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MANAGEMENT OF MANDIBULAR BODY FRACTURE IN A 4- YR OLD BOY: A CASE REPORT

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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. Treatment principles of mandibular fractures differ from that of adults due to concerns regarding mandibular growth and development of dentition. The goal of the treatment of these fractures is to restore the underlying bony architecture to pre-injury position, in a stable fashion, as non-invasively as possible, with minimal residual esthetic and functional impairment. A case of a 4-year-old boy with fractured body of mandible managed by closed reduction using Thermoformed splints and circum mandibular wiring is presented.

INTRODUCTION

Pediatric maxillofacial fractures are very uncommon compared to adult fractures due to the elastic nature of bone [1]. The most common cause of fracture in children were falls (64%), followed by traffic (22%) and sports related accidents (9%) [2]. The prevalence of girl to boy ratio was 3:5 and the mean age was 7± 4.4 years [3]. The most common facial fracture is mandible (32.7%) followed by nasal (30.2%), and maxillary / zygoma (28.6%) [4]. Patients with a fracture of the mandible were most likely to have a dental injury (39.3%) [5].

The reported incidence of pediatric injuries accounts for 4–6% and are below the age of 5 years. The incidence of pediatric facial fractures is even lower, ranging from 0.6 to 1.2%. Depending on the type of fracture and the stage of skeletal development the treatment modalities range from conservative non-invasive through closed reduction and immobilization methods to open reduction with internal fixation [6].

Case report

A 4 yrs old boy reported to the dental clinic with bleeding from oral cavity following fall from stairs. Clinical examination revealed bruise on the chin, open mouth appearance with profuse bleeding from the oral cavity and derangement of occlusion (Fig.1). Step deformity with tenderness and mobility was elicited along the lower border of the mandible on the left side canine region. Posterior-anterior view of the skull (Fig.4) revealed a parasymphysis fracture with a severe displacement of the fracture segment. Wiring was ruled out as there were only deciduous teeth and there was major displacement of the fragments. In the parasymphysis region plating of any type was contraindicated due to the proximity of the permanent tooth buds.

An impression of the fractured mandible was taken; a model was made and was sectioned at the fracture line and reduced (Fig.2). Articulated and checked for proper occlusion A thick thermoforming sheet (2mm thick) was used to adapt a splint using the BIOSTAR thermoforming machine and the splint was trimmed to fit the cast. Under general anesthesia the splint was cemented on to the teeth after adequate reduction of the fracture segments. Due to the wide separation between the fracture segments additional stabilization was done in the form of circum-mandibular wiring (Fig.3).

Patient was reviewed every week, and on the third postoperative week, the circum-mandibular wiring and splint was removed under local anesthesia. No mobility was present at the fracture site. Postoperative recovery and occlusion achieved were satisfactory. After two months, orthopantomogram showed good alignment of teeth (Fig.5,6). Patient had perfect occlusion and good masticatory efficiency except the lower left canine that needed extraction which was present in the fracture line.

Fig 1. Parasymphysis fracture with displacement.

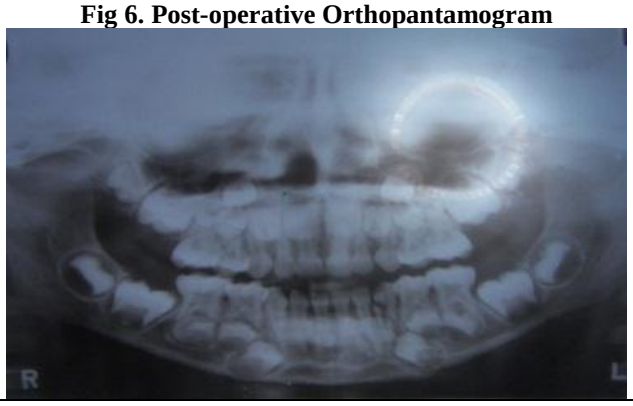
Fig 2. Mandibular cast with Thermoforming splint.

Fig 3. Post-operative photograph showing circum-mandibular wiring

Fig 4. Posterior- anterior view of skull showingcircum-mandibular wiring

Fig 5. Follow-up after 2 months

Fig 6. Post-operative Orthopantamogram



DISCUSSION

Facial fractures in children account for the approximately 5% of all facial fractures. The etiologies of mandibular fractures in children are usually falls and sports injuries [7]. Children have greater osteogenic potential and faster healing rates than adults. Therefore, anatomic reduction in children must be accomplished earlier and immobilization times should be shorter (2 weeks versus 4-6 weeks in adults) [8].

The clinical features of a fractured mandible in a child are the same as in an adult, which includes pain, swelling, trismus, derangement of occlusion, sublingual ecchymosis, step deformity, midline deviation, loss of sensation due to nerve damage, bleeding, TMJ problems, tenderness, movement restriction, open bite and crepitus. Thorough clinical examination, however, may be impossible in uncooperative young trauma patients. Lacerations should be evaluated to reveal injuries to underlying structures. General palpation should be applied over all bony surfaces of the mandible. The mandibular range of motion must be examined as patients actively open and close their mouth [9].

Treatment of mandibular fracture in children depends on the fracture type and the stage of skeletal and dental development. Mandibular growth and development of dentition are the main concerns while managing pediatric mandibular fractures. In adults, absolute reduction and fixation of fracture is indicated, whereas in children minimal manipulation of the facial skeleton is mandated. The small size of the jaw, existing active bony growth centers and the crowded deciduous teeth with permanent tooth buds located in great proximity to the mandibular and mental nerves, all significantly increase the therapy related risks of pediatric mandibular fractures and their growth related abnormalities [10].

The relatively high elasticity of the mandibular body's thin cortical bone and a thick surrounding layer of adipose tissue and the relatively larger amount of medullary bone held by a strong periosteal support results in a high incidence of greenstick fractures in children [11].

In full deciduous dentition, the arch bar fixation or wiring is difficult due to the morphology of the deciduous teeth as the area of maximum convexity is at the gingival third of the crown resulting in slipping of wires. The roots of the deciduous teeth do not tolerate force needed to tighten the wires. Miniplates needs caution so as not to injure the tooth buds of the permanent teeth and may need to be removed after osteosynthesis in growing children. Resorbable plates, eliminates the need for the second surgical procedure for the removal but the risk of damage to the tooth buds do exist. Cap splints are the good old remedy that comes in handy to manage paediatric fractures. The traditional cap splints made of steel or acrylic are cumbersome to make and will need a technician to make them. They are also very thick and may interfere with occlusion. They also consume lot of time in fitting them on to the teeth to reduce the fracture. On the other hand the thermo forming splints which were initially used as bleaching trays, can be used as Splints. They are available in1mm, 2mm, 3mm and 4mm thickness and can be trimmed with a pair of scissors or acrylic burs. Thickness of 2mm and above provides adequate immobilization for fracturefragments [12].

Ranta and Ylipaavalniemi, pointed out that teeth in which root development has already begun at the time of fracture, appear to erupt normally; however, marked deformation of the crown and roots occur in teeth located on the fracture line when the calcification process is still in progress at the time of fracture. Koenig *et al,* pointed out that the developing follicle is more elastic than the surrounding bone and better able to survive mechanical injury. Nevertheless, it is difficult to predict the facts of tooth buds and fracture and the implanted hardware fixation. Suei *et al*, mentioned that the presence of infection in the fracture site is a crucial factor affecting odontogenic cells in the dental follicle. Surgical procedures as well as fixation and reduction are also potential causes of impaction [7]. Eleonora Schiller *et al*, report that trauma occurring between 0 and 3 years of age is likely to disturb the formation and mineralization of the permanent teeth [13].

Nixon and Lowey concluded that mandibular fractures which occur during mixed dentition can be associated with subsequent failed eruption of permanent teeth when the fracture line is reduced using an open surgical approach [6]. Yocheved Ben Bassat *et al*, reported discoloration of the crown of permanent tooth in 16% of the children with the incisal one third being the most common site. Hypoplasia was evident in 9% of the permanent teeth [14].

CONCLUSION

Thermoforming splints as a method of immobilizing pediatric mandibular fractures are a novel and easy technique, less time consuming.

Intact active mandibular growth centers are important for preserving mandibular function, which have a significant influence on future facial development. Thus, restoration of the mandibular continuity after fracture is important not only for immediate function but also for future craniofacial development. Accordingly, the goal of treatment is to restore the underlying bony architecture to its pre-injury position in a stable fashion as non-invasively as possible with minimal residual esthetic and functional impairment.

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