

Circum mandibular wiring: choice of treatment in pediatric trauma

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ABSTRACT

Incidence of pediatric injuries accounts for 4-6% of cases. Operative management should involve minimal manipulation and may be modified by the stage of skeletal and dental development. The goal of 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. The purpose of this article is to provide an insight on maxillofacial injuries in pediatric patient and to assist the clinician in the management of mandibular parasymphysis fracture in children with occlusal acrylic splint fixed with circummandibular wiring, a definitive treatment modality

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Introduction

In childhood a generally impetuous nature and adventurous spirit combine to encourage participation in physical activities with little thought to immediate consequences, still paradoxically facial injuries in children are much less common than adults.[1]

The reported incidence of pediatric injuries accounts for 4-6% of the total. Below the age of 5 years, the incidence of pediatric facial fractures is even lower, ranging from 0.6 to 1.2%. [2]

When compared to adults, the pattern of fractures and frequency of associated injuries are similar in spite of the overall incidence being much lower. Treatment is usually performed without delay and can be limited to observation or closed reduction in non-displaced or minimally displaced fractures. Operative management should involve minimal manipulation and may be modified by the stage of skeletal and dental development. Open reduction and rigid internal fixation is indicated for severely displaced fractures. When tooth buds within the mandible do not allow internal fixation with plates and screws, this can be achieved with a mandibular cap splint or occlusal acrylic splint fixed to the teeth, to the mandible with circum-mandibular wire.[1] The goal of 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.[3]

Above all, the immense capacity for healing in children within the shortest possible time with minimum complications, the assistance that growth can give and the inherent ability to adapt to new situation are, quite different from what we see in adults.[1]

The purpose of this article is to provide an insight on maxillofacial injuries in pediatric patient and to assist the clinician in the management of Mandibular parasymphysis fracture in children with occlusal acrylic splint fixed with circummandibular wiring, a definitive treatment modality.

Case Report

A 4year-old boy reported to the dental clinic with bleeding from oral cavity following fall from roof of his house while playing.. Clinical examination revealed bruise on the chin, open mouth appearance with profuse bleeding from the oral cavity and derangement of occlusion. Step deformity with tenderness and mobility was elicited along the lower border of the mandible on the left side canine region. Preoperative orthopantomogram (OPG) was taken, which confirmed left parasymphysis fracture (Figure 1).



Figure 1. Pre op OPG.

Under nasoendotracheal intubation , upper and lower arch alginate impressions were taken and stone casts were poured. An open occlusal acrylic splint was fabricated and ,mandibular fracture was immobilized, fixed with the acrylic splint which was retained by circum mandibular wiring. Circum mandibular wiring was done by placing a small stab incision on the inferior border of mandible on right and left side, 4-5 cm from midline. Mandibular bone awl was used to enter lingually along the body of the mandible and thereby piercing lingual mucosa the wire was fed and passed onto buccal sulcus along the body of the mandible. Wire held together and stent stabilized by winding wire in clockwise direction at 83,84 region. Same procedure was repeated on the left side (Figure 2,3).



Figure 2. Circum - mandibular wiring using bone awl.



Figure 3. Acrylic Occlusal splint fixed with Circum - mandibular wire.

Another circummandibular wire was placed at left body region to stabilize the fractured fragment at the lower border of mandible. Postoperative OPG was taken with circum-mandibular wires in place (Figure 4). Patient was reviewed every week, and on the third postoperative week, the circum-mandibular wiring and splint was removed under ketamine sedation. No mobility was present at the fracture site. Postoperative recovery was uneventful and occlusion achieved was satisfactory. Patient was reviewed monthly for 6 months. Patient had perfect occlusion and good masticatory efficiency.



Figure 4. Post op OPG

Discussion

Mandibular fractures are the most common facial skeletal injury in pediatric trauma patients.[1] Fractures in children account for approximately 5% of all the facial fractures.[4] The protective anatomic features of a child's face decreases the incidence of facial fractures. In young children (less than 5 years of age), the face is in a more retruded position relative to the "protective" skull, therefore, there is a lower incidence of midface and mandibular fractures and a higher incidence of cranial injuries.[5]

A male predilection is seen in all age groups. Fractures in the condylar region are the most common, followed by angle and body fractures.[3] In Posnick and colleagues' study, thirty-nine percent of all the fractures were of the mandible. Mandibular fracture sites included the condyle (59 of 107, 55%), parasymphysis (29 of 107, 27%), body (10 of 107, 9%) and angle (9 of 107, 8%).[6] Etiologies of mandibular fractures in children are usually falls and sports injuries.[3]

Young bone possesses unique physical properties that coupled with space occupying developing dentition giving rise to the patterns of fracture not seen in adults. Bone fragments in children may become partially united as early as 4 days and fractures become difficult to reduce by seventh day.[7] This results in need for different forms of fixation as early as possible for comparatively shorter duration of time. Nonunion or fibrous union rarely occurs in children and excellent remodeling occurs under the influence of masticatory stresses even when there is imperfect apposition of bone surfaces.[1]

The management of mandibular fractures in children differs somewhat from that of adults mainly because of concern for possible disruption of growth. In children the final result is determined not merely by initial treatment but by the effect that growth has on the form and function.[1]

The shape and shortness of deciduous crowns may often make the placement of circumdental wires and arch bar slightly more difficult in children. While doing open reduction and fixation, presence of tooth buds throughout the body of mandible, must be a consideration as trauma to developing tooth buds may result in failure of eruption of permanent teeth and hence narrow alveolar ridge.[1] Several studies have recommended the use of pre-fabricated acrylic splints as a treatment for pediatric mandibular fractures. These splints are more reliable than open reduction or IMF techniques with regard to cost effectiveness, ease of application and removal, reduced operating time, maximum stability during healing period, minimal trauma for adjacent anatomical structures and comfort for the young patients.[8]

Conclusion

The anatomical complexity of the developing mandible and teeth and concerns regarding biocompatibility of implanted hardware often mandate the use of surgical techniques that differ markedly from those used in adults. In cases of mandibular fractures of a young child, disruption of periosteal envelope may have unpredictable effects on growth. Thus, if intervention is required, closed reduction is favored. Due to the technical difficulties of IMF, acrylic splints with circumferential wiring are recommended and remains the treatment of choice in young children.

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