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Case Report

Post-traumatic frontal bone osteomyelitis in a two-year-old: an uncommon sequela of head injury

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ABSTRACT

Frontal bone osteomyelitis, though rare, is a serious complication of craniofacial trauma in paediatric patients. This short communication presents the case of a 2-year-old male who developed frontal bone osteomyelitis following blunt trauma. The case emphasizes the importance of early diagnosis, appropriate imaging, and a multidisciplinary approach for successful management.

Keywords: Frontal osteomyelitis, Paediatric trauma, Pots puffy tumour, Frontal bone fracture

INTRODUCTION

Facial fractures are rare in the paediatric population, accounting 1.5 to 8% of injuries among children aged 12 years or younger and less than 1% under the age of 5 years.[2] Osteomyelitis of the craniofacial bones, though rare, poses a significant risk in paediatric patients.[1] The unique anatomy of the paediatric skull, with active growth plates and a robust vascular supply, offers some protection against infections.[3]

However, trauma can disrupt these defenses, creating a pathway for infection. This report highlights a rare case of frontal bone osteomyelitis in a 2-year-old patient following blunt trauma, discussing the diagnostic challenges, management strategies, and the importance of a multidisciplinary approach.

CASE REPORT

The father of a 2-year-old patient reported with a two-month-old history of purulent discharge from the child's upper eyelid region. There was a history of fall one year ago, during which the child sustained a forehead injury. Following the injury, the patient was taken to a nearby hospital, where antibiotics and analgesics were prescribed, and the condition was managed conservatively. Over the past 10 days, the father noticed swelling in the affected area and sought further evaluation (Figure 1). On examination, mild swelling was observed in the right upper eyelid, along with pus discharge and a sinus opening. Vision and extraocular muscle movements were normal. CT imaging indicated chronic osteomyelitis of the frontal bone, extending from the right supraorbital margin to the frontal bone region (Figure 2).

MRI findings confirmed frontal osteomyelitis, with associated evidence of right blepharitis and keratitis without any intracranial spread. Blood investigations revealed normal results. Pus culture and sensitivity testing (CST) identified *Staphylococcus aureus*, which was susceptible to Linezolid and Gentamycin.Surgical intervention was performed under general anaesthesia, involving a coronal approach, sequestrectomy (Figure 3 and 4), obliteration of fronto nasal duct, peri cranial flap was used to cover the defect, excision of the sinus tract, and primary closure.

Outcome

The patient showed complete recovery with no residual swelling or neurological deficits. Follow-up at one year demonstrated normal growth and development with no recurrence of symptoms (Figure 5).

Figure 1: Preoperative frontal view showing a discharging sinus over the right upper eyelid.

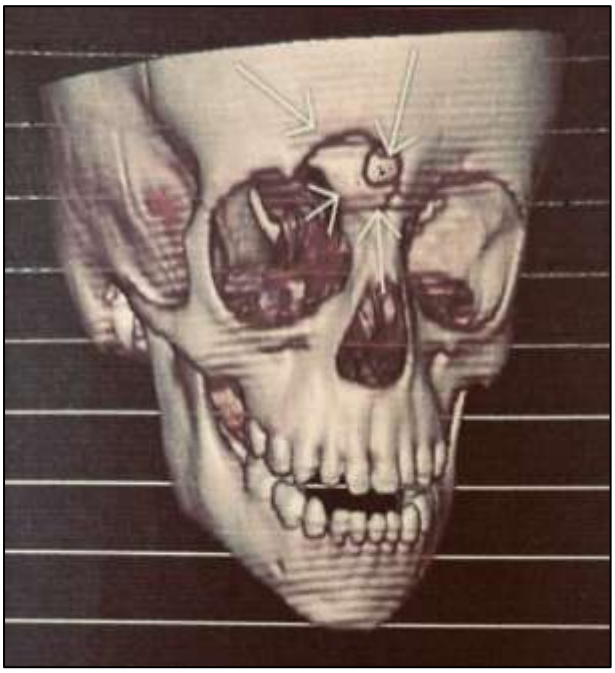

Figure 2: CT Image of the sequestra.

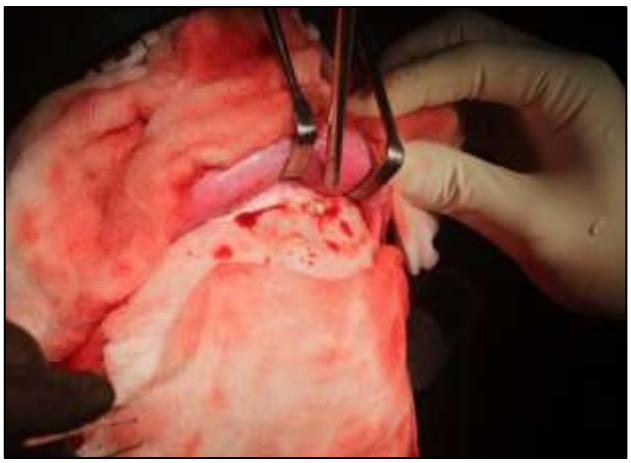

Figure 3: Intra-op picture showing pus discharge.

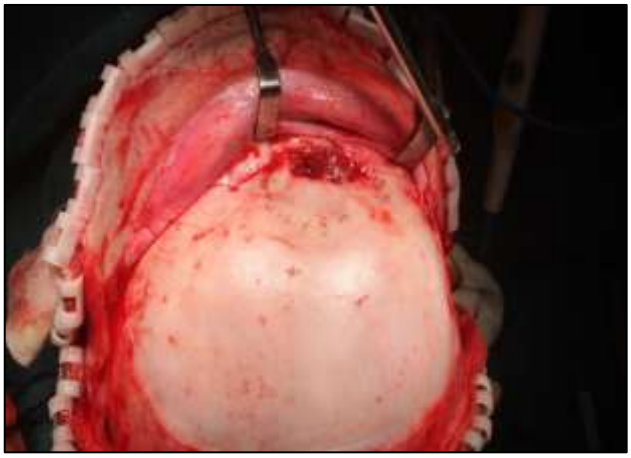

Figure 4: Coronal approach with pericranial flap for exposure of frontal region after sequestrectomy.

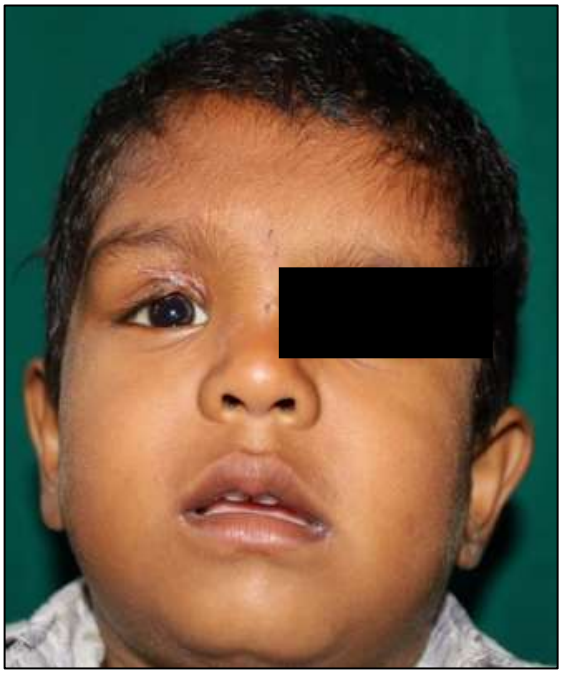

Figure 5: 1 year follow up showing progress.

DISCUSSION

A typical fluctuant swelling over the forehead known as pots puffy tumour after Sir Percival Pott who described the condition in 1760 resulting from frontal sinusitis and osteomyelitis eroding of anterior table of frontal bone. It is a serious life-threatening complication of frontal sinus infection. The rarity if the case and paucity of literature has prompted us to report this case.[11]

Frontal bone osteomyelitis is a rare condition, particularly in the paediatric population.[1] The most common predisposing factors include super infected open head trauma, frontal sinusitis involving posterior wall of the frontal sinus. Trauma, as in this case, can create a breach in the periosteum, allowing bacterial colonization and subsequent infection.[4] *Staphylococcus aureus* and non-enterococcal streptococci are the most frequently isolated pathogen in such infections.[5] Persistent bacterial overgrowth in the frontal sinus cavity and adjacent soft tissues permits small vessel thrombosis and venous congestion.[12] Disruption of frontal periosteal blood supply cascades into an inflammatory reaction marked by increased intraosseous pressure and extensive necrosis of the trabecular bone matrix. The resulting avascular and ischemic nature of this process favors the conversion of a previously aerobic environment to an anaerobic one which stimulates growth of opportunistic microorganisms from which abscesses and cortical sinus tracts develop.[13]

The anterior pericranium is particularly vulnerable to spread of infection, due to its rich venous plexus which communicates directly with the diploic veins of the frontal sinus cavity. This feature makes possible retrograde flow of septic emboli into the cranial vault, effectively seeding the intracranial space. This can occur with or without concomitant erosion of the posterior table of the frontal sinus, which is relatively thin compared to the anterior segment.[14] Sub periosteal or subgaleal abscess can extend to the infraorbital, intra septal or intracranial regions. Intra cranial complications accounts for 60 to 85% of the adult cases and almost 100 % in children. These may include subdural or epidural empyema, frontal brain abscess, cavernous sinus thrombosis, cortical venous thrombosis and acute meningitis.[6] This might present as nausea, vomiting, fever, frontal headaches, seizures, altered mental status, or focal neurologic deficits.[11]

The presentation of frontal bone osteomyelitis can mimic other conditions, making early diagnosis challenging. Clinical features such as forehead swelling, facial pain, periorbital edema, erythema, sino cutaneous fistula and fever, combined with a history of trauma, should prompt suspicion of this condition.[8] Advanced imaging techniques, such as CT and MRI, are essential for confirming the diagnosis, assessing the extent of the disease, and identifying complications.[9] Orbital Manifestations is because of its close anatomic relationship to the paranasal sinuses. Bacteria may spread rapidly through the thin lamina papyracea of the medial orbital wall to involve soft tissue components of the orbit. While permanent orbital sequelae are especially rare, early involvement of the eye poses a serious threat to visual acuity and warrants ophthalmologic consultation.[15] Management requires a multidisciplinary approach, including surgical and medical intervention. Surgical debridement is critical for removing infected and necrotic tissue, while prolonged antibiotic therapy targets residual infection and prevents recurrence. The choice of antibiotics should be guided by microbiological culture and sensitivity results.[10]

CONCLUSION

Frontal bone osteomyelitis in children is a rare occurrence probably first of its being reported here. It poses serious complication of craniofacial trauma in paediatric patients. A significant proportion of frontal osteomyelitis patients develop intracranial complications with associated morbidity and mortality. As such, early diagnosis and aggressive management are at the core of treatment and are necessary to mitigate risk of intracranial complications and long-term neurologic sequelae. Therefore, this case report highlights the importance of early recognition, imaging, and multidisciplinary management in ensuring favourable outcomes.

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