Conservative Approach to Pediatric Mandibular Fracture: A Report of Two Cases

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Abstract

Mandibular fractures are relatively less frequent in children when compared to adults, which may be due to the child's protected anatomic features and infrequent exposure of children to alcohol related traffic accidents. While the pattern of fractures in children is similar to adults, however, due to a number of factors, including the anatomical complexity of the developing mandible, management of such fractures differs from that of adults Treatment principles of mandibular fractures differ from that of adults due to concerns regarding mandibular growth and development of dentition.

Keywords: Pediatric mandibular trauma • Mixed dentition • Conservative approach • Mandibular fractures

Introduction

Maxillofacial fractures are less common in children. The incidence ranges from approximately 1% in children under age of 5 years to 8% in children younger than 12 years of age. Mandibular fractures are reported to belong to most frequent facial fractures in pediatric patients [1]. Conservative approach in treatment of maxillofacial trauma in children was common for many reasons, the presence of tooth buds and elasticity of pediatric bone were factors for splinting or IMF as standard treatment for mandible fracture in children during deciduous dentition. Open reduction and fixation was avoided for preventing harm to the teeth. Nondisplaced fractures are better treated by traditional methods of soft diet or closed reduction. Displaced fractures are better served by open reduction and internal fixation. Development of microplate and screws have made it possible to apply these fixation materials in pediatric traumatology but found to have limitations in terms of growth restriction, stress shielding and corrosion [2].

Case Presentation

Case report 1

A 5 year old male child patient, reported to the department of oral and maxillofacial surgery with a history of fall from height at his own place while playing. There was no history of vomitting, seizures, loss of consiousness, ear, nose, throat bleed. There was no relevant past medical and dental history [3]. Patient was conscious, cooperative and well oriented to time, place and person. Upon extraoral examination laceration was present near angle of the mouth on right side and on right side of forhead. Upon intraoral examination step defect was present on left parasymphyseal region. There was derrangement of occlusion with limited mouth opening (Figure 1). On radiological examination, CT head was done to rule out any component of head injury and was normal. OPG revealed mandibular symphyseal fracture (Figure 2). Routine blood investigations were carried out and were normal.

Figure 1. Step defect and deranged occlusion.

Figure 2. Preoperative OPG showing mandibular.

Treatment plan: Primary treatment was instituted. Primary closure of the lacerated wounds was done using 3-0 ethilon sutures. Preoperatively maxillary and mandibular impressions were made in alginate (Figure 3). Impressions poured in dental stone and cast made (Figure 4). Models articulated and interocclusal splint constructed after reduction of the fracture on models. Intraoperatively under local anaesthesia, the dislocated segments were reduced by bilateral pressure with the guidance of surgical splint. A small stab insision was placed at the inferior border of the mandible. A William velsey fry awl was introduced the stab incion [4]. The bone awl was guided along the body of the mandible and taken out lingually. Next the wire was tied in and the awl was gently guided along the lower border of the mandible and passed into the buccal sulcus. The acrylic cap splint was stabilized by winding the wire in the clockwise direction. Same procedure was followed on the left side (Figure 5). Postoperatively OPG radiograph was taken to check if the wires were properly secured to bone (Figure 6). Postoperative antibiotic treatment was started for 1 week. Soft diet, avoidance of physical activities and antibacterial mouth rinse was prescribed. Postoperative monitoring was performed on weekly basis [5]. The interdental wiring and acrylic splint were removed after 3 weeks.

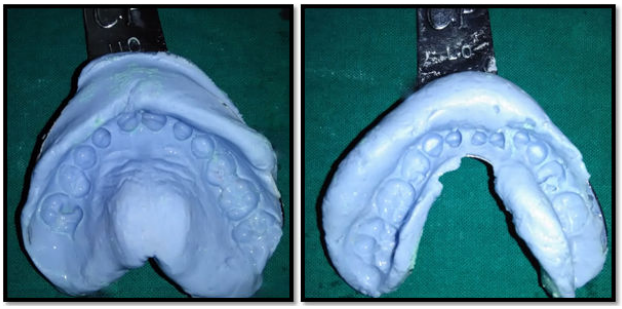

Figure 3. Alginate impressions poured.

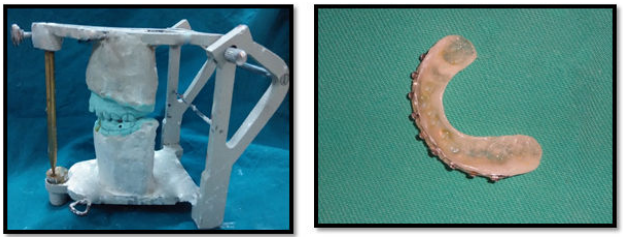

Figure 4. Acrylic cap splint made.

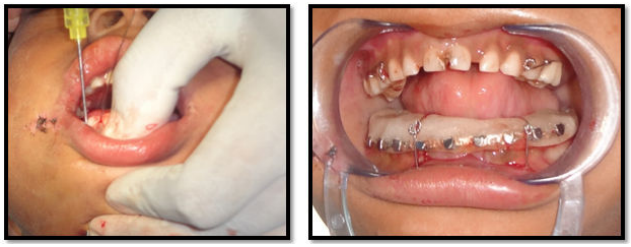

Figure 5. Circumandibular wiring.

Figure 6. Postoperative OPG.

Case report 2

A 5 year old male child patient, reported to the department of oral and maxillofacial surgery with a history of fall from a 10-feet high guava tree (Figure 7). There was no history of vomitting, seizures, loss of consiousness, ear, nose, throat bleed. There was no past medical and dental history. Patient was conscious, uncooperative and well oriented to time, place and person [6]. Upon extraoral examination laceration was present at the chin. Upon intraoral examination step defect was present on midsymphyseal region. There was derrangement of occlusion. Radiological examination: CT face revealed mandibular symphyseal fracture (Figures 8 and 9). Routine blood investigations were carried out and were normal [7].

Figure 7. Preoperative clinical photograph.

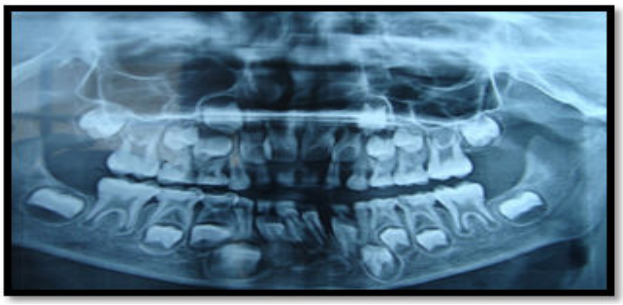

Figure 8. Preoperative OPG.

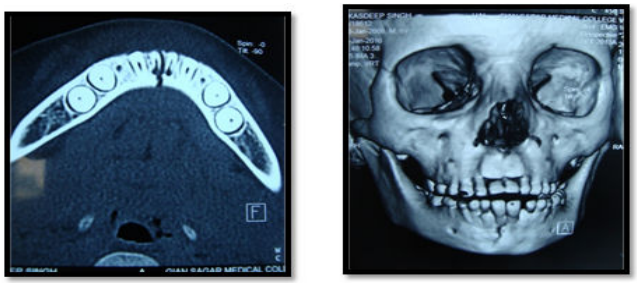

Figure 9. CT showing mandibular symphyseal fracture.

Treatment plan: Primary closure of the lacerated wound was done using 3-0 ethilon sutures. As the child was unco-operative and refused to get a cap splint, we modified the treatment plan by giving closed reduction to the patient with the help of standard Erich's arch bar which was trimmed according to the patient's dentition size. Therefore, preoperatively standard Erich's arch bar was trimmed according to the mixed dentition. Under local anaesthesia Erich's arch bar was adapted in maxillary and mandibular arches and was fixed using a more thinner wire that is 30 gauge than usual 26 gauge wire as the child's co-operation was the major concern and maxillomandibular fixation was done for 1 week [8]. Postoperative antibiotic treatment was started for 1 week (Figure 10). Soft diet, avoidance of physical activities and antibacterial mouth rinse was prescribed. Postoperative monitoring was performed on weekly basis.

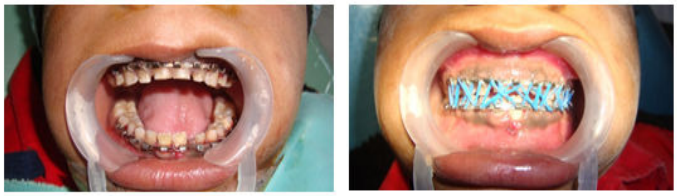

Figure 10. Erich's arch bar secured using lighter gauge wire and MMF done for 1 week.

Results and Discussion

Pediatric maxillofacial fractures are not common and demonstrate different clinical features when compared with adults. They also need different treatment due to difference in their facial bones and skulls. Most of the pediatric fractures are firmly united in 2 to 3 weeks, because of the increased metabolic rate and increased osteogenic potential of periosteum in children.

Clinical signs and symptoms of pediatric fracture are the same as in adults. Thorough clinical examination, however, may be impossible in the uncooperative young trauma patient. Wide suture lines and the elasticity of the bone may mimic fracture gaps on palpation. Panoramic radiographs are the first step in all, but the very young patient but theses radiographs are less helpful, particularly in the mid-face region where poorly developed sinuses and tooth buds occupy space and obscure skeletal anatomic landmarks. Computed tomography, is the modality of choice [9]. Computed tomography scans greatly increase diagnostic accuracy and have become the standard of care for imaging pediatric mid face trauma victims.

Treatment of mandibular fractures in children depends on the fracture site and the stage of skeletal and dental development. Studies have stated that fractures of the mandible limited to the alveolar process are treated by open or closed reduction and immobilization by splints and arch bars for 2 to 3 weeks 4 [10]. Rarely, long-term mono-maxillary immobilization (*via* splinting) for upto 2 months is indicated to prevent malocclusion.

Mandibular fractures without displacement and malocclusion are managed by close observation, a liquid to soft diet, avoidance of physical activities (e.g. sports) and analgesics. Displaced mandibular fractures need to be reduced and immobilized. When tooth buds within the mandible do not allow internal fixation with plates and screws. This can be achieved with a mandibular splint fixed to the teeth by circum-mandibular wiring, gunning splint or a splint with MMF [11]. Displaced symphysis fractures can be treated by open reduction and rigid fixation through an intraoral incision after age six, when the permanent incisors have erupted. Open Reduction Internal Fixation (ORIF) in parasymphysis fractures in feasible, when the buds of the canines have moved up from their inferior position at the mandibular border after age nine [12]. Similarly, in body fractures, the inferior mandibular border can be plated, when the buds of the permanent premolar and molar have migrated superiorly toward the alveolus.

Common recommended methods of management of mandibular fractures are as follows:

- 0 to 2 years: Treated as edentulous problems with maclennan type of splint.
- 2 to 4 years: If well formed sound deciduous teeth eyelet wiring can be used. Cap splint.
- 5 to 8 years: MacLennan, acrylic cap splints.
- 9 to 11 years: Cap splints, arch bars, plating or trans-osseous wiring at lower border.

In these cases, we preferred acrylic type of cap splint and Erich's archbar respectively. Cap splint has various advantages like it covers both lingual and buccal cortical plates and hold the mandibular cortices securely [13]. Other advantages include:

- Occlusion is open.
- Function is not impaired.
- Smaller adjustment or grinding can be done at the time of insertion.
- Functional stresses increases remodeling.
- Catabolic

Whereas in second case generally Erich's arch bar is avoided inpediatric patient due to mixed dentition. As patient's co-operation was prime concern, Erich's arch bar was trimmed, secured and MMF was done for 1 week and it was well accepted by an unco-operative child under local anaesthesia [14,15].

Prevention

The importance of preventive measures should be emphasized. Supervising adults, *i.e.* coaches, administrators, teachers and parents should be educated. Children should be encouraged to develop appropriate habits at an early age, because incidence and severity of sports-related injuries are inversely related to skill level and age. Injuries in the children can be prevented by seat restraints, conventional seat belts, protective helmets, mouth guards etc.

Conclusion

While our follow-up period was too short and the patient population is too small to determine the long-term effects of fracture treatment with acrylic cap splint and Erich's Arch Bar, is favorable. The splint and MMF showed sufficient rigidity and stability to enable initial bone healing of the mandible. Our observation showed that tissue intolerance, growth restrictions and occlusal abnormalities were not seen in our cases and occlusal relationship could be restored in all cases. Benefits for children are evident since patient comfort is higher. However, potential problems relating to resorption and bone growth to be observed carefully and investigated in further clinical studies.

Conflict of Interest

Author does not have conflict of interest.

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