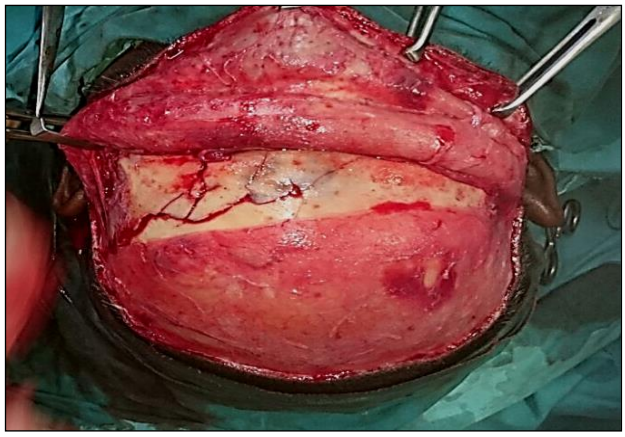

Figure 7: Coronal flap raised exposing the fractured frontal bone.

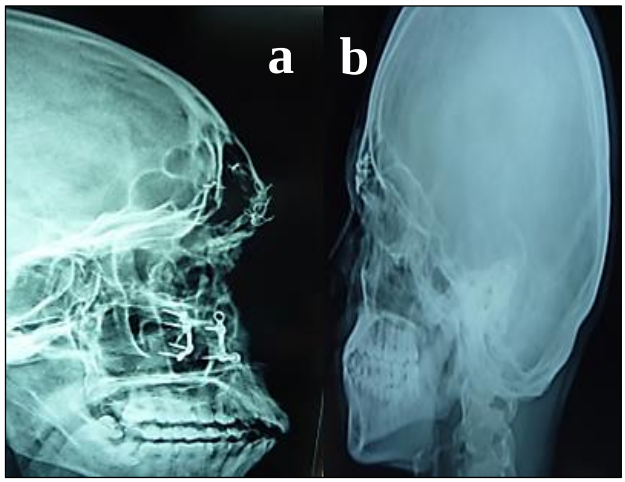

Figure 8a and 8b: (a); Patient 1 post op radiograph showing fracture fixed with stainless steel wiring, (b); Patient 2 post-op radiograph showing fracture fixed with titanium mesh.

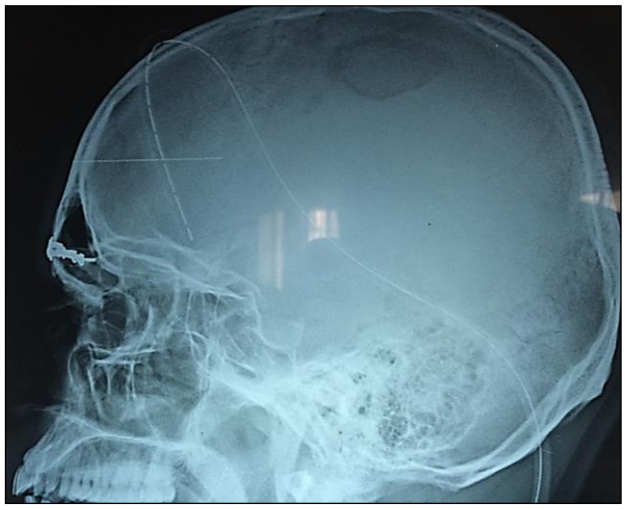

Figure 9: Patient 3 post-op radiograph showing fracture fixed with miniplates and screws.

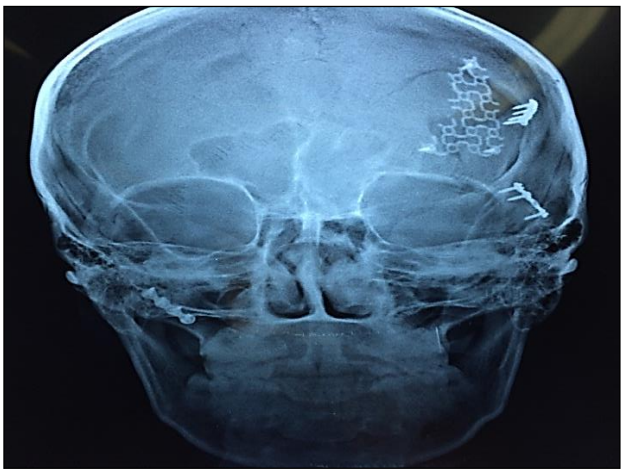

Figure 10: Patient 4 post-op radiograph showing fracture fixed with titanium mesh.

DISCUSSION

The peculiarity of frontal bone fractures is that a wrong choice or inadequate treatment could not only encompass functional or aesthetical problems but also more dangerous complications such as the risk of infections like meningitis, mucocele, encephalitis and cerebral abscess.[1] Hence the necessity to recognize precociously and rightly the type of fracture and the intervening involvement of the adjacent structures in order to perform a proper surgical treatment according to the specific case, thus reducing the risk of infectious-related complications and either functional or aesthetical alterations at minimum.[2] The goal of frontal sinus fracture management is to create a safe sinus, restore facial contour, and avoid short and long term complications.

The anterior table of the frontal sinus is normally convex. Compressive forces on the frontal bone deform the convexity into a concavity. Comminuted fractures can result in trapped mucosa within fracture lines.[3] This can result in sinusitis, or late mucocele formation. Any redundant or injured mucosa at the periphery of the fracture or on isolated bone fragments should thus be removed.

In the four patients we treated, mini plate fixation seemed to produce the least satisfactory results. This could possibly be attributed to the fact that the fracture in this patient was more complex than the others but more because complete fixation was difficult to achieve. We found that fixing the fragments towards the middle proved both difficult and challenging.

The patient we treated with intra osseous wiring provided good a result. Fixation of all the fractured fragments on a template and then to the cranium gave excellent contour but proved to be time consuming, technique sensitive and tiresome.

The two patients treated with the Mesh gave the best results with good contour and ease of surgery. It was less time consuming and the reconstruction of the supra orbital rim proved to be much easier.

Although various algorithms and protocols have been proposed for the management of frontal bone fractures treatment planning must be done on an individual basis.

CONCLUSION

The management of frontal sinus injuries continues to challenge cranio-maxillofacial trauma surgeons because of the low incidence of injury and the absence of good data supporting clinical decision-making.

Management of frontal sinus fractures is so controversial that the indications, timing, method of repair, and surveillance remain disputable among several surgical specialties.

In our view, the three main principles that have to be accomplished in treatment of frontal bone is removal all infected sinus mucosa, thorough debridement of the sinus and bony fragments and restoration of the bony contour to the pre-morbid condition.

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Ethical approval: Not required

REFERENCES

1. Oannides CH, Freihofer HP, Friens J. Fractures of the frontal sinus: a rationale of treatment. Br J Plastic Surg. 1993;46:208-14.
2. Piotrowski WP. The primary treatment of frontobasal and midfacial fractures in patients with head injuries. J Oral Maxillofac Surg 1992;50:1264-8.
3. El Khatib K, Danino A, Malka G. The frontal sinus: a culprit or a victim? A review of 40 cases. J Craniomaxillofac Surg. 2004;32(5):314-7.
4. Chen KT, Chen CT, Mardini S, Tsay PK, Chen YR. Frontal sinus fractures: a treatment algorithm and assessment of outcomes based on 78 clinical cases. Plast Recon Surg. 2006;118:457-68.
5. Bell RB, Dierks EJ, Brar P, Potter JK, Potter BE. A protocol for the management of frontal sinus fractures emphasizing sinus preservation. J Oral Maxillofac Surg. 2007;65(5):825-39.

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