

Management of Mandibular Parasymphysis Fracture in Pediatric Patient: A Case Report with Step Wise Treatment Protocol

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Abstract

Fractures of the mandible are less common in pediatric populations than adults due to child protected anatomic features. Treatment protocols of mandibular fractures in pediatric populations differ from adults due to mandibular growth and developing dentition. This case report presents a step wise treatment of a six-year-old boy with fractured mandibular parasymphysis by using acrylic cap splint and circummandibular wiring.

Keywords: Mandibular fracture, Acrylic cap splint, Circummandibular wiring, Pediatric fracture.

INTRODUCTION

The primary differences in craniomaxillofacial trauma in the pediatric or growing patient compared with the adult patient are based on developmental anatomy. Facial fractures are less common in the growing patient than in adults.¹ Fractures of the facial bones and mandible are uncommon in the pediatric age group with the overall frequency being about 1–15%.² Only 0.8–1.0% of facial fractures occur in children younger than 5 years; and 10–14.7% occurs in patients older

than 16 years.^{2,3} In pediatric patient's symphysis and parasymphysis fractures account for 15%–20% and body fracture rare.⁴

The pediatric maxillofacial complex is malleable, because there is a greater cancellous-to-cortical ratio. As such, greenstick fractures of the facial skeleton occur more frequently in children compared with adults. The consistency of the growing patient's bone (more cancellous than cortical) is less conducive to the use of screw or wire fixation to fixate fractures internally.¹ Open reduction and osteosynthesis of the pediatric fracture with titanium plates and screws or absorbable plates and screws carries

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risks of a negative effect on the skeletal growth and damaging unerupted teeth. For these reasons, closed reduction is a viable option for most facial fractures in the growing patient.⁵

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 MMF 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 young patients.⁶

The purpose of this paper is to present a method of managing a displaced mandibular fracture in a six-year-old boy using a prefabricated acrylic cap splint.

CASE REPORT

A six-year-old male child reported with a history of fall. Extraoral examination revealed the presence of a swelling in the anterior region of mandible associated with limited mouth opening. Preauricular palpation of TMJ movements were normal. On intraoral examination, 16,21,26,36,31,41,46 were present. A displaced fracture of mandible in the area between 31 and 72 was noted. There was a derangement of occlusion. Step deformity between 31 and 72 with tenderness and mobility were elicited along the lower border of mandible on the left side of anterior mandible region. The examination also revealed a subluxation of 72. There were no fractures of teeth. OPG showed a radiolucent line between 31 and 72 extending till lower border of mandible (Fig. 1). A diagnosis of left parasymphysis fracture of mandible was made. All routine blood investigation was advised. Impressions of both jaws were taken with alginate impression material and a model was prepared with dental stone (Fig. 2). The cast was then split at the fracture site (Fig. 3). The fracture was manually reduced against maxilla on the cast to simulate the reduction that would be done clinically. The split cast was stabilized with sticky wax and base was formed (Fig. 4). An acrylic cap splint was then constructed on the reconstructed model and the splint was trimmed to cover the occlusal third of the teeth (Fig. 5). Two grooves on either side of the fracture were made on the splint.



Fig. 1: Pre-operative OPG Showing Left Side Mandibular Parasymphysis fracture



Fig. 2: Alginate Impressions of mandible

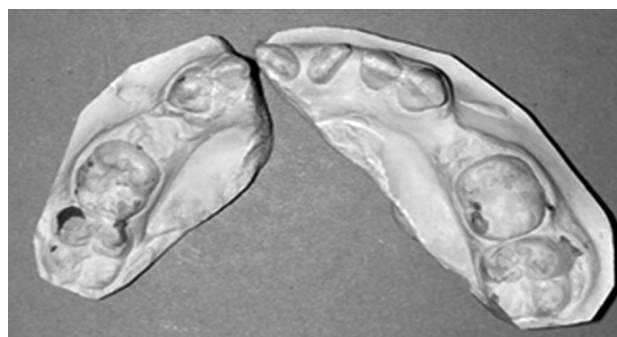


Fig. 3: Mandibular Cast Split at the Fracture Site

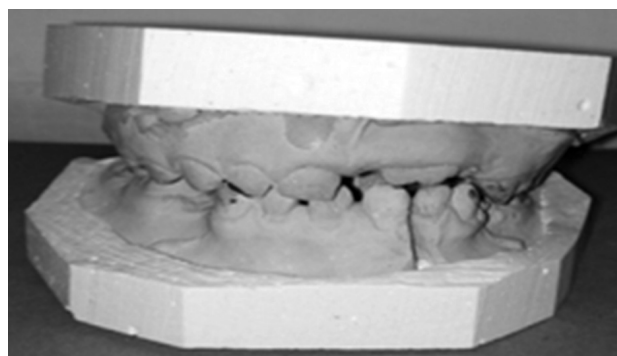


Fig. 4: Split Mandibular Cast Reduced

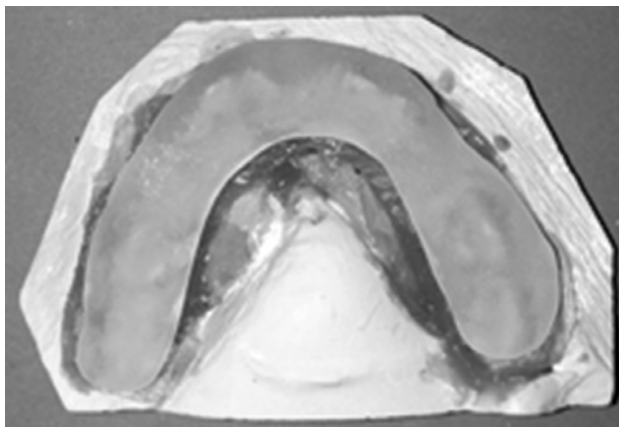


Fig. 5: Acrylic Cap Splint Fabricated on Model Formed

Under general anaesthesia, standard painting and draping was done. A small stab incision was placed at the inferior border of the mandible on the right side. A William Kelsey Fry Bone Awl was introduced through the stab incision. The bone awl was guided along the lingual surface of body of the mandible and taken out in the lingual vestibule. Next the 24 Gauge wire was threaded in the eye of the awl. It was gently retracted till the lower border of the mandible and the awl was taken out into the buccal sulcus. The wire was unthreaded from the eye of the awl followed by retraction of the awl completely. Using the same technique another 24 Gauge wire is passed in the molar region on both lingual and buccal vestibule side. The same technique was used on left side also by placing 2 wire on lingual and buccal vestibule. The acrylic cap splint was then stabilized by tightening the wires over it (Fig. 6). Then extraoral stab incision was sutured.



Fig. 6: Intraoperative photograph showing splint secured with circummandibular wires.

OPG was taken postoperatively to confirm positions of the wires (Fig. 7). Postoperative antibiotic treatment was started for 3 days. Soft diet, avoidance of physical activities, and antibacterial mouth rinse were prescribed.

Postoperative monitoring was performed on a weekly basis and was favorable in both healing and function. No complications were observed during the healing period. The interdental wiring and acrylic splint were removed after 3 weeks.



Fig. 7: Postoperative OPG showed circummandibular wiring

DISCUSSION

Fractures of mandible are uncommon in children because bone is resilient at this age and considerable force is required to effect a fracture.⁷ 5% of all facial injuries occurred in children younger than 12 years and less than 1% of these fractures occurred in children younger than 6 years. Of pediatric facial fractures observed in MVAs, 51.4% were nasal fractures, 15.5% were mandibular fractures, 11.6% were orbital fractures, and 8.7% were fractures in the zygoma and maxillary bones.¹

The differences in craniomaxillofacial trauma in the pediatric patients compared with the adult patient are based on developmental anatomy. At birth, the cranium-to-face ratio is 8:1. This decreases to 4:1 by age 5 and 2.5:1 as an adult.¹ The osteogenic and bone remodeling potential of a child exceed that of an adult. In the pediatric patients, greenstick fractures are common. The high elasticity young bones, a thick layer of adipose tissue, high cancellous to cortical bone ratio and flexible suture lines are contributing to minimum displacement of fractures segment.^{2,8}

The anatomy of deciduous crown, which does not lend itself well to circumdental wiring when arch bars are necessary to stabilize fractures during childhood. It is unsafe to apply transosseous wires or to insert bone pins or plates. Specific to the pediatric patient is the presence of underlying tooth buds, which may complicate reduction and fixation of mandibular fractures.¹

Open reduction of the angle, symphysis, or body of the mandible in the pediatric patient is rarely indicated. In patients with associated condylar fractures, however, internal fixation of the symphysis fracture limits the need for MMF and permits early function of the condyles. Typically, open reduction is limited to patients in whom there is a severely displaced fracture, closed reduction is not feasible, or there is an associated condylar fracture. ORIF includes micro/miniplates or biodegradable devices.

Complications are very rare in pediatric trauma due to greater osteogenic potential, faster healing rate and number of fractures are minimal or non-displaced. Malocclusion is rare. Infection, wound dehiscence, nonunion occur less frequently with closed reduction versus open. Late complication such as damage to permanent tooth buds may occur in 50% of mandibular fractures.⁹

Isolated fractures of the mandibular angle, body, and symphysis region in the growing patient are typically treated conservatively via closed reduction, because these fractures are usually easily reduced. The closed reduction and immobilization can be achieved by prefabricated acrylic cap splints (occlusal/lingual), orthodontic brackets, orthodontics rubber elastics, nickel titanium staples, circumferential wiring, arch bar or gunning splints.

CONCLUSION

Mandibular fractures in children heal rapidly and some undisplaced fracture are stable within a week and firmly united within 3 weeks. Normal growth of mandible will be disturbed if unerupted permanent tooth germs are lost because the alveolus will not develop normally in the areas affected. A prolonged followup should be done, so that there are no long term effects on both mandibular growth and normal development of the permanent dentition. The commonly used treatment options, acrylic cap splints are best choice. It avails support from adjacent teeth and bone. It is easy to fabricate and economical. The result of the fracture treatment presented in this case report verified the effectiveness of acrylic cap splint.

Patient Consent

Written informed consent was obtained from the patient for publication of this article and accompanying images.

Conflict of Interest: None declared.

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