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Open Reduction and Internal Fixation of Pediatric Mandible Fracture – A Case Report and Review of Literature Open Reduction of Pediatric Mandible Fracture

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Abstract

Compared with adults, fractures of the facial bones and mandible are uncommon in the pediatric age group, particularly those patients younger than 5 years. The impact of craniofacial trauma is minimized by the reduced inertia, due to the light weight and small size. In several series, motor vehicle accidents and falls are the most common causes of pediatric mandibular fractures. In this case report we are presenting a 4 year old girl was treated for fracture of the manidbular angle by open reduction method.

Key words: Pediatric trauma; Pediatric facial fractures; Fixation of pediatric fractures

Introduction

Compared with adults, fractures of the facial bones and mandible are uncommon in the pediatric age group, particularly those patients younger than 5 years. The impact of craniofacial trauma is minimized by the reduced inertia, due to the light weight and small size. The force of impact is absorbed by the forehead and the skull rather than the face since the ratio of cranial volume to facial volume is greater in children than adults. Besides, pediatric facial bones are more resistant to fractures due to their higher elasticity, poor pneumatization (by sinuses) and stabilization of the mandible and maxilla by the unerupted teeth. Incidence rates of mandibular fractures in children have been fairly consistent in the literature over the years. In 1956, MacLennan reported that 1% of mandibular fractures occur in children younger than 6 years [1] Similarly, in Rowe's 1969 study [2] , 5% of mandibular fractures were in children aged 6-11 years; only 1% occurred in patients younger than 5 years. In several series, motor vehicle accidents and falls are the most common causes of pediatric mandibular fractures.

4. Case Report

A 4 year old girl reported to the Dept of Plastic Surgery with an open mouth appearance and lacerations on the left cheek and left mandibular angle region after a history of RTA. On examination there was evident malocclusion and a step deformity in relation to the left angle of the mandible with a large extra oral laceration. The girl was unable to close her mouth and in considerable pain.

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A CT with 3D reconstruction was done under supervised sedation with the help of the Pediatric team. The CT showed a fractured mandibular angle and parasymphysis (Figure 1, Figure 2).

Figure: 1

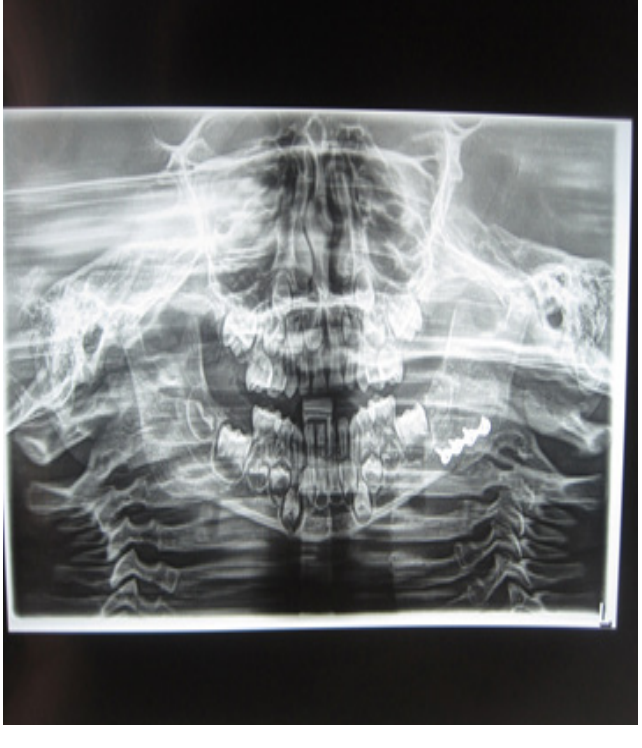
Figure: 2

Under General Anesthesia nasotracheal intubation was done and airway secured. Local anesthetic was injected into the left angle region along the pre existing laceration and fractured bone was exposed. Care was taken to reduce the fracture and bring the teeth into occlusion. Intra oral occlusion was maintained with the help of a temporary composite bonding on the occlusal surface of the teeth by our pediatric dentist. The fractured angle was plated extra orally with a stainless steel plate and screws taking into consideration the tooth buds situated in that region. With the help of the CT images we were able to place the plate without interfering with the tooth buds. (Figure.3)

Figure: 3

Since the parasymphysis fracture is un displaced one, it was left for self healing. Careful closure of the wound was done. Post closure there was no mobility of the segment and no mobility in the parasymphysis region. Post operative OPG confirmed the placement of plate and screws below the tooth buds. (Figure 4)

Figure: 4



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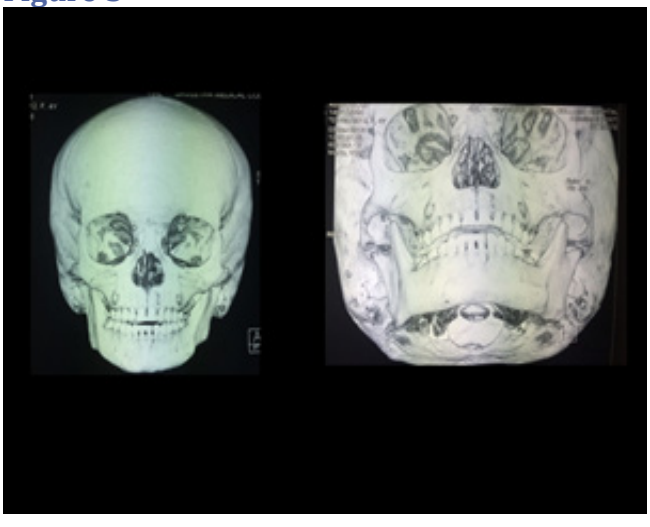
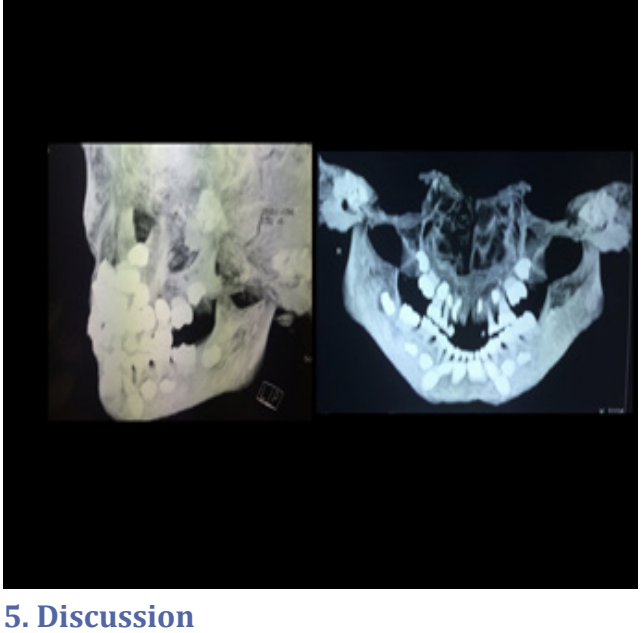
There was a mild deviation of the jaw that was corrected with physiotherapy. The patient was under regular follow up and after a period of 8 months the plates and screws were removed. (Figure 5)

Figure 5



One and a half years post surgery the patient is doing fine. No deviation of the jaw, minimal scar over the laceration and good occlusion. Post operative radiograph showed near perfect bone formation and no trace of fractures. (Figure 6)

Fegure: 6



5. Discussion

The pediatric mandible fracture is a rare occurrence when compared with the number of mandible fractures that occur within the adult population. Although the clinician who manages facial fractures may never encounter a pediatric mandible fracture, it is a unique injury that warrants a comprehensive discussion. Because of the unique anatomy, dentition, and growth of the pediatric patient, the management of a pediatric mandible fracture requires true diligence with a variance in treatment ranging from soft diet to open reduction and internal fixation [3].

In several series, motor vehicle accidents and falls are the most common causes of pediatric mandibular fractures. However, the frequencies of etiologies of fractures in a Swiss series were 72% due to recreational activities and 17% to traffic accidents. Thoren's 1992 series reports 57% of fractures were due to vehicular accidents and another 18% to fall [4].

During the first years of life, the size and proportions of the facial skeleton change markedly. The facial skeleton increases in relation to the rest of the head, and the sinuses and dentition develop postnatally. The mandible is relatively small at birth and grows by remodeling. The eruption of teeth and the development of the alveolar process also contribute to vertical growth. Apposition of bone at other surfaces causes the bone to develop a more adult shape. Thus, the mandible assumes a more forward position and a longer shape. The condylar growth centers are crucial in mandibular development. Each center consists of chondrogenic, cartilaginous, and osseous zones. A thin vascular layer covers the chondrogenic zone. Bone is deposited at the posterior borders of the rami and condyles. Trauma to the growth center just beneath the articular disc is cause for concern. Delayed growth on the affected side can cause facial asymmetry, mandibular deviation, and malocclusion. The general principles of the management of maxillofacial trauma are similar in both children and adults, but the ongoing developmental changes in the growing face of a child must be taken into consideration [5].

Adequate treatment of mandibular fractures should accomplish several goals. Restoration of occlusion, function, and facial balance is necessary for therapy to be considered successful. Proper treatment may prevent complications such as growth disturbance and infection. The specific treatment of mandibular fractures depends on location of the fracture, degree of bony displacement, occlusal status, and dentition status of the child. Methods of fixation

vary by dental status.

Before 2 years of age, the deciduous teeth are not completely erupted. Children at this stage of development are treated as though edentulous. An acrylic splint may be fixed in place with circum mandibular wires. If immobilization of the jaw is necessary, the splint may be fixed to both occlusive surfaces with both circum-mandibular wires and wires through the pyri form aperture. However there are few disadvantages are present using these splints like patient discomfort, poor oral hygiene and trauma to other teeth.

Once deciduous teeth are established, at about ages 2-5 years, they may be used for fixation. Arch bars are somewhat more difficult to secure below the gum line. Redundant support may be necessary. Mini-arch bars attached with resin may be used to treat non-displaced fractures, again avoiding immobilization of the mandible [6].

The controversy of open treatment vs closed treatment of pediatric mandibular fractures remains. However, recent literature shows a change in using ORIF in pediatric fracture stabilization. The risks of facial growth disturbance in ORIF have not been well supported and the complications and discomforts of putting a young child through splinting or arch bars have not been well documented. Although literature tells us that conservative management is the way to go it clearly fails to shed light on all the short comings of such management. In our case we placed the plates and screws under general anesthesia. The child was monitored regular with physiotherapy. Hence we there was no jaw deviation and none of the growing tooth buds was damaged. Hence, thorough knowledge of the developing mandible, its associated position of the tooth bud and the nerve placement is necessary in treating pediatric mandible fractures.

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