A modified surgical approach to a case of mandibular fracture in a 5-year-old girl

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Abstract

Injuries to the face are far more uncommon than other injuries in children. However, when they occur they can pose considerable management challenges to concerned specialists and the subsequent functional and esthetic impact to the growing child can be overwhelming. Here is a report of a 5-year-old girl diagnosed with fracture of the body of the mandible and an associated fracture of the parasymphysis. This paper presents a unique treatment modality considering the various anatomic and developmental factors in such young children.

Keywords: Mandibular fracture, trauma, transosseous wiring

Introduction

It is quite a common experience for pedodontists to encounter traumatic injuries in children ranging from minor contusion injuries to the teeth to fractures of the jaw bones. Children have an immense capacity for healing in the shortest possible time with a minimum of complications. The assistance that growth can give, coupled with the inherent ability of the young bone, periosteum, and soft-tissues to adapt to new situations, is quite different from that which is seen in adults.[1] In children, the incidence and etiology of craniomaxillofacial trauma are affected by age-related activities. Overall, facial fractures in the pediatric population comprise less than 15% of all facial fractures and are rare below age 5 (0.6-1.4%).[2]

Case Report

Here is a case of a 5-year-old girl who reported to us 2 days after encountering trauma due to fall from an elevated platform. Clinical examination revealed a discontinuity of the lower border of the mandible on the left side. Her mouth opening was restricted to 10 mm and the mandible was seen to deviate to the left side on opening. Intra oral examination revealed a derangement of occlusion. There was no mobility of the fractured segments. A hematoma was present on the buccal aspect in the parasymphyseal region on the right side [Figure 1]. Further, the orthopantomograph confirmed our clinical observations [Figure 2]. A diagnosis of fracture of the body of the mandible on the left side associated with a fracture of the parasymphysis on the right side of the mandible was made.

The treatment approach chosen was a unique one, involving a modification of the conventional transosseous wiring technique. The procedure was carried out under general anesthesia. The body fracture was exposed using a buccal vestibular incision. Two holes were drilled on either side of the fracture line into the buccal cortical plate; one at the region of external oblique ridge to avoid damage to the permanent tooth germ of the first molar and the other close to the lower border of the mandible. Two intermaxillary fixation (IMF) screws with eyelets, 1.5 mm diameter and 10 mm in length were inserted into the holes such that they were perpendicular to the cortical plate following which a 26 gauge stainless steel wire was passed into the eyelets and fastened. Having assured reduction and fixation of the fractured ends, wound closure was achieved. Fracture reduction and stabilization was concluded satisfactory as shown by the post-operative occlusion. Recovery from general anesthesia was uneventful. An orthopantomograph was made post-operatively to confirm the approximation of the fractured ends [Figure 3a]. The patient was discharged on the third post-operative day with instructions for a soft diet and maintenance of good oral hygiene.

Subsequently, satisfactory healing was observed. Four weeks after placement of the screws, following the confirmation of the stability of the fractured ends both clinically and radiographically a decision was made to remove the screws [Figure 3b]. The patient was followed periodically, and presently shows satisfactory occlusion [Figure 4].
There are certain unique features which distinguish a pediatric patient from an adult. Treatment of jaw bone fractures in the pediatric age group almost always requires alterations due to anatomical reasons. At birth, the ratio between cranial and facial volume is approximately 8:1. The retruded position of the face relative to the "protecting" skull is an important reason for the lower incidence of mid-face and mandibular fractures in young children (less than 5 years of age). The fractures are often minimally displaced because of the thick layer of adipose tissue that covers the more elastic bones and the suture lines are flexible. In addition, stability is increased by the presence of tooth buds within the jaws and the lack of sinus pneumatization. As in adults, clinical signs of mandibular fractures may include displacement of the fragments, mobility, crepitus, hematoma, swelling, mucosal tears, limited mouth opening, malocclusion, pain, and sensory deficits in the distribution of the inferior alveolar nerve. In children, clinical suspicion of a fractured mandible is confirmed by panoramic, may be supplemented by posterior–anterior, lateral oblique and occlusal radiographic views.

Treatment is aimed at obtaining bony union, normalizing the occlusion, restoring normal form and function, and avoiding impediments to normal growth. To best fulfill these aims the bony fragments must be accurately aligned. Efforts to ensure this alignment have led to complex methods of treatment. Treatment of mandibular fractures in children depends on the fracture site and the stage of skeletal and dental development. Fractures of the mandible limited to the alveolar process are treated by open or closed reduction and immobilization by splints and arch bars for 2-3 weeks. However, displaced mandibular fractures need to be reduced and immobilized. Open reduction and internal fixation provides stable three-dimensional reconstruction, promotes primary bone healing, shortens treatment time and eliminates the need for or permits early release of maxillo mandibular fixation (MMF). Decreased dependence on MMF improves post-operative respiratory care, nutritional intake and oral hygiene measures. At times, tooth buds within the mandible may not allow internal fixation with plates and screws and hence modification of the existing procedures should be resorted to. This case presents one such alternative approach in a 5-year-old-girl in whom a modification of the conventional transosseous wiring technique was adopted. The transosseous wiring technique involves drilling of holes on either side of the fracture line and the stainless steel...
wire is passed into the holes and tightened to bring about Coaptation of the fragments.[6] In our case, however, the presence of tooth buds in the vicinity of the fracture line exempted us from drilling holes through and through into the bone. Thus, the screws were placed in the buccal cortical plate, one close to the inferior border of the mandible to prevent damage to developing premolar and to the nerve terminals exiting the mental foramen and the other was placed in the region of the external oblique ridge carefully to avoid damage to the developing first molar.

The parasymphyseal fracture was left untreated due to potential harm to the developing canine and also since it did not markedly alter the occlusion. Additionally, the treatment of parasymphyseal fractures is recommended only when the buds of the canines have moved up from their inferior position at the mandibular border after age 9.[2]

**Conclusion**

The ultimate result with our treatment approach was the accurate approximation of the fractured segments, restoration of occlusion, no damage to the developing teeth intra-operatively and lastly patient satisfaction.

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