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# Surgical Management of A Palatally Impacted Mesiodens in An 8-Year-Old Male: A Case Report

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## Abstract

Panfacial trauma is one of the most complex maxillofacial injuries involving simultaneous fractures of the upper, middle, and lower thirds of the facial skeleton. Management sequencing remains controversial and depends upon fracture pattern, associated injuries, neurological status, and surgeon preference. In patients with associated cranial injuries, immediate stabilization of frontal bone fractures may take precedence over definitive facial reconstruction.

This case report describes a staged management protocolina patient with panfacial trauma associated with a depressed frontal bone fracture involving the frontal sinus. A 32-year-old male patient presented following a high-velocity road traffic accident with forehead depression, facial asymmetry, malocclusion, bilateral periorbitaledema, and multiple facial fractures. Computed tomography revealed depressed frontal bone fracture with frontal sinus involvement, naso-orbito-ethmoidal fracture, bilateral zygomaticomaxillary complex fractures, Le Fort fractures, and mandibular parasymphysis fracture.

Due to the significant inward displacement of frontal bone fragments and associated risk of traumatic brain injury progression and cerebrospinal fluid leak, emergency frontal bone stabilization was performed through abicoronal approach. Fractured segments were elevated, reduced anatomically, and stabilized using titanium plates and screws. Dural inspection and repair were performed wherever necessary. Definitive reconstruction of the midfacial and mandibular fractures

was delayed until reduction of edema and systemic stabilization.

Secondary reconstruction of the remaining facial skeleton was performed successfully using open reduction and internal fixation techniques. Restoration of facial contour, occlusion, and cranial stability was achieved with satisfactory functional and aesthetic outcome.

This report highlights the importance of individualized sequencing in panfacial trauma and supports early frontal bone stabilization as a stable superior anchoring frame work in selected cases associated with cranial injury with the support of multidisciplinary team approach.

**Keywords**: Panfacial trauma, Frontal bone fracture, Depressed skull fracture, Coronal approach, Staged reconstruction, Traumatic brain injury, Frontal sinus fracture, Maxillofacial trauma

## Introduction

Panfacial fractures are complex injuries involving simultaneous disruption of the upper, middle, and lower facial skeleton. These injuries commonly result from high-energy trauma such as road traffic accidents and are frequently associated with neurological injuries, airway compromise, ophthalmic injuries, and severe soft tissue damage.[1]

Management of panfacial trauma remains challenging due to loss of stable anatomical landmarks, severe comminution, and involvement of multiple facial buttresses. Various surgical sequencing protocols including “bottom-up,” “top-down,” “inside-out,” and “outside-in” approaches have been described inliterature.[2] However, treatment planning

Should be individualized depending upon fracture severity, systemic condition, and associated cranial injuries.

Frontal bone fractures account for a significant proportion of craniofacial trauma and may involve the frontal sinus, anterior cranial fossa, and dura. Depressed frontal bone fractures can increase the risk of traumatic brain injury progression, cerebrospinal fluid (CSF) leakage, infection, and cosmetic deformity.[3]In such situations, early stabilization of the frontal bone becomes a priority to restore cranial integrity and establish a stable superior framework for future reconstruction.

The present case report describes a staged management approachina patient with panfacial trauma where primary reconstruction of the depressed frontal bone fracture was prioritized before definitive reconstruction of the midface and mandible.

## Case Report

A 32-year-old male patient reported to the emergency department following a high-velocity road traffic accident with chief complaints official swelling, forehead depression, inability to occlude properly, and pain over the facial region.

### Clinical Examination

Extraoral examination revealed:

- Forehead depression over the frontal region
- Bilateral periorbital edema and ecchymosis
- Facial asymmetry
- Nasal deformity
- Multiple facial lacerations
- Restricted mouth opening

Intraoral examination showed deranged occlusion with mobility in the mandibular parasymphysis region.

Neurological assessment revealed altered sensorium with Glasgow Coma Scale score of 8/15.

### Radiographic Findings

Computed tomography (CT) scan demonstrated:

- Depressed frontal bone fracture involving anterior wall of frontal sinus
- Frontal sinus comminution
- Naso-orbito-ethmoidal fracture

- Bilateral zygomaticomaxillary complex fractures
- Le Fort fracture pattern
- Mandibular parasymphysis fracture

Significant in ward displacement of frontal bone fragments with dural exposure raised concern for traumatic brain injury progression and possible CSF leakage.

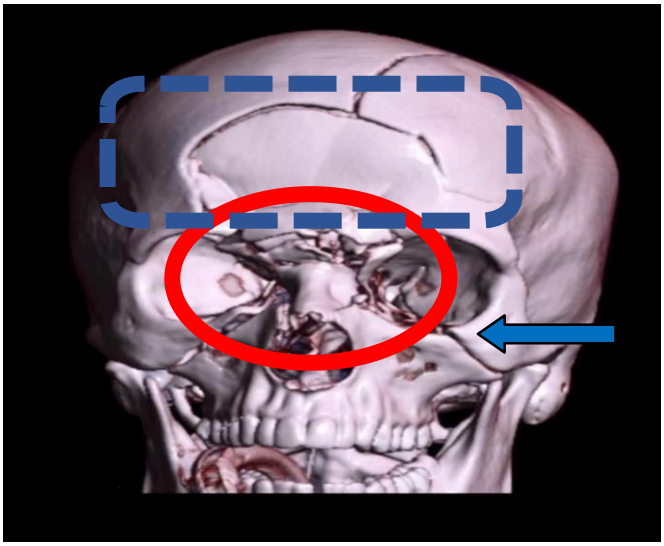

Figure 1: CT scan demonstrating depressed frontal bone fracture with frontal sinus involvement.

**Diagnosis**

Based on clinical and radiographic findings, a diagnosis of Panfacial trauma associated with depressed frontal bone fracture and frontal sinus involvement was established.

**Treatment Plan**

A staged surgical treatment protocol was planned in consultation with the neurosurgery team.

**Stage I:**

Emergency reduction and stabilization of the depressed frontal bone fracture through bicoronal approach.

**Stage II:**

Delayed definitive reconstruction of the remaining facial fractures after systemic stabilization and reduction of edema.

**Surgical management**

**Stage I–Frontal Bone Stabilization**

Under general anesthesia, abicoronal incision was placed and full-thickness flap elevation was performed to expose the frontal bone and superior orbital rim.

Depressed frontal bone fragments and comminuted anterior frontal sinus wall were identified. Fractured segments were elevated carefully and devitalized fragments were debrided. Dural integrity was assessed and repaired wherever necessary in collaboration with the neurosurgical team.

Rigid fixation was achieved using titanium miniplates and screws. Adequate forehead contour and cranial stability were restored.

The rationale for primary frontal bone fixation included:

- Prevention of worsening traumatic brain injury
- Repair of dural tears
- Management of potential CSF leak
- Restoration of cranial stability
- Establishment of a stable superior anchoring point for future reconstruction
- Postoperative recovery was uneventful with gradual neurological improvement.

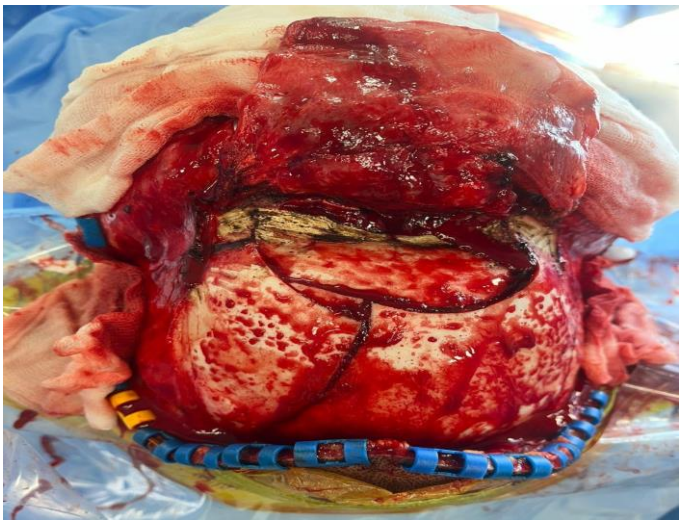

Figure 2: Intraoperative exposure through bicoronal approach

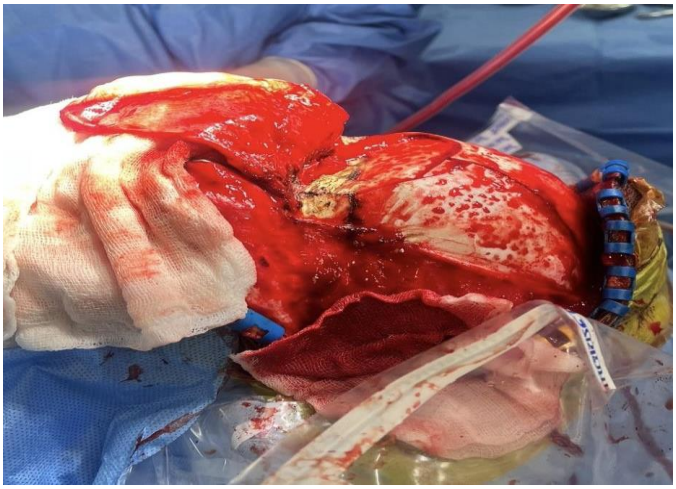

Figure 3: Intraoperative exposure through bicoronal approach.

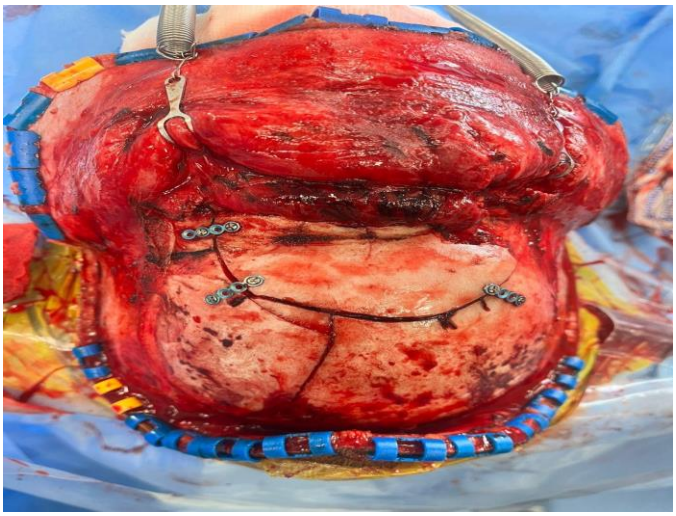

Figure 4: Fixation of frontal bone using titanium plates and screws.

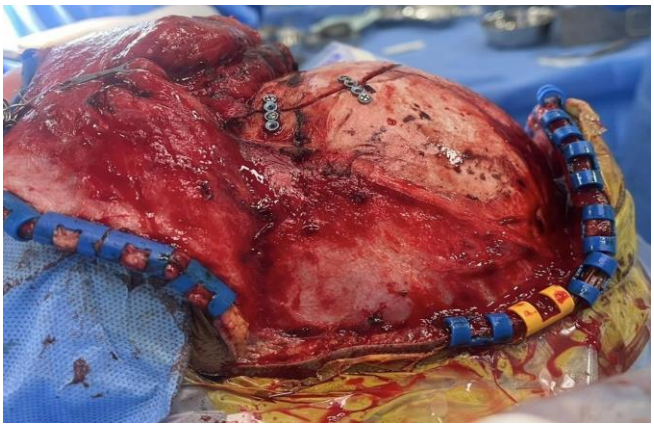

Figure 5: Fixation of frontal bone using titanium plates and screws.

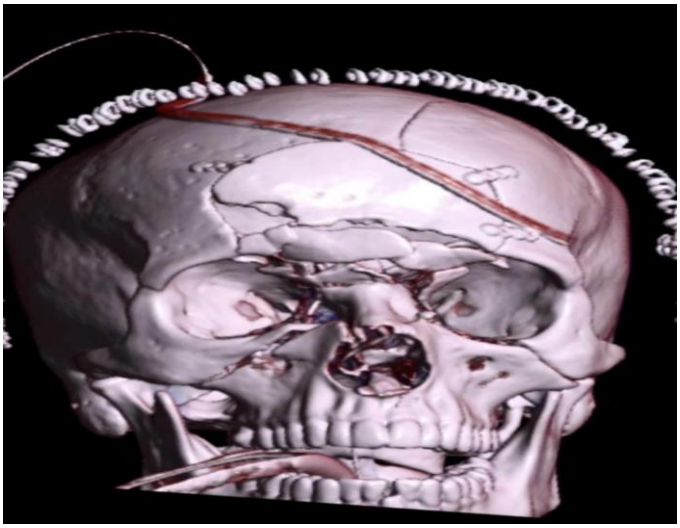

Figure 6: Postoperative radiological frontal profile following primary reconstruction.

**Stage II–Deferred Facial Reconstruction**

Definitive reconstruction of the midfacial and mandibular fractures was deferred due to the patient's poor neurological status and low Glasgow Coma Scale (GCS) score. Considering the risk associated with prolonged general anesthesia and extensive surgical intervention in a neurologically unstable patient, only emergency stabilization of the depressed frontal bone fracture was performed during the acute phase. The primary objective at this stage was preservation of life, prevention of further neurological deterioration, management of potential cerebrospinal fluid leakage, and stabilization of the cranial vault. Definitive reconstruction of the remaining facial fractures was postponed until improvement in neurological status and systemic stabilization could be achieved.

**Discussion**

Panfacial trauma presents considerable reconstructive difficulty due to simultaneous disruption of multiple facial but tresses and anatomical landmarks.[2]

Surgical sequencing remains controversial and must be tailored according to fracture pattern and associated systemic injuries.

Traditional management protocols commonly advocate either “bottom-up and outside-in” or “top-down and inside-out” approaches. However, in patients with associated frontal bone depression and cranial involvement, neurosurgical priorities may necessitate early stabilization of the frontal bone.[3]

In the present case, significant inward displacement of frontal bone fragments posedarisk for progression of traumatic brain injury and CSF leakage. Therefore, frontal bone stabilization was prioritized before definitive facial reconstruction.

The bicoronal approach provided excellent exposure of the frontal sinus, superior orbital rim, and upper facial skeleton while allowing accurate reduction and fixation. Early restoration of cranial integrity also created a stable superior reference point for subsequent reconstruction of the remaining facial skeleton.

In the present case, complete facial reconstruction was intentionally deferred because the patient presented with low Glasgow Coma Scale (GCS) score and associated neurological compromise. In patients with severe craniofacial trauma, preservation of neurological function and hemodynamic stability takes precedence over prolonged reconstructive procedures. Extended operative time under general anesthesia in neurologically unstable patients may increase morbidity and worsen intracranial status.

Therefore, emergency management was limited to elevation and stabilization of the depressed frontal bone fracture to prevent progression of traumatic brain injury, manage possible cerebrospinal fluid leakage, and restore cranial stability. The frontal bone was prioritized because of its direct relationship with the anterior cranial fossa and potential neurosurgical complications.

Literature supports staged or delayed management protocols in Panfacial trauma patients with associated head injury, where definitive facial reconstruction may be postponed until neurological recovery and systemic stabilization are achieved. Such an approach reduces surgical burden during the acute phase while allowing life-saving neurosurgical priorities to be addressed adequately.

The present case emphasizes the importance of individualized sequencing protocols in panfacial trauma based on neurological status and overall systemic condition.

**Conclusion**

Panfacial trauma associated with depressed frontal bone fracture requires careful multidisciplinary planning and individualized surgical sequencing.

Early stabilization of the frontal bone through a bicoronal approach can reduce neurological complications, restore cranial stability, manage potential CSF leakage, and establish as table superior framework for delayed reconstruction of the remaining facial skeleton.

“Neurological stabilization should take precedence over definitive facial reconstruction in panfacial trauma patients presenting with low GCS and associated cranial injuries.” staged surgical approach can provide satisfactory functional and aesthetic outcomes in patients with complex craniofacial injuries.

**Abbreviations**

CSF – Cerebrospinal Fluid

CT–Computed Tomography

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