Management of mandibular body fracture in a young child

Hitesh Chander Mittal^{1*}, Chetan Pathak², Sunil Yadav¹

¹Department of Dentistry, BPS Government Medical College for Women, Sonepat, ²Department of Prosthodontics, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana, India

ABSTRACT

The purpose of the present case is to demonstrate a conservative and effective treatment modality for the pediatric mandibular fractures with reinforced open cap splint, which limited the discomfort and morbidity while taking care of the anatomical, physiological, and psychological complexity of developing jaw in children.



Key words: Cap splint, Mandible fracture, Pediatric trauma

INTRODUCTION

Facial trauma in children can often be challenging to manage with long-term consequences involved and the psychological impact. The most common mandibular fracture site in children are subcondylar, and the angle followed by parasymphysis region while the body fracture are comparatively rare.^[1,2] The high tooth to bone ratio predisposes the mandible to fracture compared to the midface.^[1-3] The traditional treatment methods of open reduction with the internal fixation have little applicability in children.^[1,2,4] The use of occlusal splints with circummandibular wiring for treating pediatric mandibular fractures is a versatile technique as:

- Re-establish function and esthetics with limited morbidity;
- does not hinder jaw growth and developing dentition; and
- 3. can be used for wider age of patients.[1-7]

This paper reports a child with mandibular body fracture treated with the minimal invasive method of reduction and fixation, that is, open cap splint with circummandibular wiring.

CASE REPORT

A 5-year-old female child presented with multiple maxillofacial laceration wounds with the history of road side accident. There was no history of convulsions/ vomiting/nasal or ear bleed and loss of consciousness. Intraoral examination revealed sublingual ecchymosis and step deformity at the mesial aspect of the mandibular right first primary molar with the visible mucosal tear. Tenderness could be elicited along the lower border of the mandible over the same area. Derangement of occlusion, the mobility of the fractured fragments, and restricted mouth opening was present. The computed tomographic (CT) findings revealed the oblique fracture

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*Address for correspondence

Dr. Hitesh Chander Mittal, Department of Dentistry, BPS Government Medical College for Women, Khanpur Kalan, Sonepat - 131 305, Haryana, India. E-mail: dr.hiteshmittal@gmail.com

line running posteriorly from mesial of a mandibular primary first molar. There was no clinical or radiographic evidence of the fracture in any other region. On the basis of CT scan findings and the clinical examination, a diagnosis was made as unilateral right body fracture of the mandible [Figure 1].

A treatment plan was made to reduce and immobilize the fracture segments using open cap splint and circummandibular wiring. Upper and lower alginate impressions were made under bilateral field block local anesthesia. Preoperatively, dental stone cast was poured; fracture line simulated on the cast by cutting with saw [Figure 2]; occlusion adjusted and stabilized with wax and plaster of Paris base [Figures 3 and 4]. A cap splint reinforced with 19G stainless steel (SS) wire was fabricated on the mandibular cast using clear acrylic [Figures 5 and 6]. The fracture was reduced under general anesthesia and immobilized with the help of open cap splint as seen prepared on the cast. In the submandibular region, stab incisions were made with the help of no. 11 B.P. blade



Figure 1: Computed tomography scan findings shows unilateral right body fracture of the mandible



Figure 3: Occlusion adjusted and stabilized with wax

with respect to the deciduous molar region. Mandibular bone awl was passed through the submandibular incision to pass through intraorally on the buccal side of the mandible and splint. A 26G flexible wire was passed through the eyelet of the awl and secured with two turns. The awl was retrieved back upto the lower border of the mandible and guided intraorally on the lingual side of the mandible and splint. The wire was unwinded, and bone awl was removed. The both ends of the wire, that is, buccal and the lingual parts were tied together over the splint after sawing the wire to avoid any soft tissue between the lower border of the mandible and the wire. The same procedure was repeated on the contralateral side [Figure 7]. The patient was advised to be on liquid and soft diet along with the antibiotics and analgesic medications. Oral hygiene instructions were given which included the supervised brushing; oral rinsing after every meals; and oral irrigation with saline using syringe and blunt needle twice daily by parents (parents were taught the technique how to use for the oral irrigation). The cap splint was removed after 3 weeks. Occlusion was satisfactory, and no other complication was noted except mild inflammation of



Figure 2: Fracture line simulated on the cast by cutting with saw



Figure 4: Cast fragments stabilized with plaster of Paris base showing adapted 19G stainless steel wire

gingival [Figure 8]. Patient advised to continue on soft diet and oral hygiene instructions are given.

DISCUSSION

The primary concern during treatment planning for pediatric maxillofacial injuries is to prevent injury to the developing dentition. The management of the pediatric patients with maxillofacial injury should take into consideration:

- I. The differences in anatomy and physiology,
- 2. Particular stage in growth and development,
- 3. Degree of compliance,
- 4. The complexity and any concomitant injury,
- 5. Anatomic sites injured,
- 6. Time elapsed since injury, and
- 7. The surgical approach being contemplated.[1-4,6-8]

The available treatment options for management of the jaw fracture are closed reduction with intermaxillary



Figure 5: (a-c) Fabricated open cap splint off the model with different views



Figure 7: Fracture immobilized with the help of cap splint and circummandibular wiring

fixation; open reduction with intra-osseous wires; and open reduction with mini-plates and screws for internal rigid fixation.^[4,6,9] But in children, due to incomplete ossification of the jawbones and the presence of underlying erupting teeth, open reduction with miniplate fixation of the jaw fracture is not usually considered except for highly displaced fractures. However, resorbable plates eliminate the need for the second procedure for the removal of miniplate, but the risk of damage to the tooth buds does exist.^[3,10] Mandibular fractures, which occur during mixed dentition can be associated with subsequently failed eruption of the permanent teeth when fracture line is reduced using an open surgical approach.^[3,9]

Closed reduction and fixation with arch bar and wires is also difficult in children because of the bell-shaped crown with little undercut, short height unfavorable for retention of wire and splints, resorbed roots and partially erupted permanent teeth.^[3,8] Therefore, in minimal to moderately displaced pediatric mandibular



Figure 6: Fabricated open cap splint reinforced with 19G stainless steel wire



Figure 8: Occlusion achieved after cap splint removal

fractures circumferential wiring with acrylic splints is a definitive treatment modality.^[1-3] The acrylic cap splint may be intermaxillary, lingual, labiolingual, and a cap type that covers the dental arch. The intermaxillary type is indicated for the loss of multiple teeth, the lingual type for the predicted intraversion of bone fragments, and the labiolingual as well as cap types for the deciduous and mixed dentition.^[3,10] The open cap splint allows early jaw movement which is highly desirable in cases of concomitant subcondylar fracture and hence prevents the development of temporomandibular joint ankylosis.

In the present case, closed reduction and fixation of the fracture was done using a reinforced open acrylic splint and circummandibular wiring. The fracture was first simulated on cast and cut segments were repositioned as close as possible to establish the preinjury occlusion. However, slight occlusal discrepancies resulting from the lack of a perfect reduction resolve spontaneously as the permanent teeth erupt, and bone undergoes remodeling with function. The SS wire was used to reinforce the acrylic splint from breakage and distortion. The fabricated and finished splint is then secured in position with circummandibular wires. However, cemented cap splint were also suggested but there are chances of dislodgement due to cement failure. The child may tease the splint due to the discomfort of a foreign body, cement may overflow into the throat, and gingival irritation may occur due to the cement used. The acrylic splint was removed after 3 weeks due to the rapid reparative process in children (high metabolic rate and high osteogenic potential of periosteum) resulting in the early union of fractured segments.^[3,4]

The present case report demonstrated a conservative and effective treatment modality for the pediatric mandibular fractures with reinforced open cap splint which limited the discomfort and morbidity while taking care of anatomical, physiological, and psychological complexity of developing jaw in children.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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