Management of Mandibular Fracture in a Young Child with Conservative Approach: A Case Report

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ABSTRACT

Mandibular fractures comprise of more than half of the facial fractures in children. The treatment in pediatric patients can get complicated due to the presence of growth centers in the mandible along with the smaller size of jaws and numerous tooth buds present in them. Thus a conservative management protocol of closed reduction with functional therapies is the treatment of choice for most undisplaced pediatric mandibular fractures. This article discusses the management of right parasymphysis fracture along with left subcondylar fracture in a 7-year old child. The reduction of fracture, construction, and fixation of MacLennan splint with circummandibular wiring was made under deep sedation. This splint with elastics limited the discomfort and morbidity and served the purpose of reduction of the fracture.

KEYWORDS: Elastics, MacLennan Splint, Parasymphysis, Subcondylar, Trauma

INTRODUCTION

At the temporomandibular joints, the mandible, which is a ‘U-shaped’ bone, articulates with the cranial base and forms a functional interface with the maxilla via the dental occlusion.¹ The pediatric mandible is a dynamic structure, which is changing continuously with growth and development. Children are more susceptible to craniofacial trauma because of their higher cranial mass to body ratio.²

Maxillofacial fractures are less common in children. The incidence is less than 1% below age 5 and up to 8% in children younger than 12 years.³ Although, in hospitalized pediatric patients, mandibular fractures are most common and accounts for 56%.⁴,⁵ In pediatric patients the angle, condyle, and subcondylar region comprise 80% of mandibular fractures, the remaining 15-20% is symphysis and, parasymphysis fractures.⁶ Most common etiological factors for facial trauma are fall from height (64%), road traffic accidents (22%) and sports-related accidents (9%).⁷

For most of the pediatric patients, fractures involving body and symphysis are undisplaced as a result of the elasticity of mandible and embedded tooth buds that help in holding the fragments together securely.² Inside the lower jaw: there are a number of active bone growth centers which are significant for lifetime maintenance of form and function. These growth centers, along with the smaller size of jaws and numerous tooth buds present in them, can make treatment in pediatric patients difficult.⁸

Thus, on-time management of the injury is mandatory for a successful outcome. The treatment of choice for most undisplaced pediatric mandibular fractures is closed reduction with functional therapies. The use of occlusal splints or open cap splint with circummandibular wiring for treating pediatric mandibular fractures is a versatile technique as it:

1. Re-establishes function and aesthetics with limited morbidity;
2. Does not obstruct jaw growth and developing dentition; and
3. Can be used for broader age of patients.⁹,¹⁰

The purpose of this article is to highlight the management of right undisplaced parasymphysis fracture along with left subcondylar fracture in a 7-year old child using a MacLennan splint and circummandibular wiring along with brackets and elastics to reduce, stabilize the fracture segment and to restore function with least complications.

CASE REPORT

A 7-year old male patient reported to the Department of Paedodontics and Preventive Dentistry, Pacific Dental College and Hospital, Debari, Udaipur, one week after an injury to the oral and perioral region after a fall from the first floor. Parents reported bleeding from mouth and bruises over the left cheek region immediately after an injury. The patient was taken to a general practitioner, who cleaned the wound and placed him on antibiotics. The patient’s parents did not report any history of syncope, vomiting or, convulsions. At the time of

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reporting to the department, the patient complained of spontaneous pain and swelling in the chin region with difficulty in speech and mastication.

On extraoral examination, a healing wound was noticed on the left cheek extending from the temporomandibular region below zygomatic buttress. (Figure 1A) Facial edema was appreciated in the lower part of the face. The left temporomandibular joint and subcondylar region were tender on palpation.

On intraoral inspection, all the teeth were intact. The permanent right mandibular lateral incisor and primary right mandibular canine presented with grade I mobility and a step defect were seen between these teeth with derangement of occlusion, mobility of fractured segments, and restricted mouth opening. On palpating the lower border of the mandible, tenderness could be elicited in the anterior region.

An orthopantomograph revealed right undisplaced parasymphysis and left subcondylar fracture. (Figure 1B) Hematological parameters such as blood count, bleeding and clotting time were normal at the time of examination. A treatment plan was devised such that the fractured segments could be reduced and immobilized using open cap splint with bonded brackets and circummandibular wiring. A brief idea about treatment procedure was given to parents, and informed consent was prior to the start of treatment.

Under the bilateral field block local anesthesia, alginate impressions of both the jaws were made. Preoperatively, working models were poured using fast setting stone.

After marking the fracture site on the mandibular cast, it was then split into two segments using a saw along the fracture line. The fragments were held in their reduced positions using wax and checked against the maxillary arch for proper occlusion. (Figure 2A) A Mac Lennan splint was fabricated with cold cure acrylic on the altered and sealed mandibular cast. Six bondable brackets were fixed in the posterior aspect of splint; three on each side and six brackets were bonded bilaterally over the labial aspect of maxillary posterior teeth, after which splint was finished, polished and kept in an antibacterial solution. (Figure 2B)

Under deep sedation, digital pressure was used to reduce the fracture. Mandible was then stabilized with the MacLennan splint and circummandibular wiring. Stab incisions were made distal to the mandibular canines bilaterally. A mandibular bone awl was passed through the incision, guided along the lower border of the mandible, and passed into the buccal sulcus. A wire was held around the mandible and splint to stabilize the reduced fracture segments. After the insertion, the patient was advised to avoid physical activity, to be on a soft diet along with antibiotic and analgesic medications. The patient was also advised supervised brushing, rinsing after every meal, and oral irrigation using chlorhexidine. The patient was recalled after one week, and elastic were engaged into the bonded brackets so as to establish proper occlusion. (Figure 3)
Postoperative radiographic evaluation was done at the same time. (Figure 4) The splint was removed after 3 weeks. Healing and function were favorable at follow up except for an ulcer in the lower anterior region for which an anesthetic gel was prescribed.

**DISCUSSION**

Most of the pediatric fractures are ‘greenstick type,’ so a conservative approach is preferred as the fracture heals rapidly as the child grows normally. Another benefit of closed reduction is that it can be performed on an outpatient basis under local anesthesia, so more patient compliance and cooperation are attained with lesser complications.  

The majority of the mandibular body and parasympysis fractures in pediatric patients are undisplaced because of the elasticity of bone and tooth buds. While treating a child patient, various factors need to be taken into consideration. These include age, compliance, the anatomy of the fracture site, stage of growth and development and its potential to change, the complexity of the injury, any related complications, the time elapsed since injury, and treatment approach being contemplated. However, pediatric patients have an advantage of a faster ability to heal in minimum time with lesser complications because of the increased vascularity of the facial tissues. The repair of damaged orofacial tissues and restoring the same to function is aided by growth potential and increased adaptability. But the presence of multiple tooth buds in the mandibular body and growth centers at the mandibular condyle is a great concern when treating a child patient. A loose anchorage system due to attrition of deciduous teeth with physiological resorption of roots, unstable partially erupted secondary teeth, and precarious dental stability in the mixed dentition stage further complicate treatment in a pediatric patient. Thus, the aim of the current case was to restore the underlying bony structure to its anatomical position with minimal invasion and impairment. Clinical features of mandibular fracture in a child and adult are alike: pain, swelling, trismus, derangement of occlusion, sublingual ecchymosis, step deformity, midline shift, bleeding, temporomandibular joint problems, loss of sensation and movement restriction. It must also be noted that a pediatric patient with craniofacial trauma is more difficult to examine as they are uncooperative due to fear. In pediatric patients, the treatment modalities vary depending on the category of fracture and stage of skeletal and dental development. These range from conservative, non-invasive through closed reduction and immobilization to open reduction with internal fixation. Mandibular fractures without displacement are supervised by close observation, soft diet, medication, and avoidance of physical activity. Displaced mandibular fractures are to be reduced and immobilized. Monomandibular fixation for parasympysis injury is the treatment of choice in young patients. Thus a cap splint (MacLennan splint) was used to treat our patient. A cap splint was preferred for the following reasons: it covers both buccal and lingual cortical plates and holds them securely, occlusion is open, the function is unimpaired, functional stresses increase remodeling, ease of application and removal, ease of fabrication, ease of checking occlusion after reduction, and cost-effectiveness. The height of contour in deciduous teeth is lower when compared to the permanent teeth, which suggest that the mandible has a shorter vertical height. This warrants circummandibular wiring for acrylic support, which was followed in our case. The use of circummandibular wiring is further sustained due to the increased elasticity of bone, thin and less dense mandibular cortex, and the presence of tooth buds. An attempt was made to reduce the fracture to its pre-injury position, and the splint was removed in 3 weeks. An increased rate of metabolism and increased osteogenic activity of the periosteum speeds up the reparative process resulting in the early union of fractured segments. To avoid occlusal discrepancies guiding elastics were given. Most fractures of the undisplaced subcondylar fractures are treated with observation or closed reduction. The same protocol was followed in this case. Complications in pediatric patients are highly unlikely due to higher osteogenic potential and faster healing rates. Damage to the permanent tooth bud and nonunion of fracture segments due to metabolic disturbances, poor patient compliance, and generalized disease state can occur occasionally. A long term follow up is needed to ensure that teeth in the line of fracture are not deformed or damaged, developing follicle is intact and absence of infection in the fracture site to protect the odontogenic cells in the dental follicle.

**CONCLUSION**

Fractures in pediatric patients are less common than in adult patients. For a good outcome, a thorough knowledge of the manifestations is a key. An organized method of investigation and age-appropriate treatment protocol is mandatory. The majority of pediatric facial fractures can be managed conservatively, and this should be the goal considering the anatomical complexity of the developing mandible.
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REFERENCES


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