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A case series of frontal bone fracture management in a tertiary care centre

Dr.A.SUDHARSAN,Dr.R.J.SREE CHARAN,Dr.V.GOVINDHARAJ

DEPARTMENT OF PLASTIC & RECONSTRUCTIVE SURGERY,

CHENGALPATTU MEDICAL COLLEGE AND HOSPITAL.

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ABSTRACT

Background :Fractures of the frontal bone are quite common in the context of head and neck injuries and are often involved in high-energy trauma such as road traffic accidents.Generally they occur in a polytrauma scenario associated with injuries of the maxillofacial region including zygomatic complex fracture, orbital fractures, naso-ethmoid fractures or mandible fractures and injuries in other areas of the body such as limbs, thorax or abdomen.The treatment of frontal fractures depends on the type of fracture and associated injuries.

Methods:It is a prospective study done in the Department of Plastic and Reconstructive Surgery, Chengalpattu Medical College, Tamil Nadu, during the period of June 2021- December 2022.10 cases were included. In all our cases the anterior table fractures were reduced and fixed using stainless steel plates and screws, or titanium mesh.

Results:Out of 10 cases, titanium mesh was kept in 5 cases. MiniPlates were used in 5 cases.All Patients had better aesthetic outcome.

Conclusion: Aesthetic correction of depressed frontal bone is important to avoid contour deformities. Timely surgical intervention and proper reconstruction of frontal bone fracture are necessary to maintain contour and function.

I. 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.

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Case 1:

A 38yr old male patient sustained facial injury following road traffic accident. CT showed comminuted fracture anterior table of frontal bone.ORIF done via bicoronal approach. Fracture fixation done with MiniPlates by cantilevering technique.

Case 2:

A 30 Yr old male patient sustained facial injury following road traffic accident.CT suggestive of depressed fracture frontal bone over right supra orbital region.Fracture site approached through the wound at fracture site.ORIF done with titanium mesh placement

Case 3:

A 23 Yr old male patient sustained facial injury following RTA. CT suggestive of displaced fracture anterior table of frontal bone.ORIF done with mini plate fixation via bicoronal approach




Case 4:

A 22 yrs old male patient sustained facial injuries following assault by an unknown person with heavy object .CT suggestive of depressed fracture left supra orbital region of frontal bone.ORIF done with MiniPlate via through the wound approach



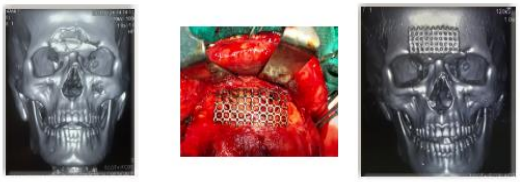

Case 5:

A 35 yrs old male Sun stained facial injury following an assault.CT suggestive of depressed fracture of frontal bone at glabellar region.ORIF done with miniplate fixation through the wound approach




Case 6:

A 24 yrs old male patient sustained depressed comminuted fracture of frontal bone following RTA.ORIF and titanium mesh fixation done via bicoronal approach.



Case 7:

A 33 yrs old female sustained facial injuries following accidental fall from height.CT suggestive of fracture frontal bone and nasal bone.ORIF done with titanium mesh placement via bicoronal approach without hair shaving and closed reduction of nasal bone.

Case 8:

A 37 Year old male patient sustained facial injury following an assault with heavy object.CT suggestive of fracture frontal bone at glabellar region.ORIF done with miniplate via the sutured wound

Case 9

A 25 yrs old male patient sustained facial injury following an assault with heavy object.CT suggestive of depressed fracure frontal bone.ORIF with titanium mesh done approached via through the wound.

Case 10

A 30 yrs old male patient sustained facial injury following self fall from two wheeler.CT suggestive of depressed fracture frontal bone .ORIF done with titanium mesh via bicoronal approach

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

S.no	Age/sex	Mode of injury	Clinical findings	CT findings	Surgical approach	Procedure	Results
1	38/Male	RTA	Deformity noted over the forehead	Comminuted fracture of anterior table	Bicoronal approach	ORIF with miniplate fixation by cantilevering technique	Nil early / late complication
2	30/Male	Road traffic accident	Depression over right supra orbital region	Depressed fracture of frontal bone at supra orbital region	Through the wound approach	ORIF with titanium mesh	Good aesthetic outcome
3	23/Male	RTA	Contusion and edema over forehead	Linear fracture of outer table of frontal bone	Bicoronal approach	ORIF with miniplate fixation	Nil early / late complication
4	22/Male	Assault	Lacerated wound with hematoma	Fracture supra orbital region of frontal bone	Through the wound approach	ORIF with miniplate fixation	Good aesthetic outcome without anything complication.
5	35/Male	Assault	Deep Laceration with exposed fracture segment	Depressed fracture glabellar portion of frontal bone	Through the wound approach	ORIF with miniplate fixation	Good aesthetic result
6	24/Male	RTA	Depression over glabellar region	Comminuted fracture of outer table of frontal bone	Bicoronal approach	ORIF with titanium mesh	Good aesthetic outcome without any complication.
7	33/Female	Accidental Fall from height	Depression with surrounding hematoma	Comminuted fracture of outer table with noe complex fracture	Bicoronal approach	ORIF with titanium mesh	Good aesthetic outcome without any complication.
8	37/Male	Assault	Deformity over forehead	Fracture outer table of frontal bone	Through the wound approach	ORIF with miniplate fixation	Good aesthetic outcome without any complication.

S.no	Age/sex	Mode of injury	Clinical findings	CT findings	Surgical approach	Procedure	Results
9	25/Male	Assault with heavy object	Deep laceration exposing fracture segments	Comminuted fracture of outer table	Through the wound approach	ORIF with titanium mesh	Good aesthetic outcome
10	30/Male	Accidental fall from height	Depression over forehead	Comminuted fracture of outer table	Bicoronal approach	ORIF with titanium mesh	Good aesthetic outcome without any complication.

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, Timely surgical intervention and proper reconstruction of frontal bone fracture are necessary to maintain contour and function.

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