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Case Report

Titanium miniplate fixation in 6-month-old infant with parasymphysis fracture: a case report

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ABSTRACT

Mandibular fractures in infants are uncommon and challenging due to ongoing facial growth and the presence of developing tooth buds. We report a case of a 6-month-old infant with a parasymphysis mandibular fracture managed with open reduction and internal fixation using a titanium miniplate. Surgery was performed with caution to avoid damage to dental structures, and the plate was removed after three months. Follow-up showed normal growth and dental development without complications. This case demonstrates that with proper technique and timing, rigid fixation can be safely used in infants, ensuring both functional recovery and normal craniofacial development.

Keywords: Infant mandible, Parasymphysis, Miniplating, Fracture

INTRODUCTION

In the pediatric age group, especially in patients under five years, fractures of the mandible and facial bones are rarer than in adults. The impact force is absorbed by the forehead and skull rather than the face, as the ratio of cranial volume to facial volume is larger in children than in adults (8:1 at birth, 4:1 at 5 years, compared to 2:1 in adults).[1]

The rarity of facial fractures in infants is primarily attributed to both physical and social factors. At this developmental stage, children are typically nurtured within highly supervised and protective environments, significantly reducing their exposure to high-impact trauma.

Unlike adults, infants are not subjected to occupational hazards, motor vehicle collisions, or interpersonal violence-common etiological factors in adult facial fractures.[2] Furthermore, because to their increased elasticity, reduced sinus pneumatization, significant surrounding adipose tissue, and the stabilization of the mandible and maxilla by unerupted teeth, paediatric facial bones are more resistant to fractures.[3] Despite the use of similar medical tools, treating mandibular fractures in paediatric patients poses special obstacles that set it apart from managing fractures in adults. This difference mainly results from the fact that the paediatric mandible contains many tooth buds that are still forming, as well as the possible danger that these injuries could represent to the growth and development of the craniofacial region in the future.[4]

In order to prevent long-term developmental disruptions, these elements make the treatment approach more difficult and call for careful planning. However, compared to the sclerotic and functionally compensatory remodeling processes that are usually observed in adults, children have a greater capacity for biological healing and restitutive remodeling. When diagnosing and treating mandibular trauma in children, these factors are crucial.[5] This paper describes an infant parasymphysis mandibular fracture where mini plate fixation was done and plate

removal done after 3 months without any growth disturbance.

CASE REPORT

A 6-month-old female infant was brought to the emergency department by her parents following a fall from her mother's arms, which occurred when the mother was struck by a four-wheeled vehicle. Upon presentation, the infant exhibited a laceration on the right side of the lower alveolus, with intraoral bleeding. The child was noted to be drowsy but hemodynamically stable. According to the mother's history, there was no history of vomiting, seizures, or bleeding from the ears or nose. The only observable injury was intraoral oozing from the lacerated area.

In light of the mechanism of injury and the patient's altered level of consciousness, a CT scan of the brain along with a 3D reconstruction of the facial bones was performed under sedation (Figure 1). A neurological consultation was obtained, and following clinical examination and review of imaging, no evidence of intracranial injury was found. The patient was admitted to the intensive care unit under the care of the plastic surgery team for close monitoring, particularly in view of potential airway compromise and bleeding. Surgical clearance was obtained following routine preoperative investigations. On the following day, the infant was taken to the operating theatre for open reduction and internal fixation of the mandibular fracture using titanium miniplates. The procedure was performed under general anesthesia with nasal endotracheal intubation.

Following induction of general anesthesia, a lower gingivobuccal sulcus incision was made to access the fracture site (Figure 2). The mandibular fracture segment was carefully exposed, and open reduction and internal fixation were carried out using a 1.5 mm four-hole titanium miniplate with gap. Fixation was achieved using 1.5×4 mm unicortical screws. Intraoperative care was taken to avoid injury to the developing tooth buds (Figure 3). Water tight closure was done (Figure 4).

The infant was managed postoperatively with a liquid diet and monitored closely for any signs of airway compromise or feeding difficulty. The postoperative course was uneventful, and the patient was discharged in stable condition on the second postoperative day with instructions for continued outpatient follow-up. Check X-Ray was done to verify reduction of fracture segments.

At three months postoperatively, the patient underwent a second procedure under general anesthesia for elective removal of the fixation hardware. Intraoperative findings confirmed satisfactory osseous healing of the mandibular fracture. At the one-year follow-up, clinical examination demonstrated symmetrical mandibular growth with no evidence of facial asymmetry or functional impairment. The patient exhibited normal mouth opening, and eruption of the lower central and lateral incisors was observed to be appropriate for age (Figure 5). X-Ray mandible was done for confirmation of tooth buds and fracture healing (Figure 6). Overall, mandibular development, occlusion, and dentition were consistent with normal growth parameters for the child's age.

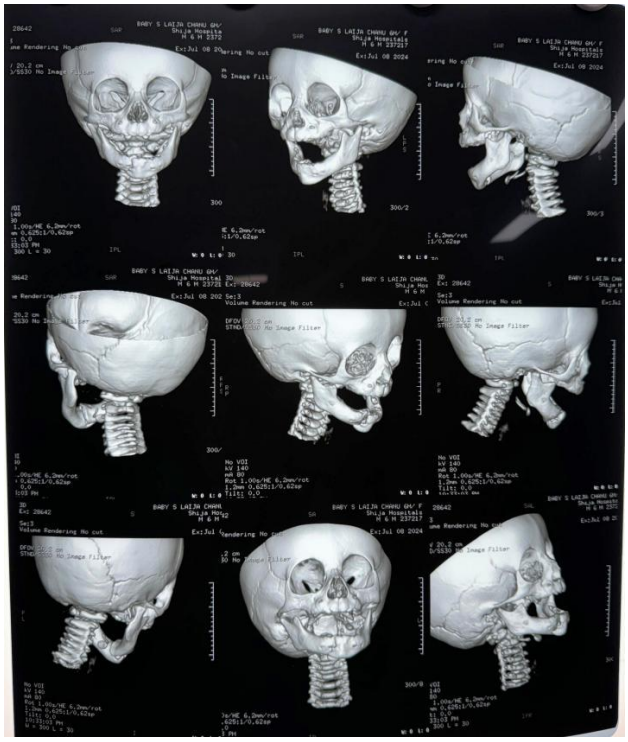

Figure 1: Pre op 3d CT mid face.

Figure 2: Fracture segment exposure.

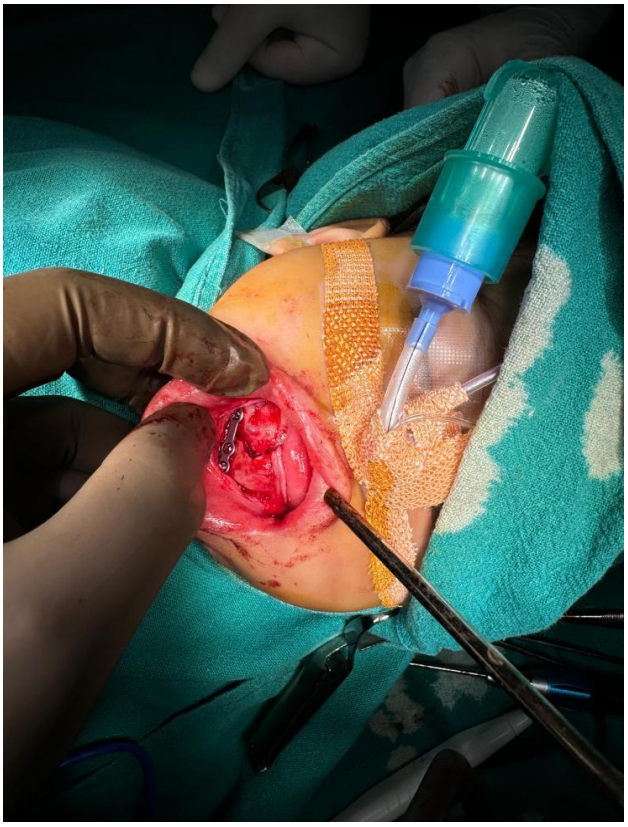

Figure 3: Mini plate fixation.

Figure 4: Post op 1 year X ray mandible showing normal growth.

Figure 5: Post op 1 year normal tooth eruption.

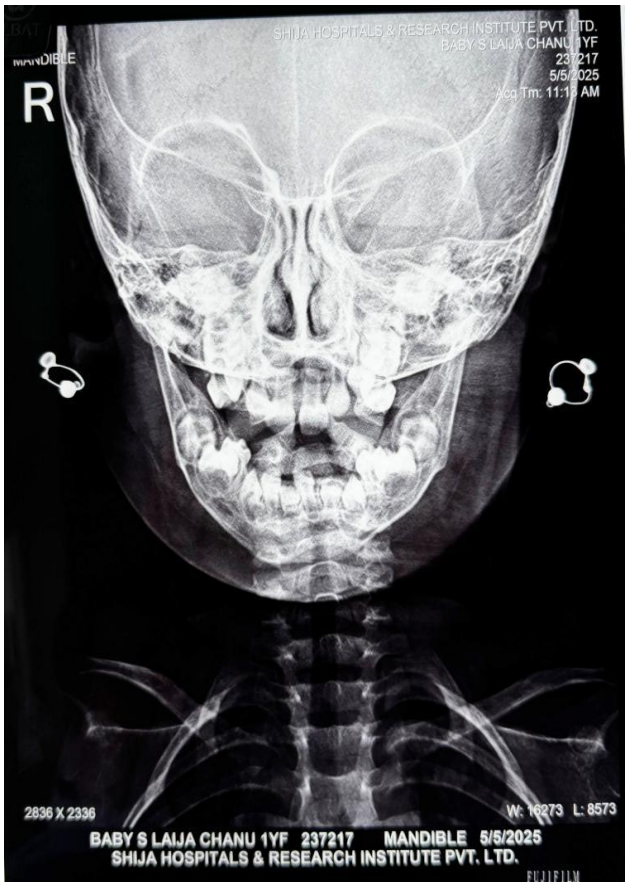

Figure 6: Water tight closure.

DISCUSSION

Mandibular fractures in infants are extremely rare due to the protective anatomical and social environments typically surrounding this age group. When they do occur, they present unique challenges in diagnosis and management, especially given the developing facial skeleton and the presence of unerupted tooth buds.[6] The case presented here of a 6-month-old infant with a mandibular fracture caused by trauma highlights the diagnostic and therapeutic complexities associated with such injuries.

The mandible will undergo major morphological and dimensional changes and is comparatively undeveloped in the paediatric population, especially in children under the age of two. The mandible's vertical and anteroposterior expansion is greatly influenced by the eruption of teeth and the growth of alveolar bone. Mandibular hypoplasia, malocclusion, and facial asymmetry are among the long-term effects of disruption to growth centers, especially the condyles. Therefore, the goal of any operation must be to minimize the risk to tooth buds, preserve growth potential, and restore anatomical alignment.[7]

Diagnosis of mandibular fractures in infants can be complicated by limited cooperation during clinical examination. As recommended in the literature, the use of CT with 3D reconstruction is critical for accurate evaluation of fracture location, displacement, and assessment of proximity to developing tooth follicles.[8] In the presented case, prompt imaging under sedation allowed for rapid diagnosis and surgical planning. Management of pediatric mandibular fractures varies significantly depending on age, fracture location, dentition status, and degree of displacement. While conservative approaches using soft diets, splints, or intermaxillary fixation (IMF) are often considered in minimally displaced fractures, ORIF becomes necessary in cases of significant displacement or instability.[9] ORIF offers the advantages of accurate anatomical reduction, early mobilization, and functional rehabilitation.

The use of titanium miniplates in infants remains controversial due to concerns regarding facial growth inhibition and potential damage to developing teeth. However, several studies have demonstrated that careful technique-such as placing the plate along the inferior border of the mandible and using monocortical screws-can minimize these risks while providing adequate stabilization. In our case, a single 4-hole titanium miniplate with 1.5×4 mm monocortical screws was used. Special care was taken to avoid the developing tooth buds, and the surgical approach via a lower gingivobuccal sulcus incision allowed safe exposure while preserving vital structures. Children's rapid bone remodeling promotes recovery but also calls for prompt treatment. Within 4 to 7 days, fracture parts may start to join, making delayed reduction more challenging.[10] Early surgical intervention in our situation resulted in a smooth recovery. In order to remove the alloplastic material's long-term presence and prevent any potential interference with mandibular growth, the miniplate was electively removed after three months. There was no sign of malunion or functional impairment at follow-up, and the mandible developed normally with symmetrical growth and age-appropriate dentition.

This case contributes to the growing body of evidence supporting the judicious use of ORIF with titanium miniplates in appropriately selected pediatric mandibular fractures. With proper planning, careful surgical technique, and close follow-up, favorable outcomes can be achieved even in very young patients.

CONCLUSION

Mandibular fractures in infants are rare but clinically significant due to the anatomical complexity and developmental considerations of the pediatric facial skeleton. This case highlights that with timely diagnosis, careful surgical planning, and meticulous technique, open reduction and internal fixation using titanium miniplates can be safely and effectively performed in very young patients. The successful outcome-characterized by normal mandibular growth, appropriate tooth eruption, and absence of complications-demonstrates that rigid fixation, when judiciously applied and followed by timely hardware removal, can preserve both function and developmental potential in pediatric mandibular trauma. Long-term follow-up remains essential to monitor facial growth and dental development.

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