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Case Report

Dentistry Section

Paediatric Mandibular Fracture- An Enigma of its Own: A Case Report

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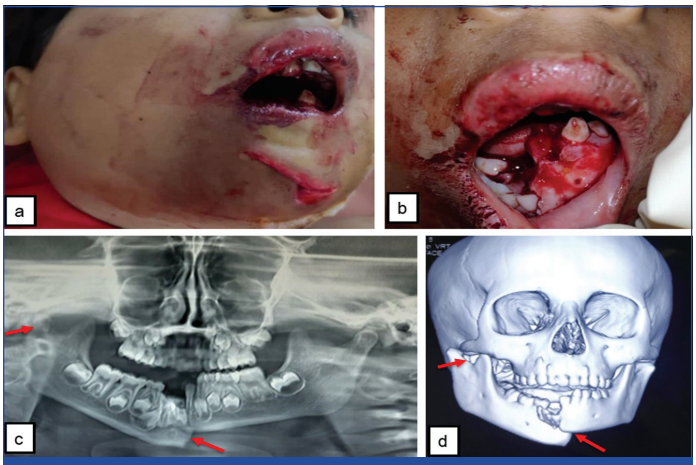
ABSTRACT

Mandibular fractures are very rare in the paediatric age group; however, they remain the most common maxillofacial trauma occurring in children. A paediatric mandibular fracture can cause severe pain and discomfort for the patient. Due to the complex anatomy of the developing mandible, such as the presence of permanent tooth buds and its small size, the treatment of mandibular fractures in the paediatric age group differs markedly from that in adults. Treatment of maxillofacial fractures in the paediatric population has always been a challenge for the operating surgeon. Different treatment modalities for managing paediatric mandibular fractures include closed reduction or surgical intervention. Open/closed cap splint provides closed reduction and stabilisation of paediatric mandibular fractures without any risk of damage to permanent tooth buds. It is more commonly preferred over Open Reduction and Internal Fixation (ORIF) of the fractures. However, for highly displaced fractures, ORIF is the preferred treatment. In the present case report, the author present and describe the management of a mandibular symphyseal and medial pole of the right condyle fracture in a seven-year-old patient. Since the bone fragments were highly displaced and occlusion was severely deranged with an anterior open bite, conservative treatment using a cap splint was not considered. ORIF was performed under general anaesthesia. At the one-year follow-up, complete clinical and radiological bone healing was observed. Occlusion was satisfactory, and mouth opening was maintained. There was normal eruption of permanent teeth with no complications or delays associated with the eruption pattern.

Keywords: Bone, Maxillofacial, Symphysis, Tooth, Trauma

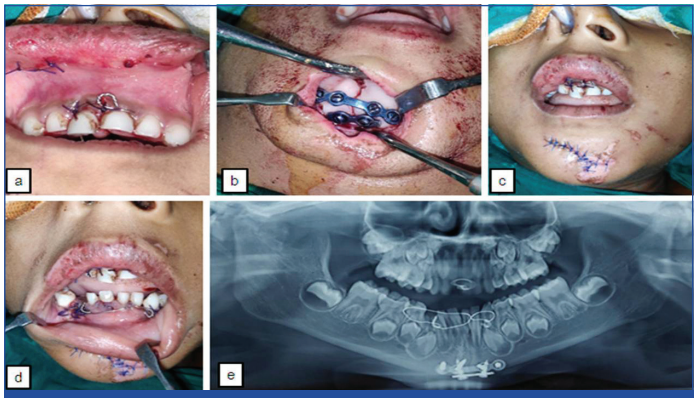
CASE REPORT

A seven-year-old female patient was brought to the casualty Department by relatives with a suspected history of a motor vehicle accident and suffering from maxillofacial trauma. There was no neurosurgical or respiratory distress. She had upper lip oedema and a full-thickness facial laceration at the chin region [Table/Fig-1a]. Intraoral examination revealed a completely exposed highly displaced fracture with evident mobile fracture segments at the symphysis region [Table/Fig-1b]. The occlusion was severely deranged, showing an anterior open bite. Multiple teeth (51, 31, 32, 41, 42) were displaced and mobile, and avulsion of tooth 83 was present. Orthopantomogram (OPG) and Computed Tomography (CT) scan of the face [Table/Fig-1c,d] suggested a fracture at the symphysis and medial pole of the right condyle of the mandible. Since the bony fragments were highly displaced, conservative treatment using a cap splint was not considered, and ORIF was planned. The patient and relatives were informed about the condition and the need for surgery, and informed consent was obtained.



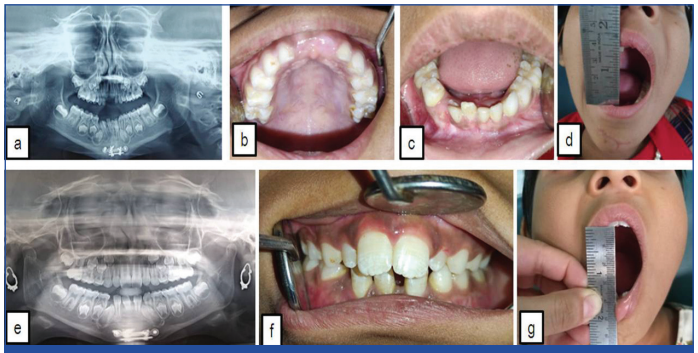
[Table/Fig-1]: Preoperative: a) Upper lip oedema and full thickness facial laceration at chin region; b) Completely exposed highly displaced fracture of mandibular symphysis region; c) Orthopantamogram (OPG) suggestive of symphysis and medial pole of right condyle of mandible fracture (Indicated by red arrow); d) CT scan face suggestive of symphysis and medial pole of right condyle of mandible fracture (Indicated by red arrow).

After obtaining preanaesthetic clearance, the patient was transferred to the operation theatre, and the surgery was performed. Interdental wiring was used to stabilise and reduce the mandibular fracture, and occlusion was achieved through slight manipulation. Tooth 51 was also stabilised using interdental wiring [Table/Fig-2a]. The fracture site was accessed through the existing degloving injury site, and the bone segments were anatomically reduced and fixed with 2 mm titanium miniplates placed close to the inferior border to avoid damaging the permanent tooth buds [Table/Fig-2b]. Meticulous multiple-layered suturing was performed [Table/Fig-2c], resulting in satisfactory fracture reduction [Table/Fig-2d]. Postoperative OPG showed the reestablishment of the lower border of the mandible and no damage to any tooth or tooth bud [Table/Fig-2e]. The patient received active physiotherapy and was administered medications (Inj. Augmentin 300 mg i.v. BD, Inj. Metronidazole 30 mg/kg/day i.v. TDS, and Inj. Paracetamol 10 mg/kg TDS) intravenously for three days, followed by oral administration for the next two days. Regular



[Table/Fig-2]: Intraoperative: a) Tooth 51 stabilised by interdental wiring; b) Reduction and fixation of fracture at mandibular symphysis region; c) Meticulous multiple-layered closure; d) Satisfactory reduction of fracture; e) Postoperative OPG showing good reduction of fracture at mandibular symphysis region with no damage to any tooth or tooth bud.

wound support dressing was performed, with dressing changes twice daily. Suture removal took place one week postoperatively, and the patient was discharged without any complications on the same day. The patient was scheduled for regular follow-up visits. At the 3-month follow-up [Table/Fig 3a-d], healing was uneventful clinically and radiographically, with adequate mouth opening (35 mm). At the one-year follow-up [Table/Fig-3e-g], the fracture site was completely healed, as evident on OPG. Occlusion was satisfactory, and mouth opening was maintained (35 mm). There were no complications or delays associated with the eruption pattern of permanent teeth, and no functional deficits or limitations such as restricted mouth opening were present.



[Table/Fig-3]: Postoperative: a) Orthopantamogram at 3-months follow-up; b) Satisfactory healing of maxilla at 3-months follow-up; c) Satisfactory healing of mandible at 3-months follow-up; d) Adequate mouth opening (35 mm) at 3-months follow-up; e) Orthopantamogram at one year follow-up; f) Satisfactory occlusion at one year follow-up; g) Mouth opening maintained (35 mm) at one year follow-up.

DISCUSSION

Maxillofacial fractures in the paediatric population are rare because of the protective environment provided by parents. Additionally, in the paediatric population, there is a wide coverage of adipose tissue over the bones in the maxillofacial region. The developing bones in children are very resilient with greater elasticity, and there is less pneumatisation of the growing maxillary sinus. These characteristic features make it more difficult for fractures to occur in developing bones, requiring a significant amount of energy [1]. The incidence of facial bone fractures in children is approximately 10%, with the peak incidence occurring above the age of five [2,3]. In children, these fractures commonly present as undisplaced or greenstick fractures. Factors such as the relatively small size of the paediatric mandible, a relatively low tooth-to-bone ratio, the resilient nature of the maxillofacial bones, and the protected environment contribute to the low incidence of paediatric fractures [4]. Mandibular fractures in children can result from trauma due to self-falls, motor vehicle accidents, sports injuries, etc., [5].

Paediatric maxillofacial fractures can be treated conservatively or surgically, depending on factors such as bone quality and density, degree of mobility and displacement between fracture segments, eruption status of teeth, presence of tooth buds, and chances of restricted bony growth [5,6]. Undisplaced or greenstick fractures are typically managed conservatively through closed reduction. For more complex or highly displaced fractures, open surgical treatment is recommended [7]. However, the application of closed reduction or open surgical treatment for paediatric mandibular fractures remains controversial.

Closed reduction using cap splints stabilised with circummandibular wiring is the preferred conservative treatment method [6]. It prevents damage to developing tooth buds and does not interfere with condylar growth. However, it has limitations and is suitable for undisplaced or slightly displaced anterior mandibular fractures only. Highly displaced or complex fractures of the mandibular symphysis require ORIF [8]. During ORIF, care should be taken to minimise damage to tooth roots, developing tooth buds, or dental follicles by fixing screws along the lower border of the mandible [9]. The use of minimally traumatic surgical techniques and careful fixation of miniplates at the lower border of the mandible is crucial to prevent damage to permanent tooth buds.

Restoring the continuity of a fractured bone is essential for achieving immediate function and normal bone development [10]. Studies have shown that ORIF using monocortical miniplates and screws can effectively treat paediatric mandibular fractures with minimal complications [11]. Examples include the use of a 4-hole 1.2 mm titanium miniplate for ORIF of a parasymphyseal fracture in a 13-month-old patient, resulting in satisfactory mouth opening and occlusion after a ten-month follow-up [12]. Another case involved the surgical treatment of a mandibular symphysis fracture using ORIF with a 1.5 mm titanium plate, with the patient demonstrating no restriction in mandibular movements or limitations in mouth opening during follow-up [13].

In the present patient, the fractured bony fragments were significantly displaced, and there was a severe derangement of occlusion with an anterior open bite. Closed reduction with a cap splint and circummandibular wiring would not have provided enough stability and rigidity for proper fracture reduction. This approach could have resulted in malunion or contour deformities. Therefore, ORIF were planned and performed under general anaesthesia. During the ORIF procedure for paediatric mandibular fractures, there is always a risk of damaging the permanent tooth buds. To minimise this risk, miniplates were fixed very close to the lower border of the mandible, effectively protecting the tooth buds. At the one-year follow-up, complete clinical and radiological bone healing was observed. The occlusion was satisfactory, and there was no limitation in mouth opening. The eruption of permanent teeth occurred normally, without any complications or delays associated with the eruption pattern.

CONCLUSION(S)

In the conservative treatment of highly displaced fractures, inadequate reduction can lead to malunion and contour deformities. Paediatric mandibular fractures can be effectively treated by ORIF using monocortical miniplates and screws, resulting in optimal outcomes with very few or no complications. All factors that can affect treatment outcomes should be assessed, and the most effective treatment plan should be formulated and executed to ensure the patient's well-being with minimal complications.

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