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### ABSTRACT

**Introduction:** Children (below 13 yrs of age) are usually susceptible to cranio-facial trauma because of their greater cranial mass to body ratio. When compared to adults, the pattern of fractures and frequency of associated injuries are similar but the overall incidence is 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 compression splint (MacLennan splint) fixed to the teeth, to the mandible with circum-mandibular wire. Children require long-term follow-up to monitor potential growth abnormalities.

**Case report:** A case of a 7-year-old girl with fractured body of mandible managed by closed reduction using MacLennan splint and stabilization using circum mandibular wiring.

**Conclusion:** MacLennan splint for treatment of pediatric mandibular symphysis/parasymphysis/body fractures are reliable treatment modality with regard to occlusion-guided fracture reduction. We can also manage the pediatric dentoalveolar fracture with minimum invasion and minimum cost by this splint.

**Keywords:** pediatric maxillofacial trauma, mandibular dentoalveolar fracture, MacLennan splint

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### INTRODUCTION:

Dental trauma in children constitutes a major and serious dental public health problem. There is no single dental disturbance that has greater psychological impact on both parents and child than the child's facial esthetic. Trauma in primary teeth can result in pain and affect the development of the permanent dentition. The most common effects on the permanent successors are defects in mineralization or tooth morphology, changes in colouration and enamel defects.<sup>[2]</sup>

Children are usually prone to craniofacial trauma because of their higher cranial mass to body ratio. The ratio of cranial volume to facial volume is approximately 8:1 at birth. By the completion of growth, this ratio becomes 2.5:11. Facial bone fractures in children are relatively rare than in adults and if it occur, they are minimally displaced. The reason may be due to presence of thicker layer of adipose tissue covering the elastic bones and the suture lines are more flexible. In addition, presence of tooth buds within the jaws and the scarcity of sinus pneumatization increases stability.<sup>[3]</sup>

The most common site of fracture in the child is the

nasal bone. The second most common fracture reported is the mandibular fracture. The angle, condyle and the subcondylar region contribute approximately 80% of the mandibular fractures in pediatric patients. Around 15-20% of cases have symphysis and parasymphysis fractures. Body fracture is rare.<sup>[3]</sup>

The mandibular growth centre disturbance due to injuries can range from small temporary inconvenience to lifelong disfigurement. On-time suitable management of these injuries is important for the successful outcome for the patient. Treatment is usually performed without delay. The treatment can be observation or closed reduction in non-displaced or slightly displaced fractures.<sup>[3]</sup>

MacLennan splint is a custom made appliance which can be constructed using acrylic material. It is made for the stabilization of mandibular arch, mainly in cases of fractures involving dentoalveolar segment in children, where there is mixed dentition and presence of developing tooth buds, where open reduction and direct fixation is contraindicated. It can also be used in cases where number of firm teeth for anchorage are inadequate, the wiring of the teeth

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can not provide adequate fixation and in adult mandibular body fracture, where the stability cannot be obtained by means of other type of horizontal wiring method.<sup>[4]</sup>

**CASE REPORT:**

A seven years old girl, reported to dept. of Oral and Maxillofacial Surgery having history of animal attack before one week. The patient was conscious and well oriented. Patient had History of oral bleeding without convulsion and vomiting. Primary treatment of bridal wiring between lower left 1<sup>st</sup> and 2<sup>nd</sup> primary molars was done and medicines were given at nearby civil hospital. Extra oral examination revealed that there was a diffuse facial edema (figure 1a) in the left cheek region, with palpable step deformity in the lower border of the mandible over the same area which was tender. There was normal TMJ movements. Intra oral examination revealed that there was restricted mouth opening with a laceration in the left labial vestibule in relation to 1<sup>st</sup> and 2<sup>nd</sup> deciduous molar along with bleeding and mobility of the fractured fragments. Derangement of occlusion (figure 1b) with posterior open bite on left side was evident (figure 1c). Preoperative orthopantamogram (OPG)(figure 2), showed a fracture line running down on the left body region of mandible between 74 and 75. On the basis of OPG report and clinical examination, it was diagnose as unilateral displaced left body fracture of the mandible.



Figure 1b  
Derangement of occlusion



figure 1c  
posterior open bite



Figure 1a  
Diffuse Facial Edema



Figure 2  
Preoperative orthopantamogram

**MANAGEMENT:**

Upper and lower alginate impressions were taken under local anesthesia and stone casts were prepared. These casts were occluded to check for occlusal derangement. [Fig: 3 (AandB)] Using OPG as a guide the fracture line was identified, and the model was sectioned with the help of die cutting saw. [Fig: 4] The lower model was assembled against maxillary arch in occlusion and seated with sticky wax. A MacLennan splint was fabricated [Figure 5a and b]. Then the splint was finished and polished and isolated in an antibacterial solution.



Figure 3(a)



Figure 3(b)

**Pre-operative upper & lower cast**

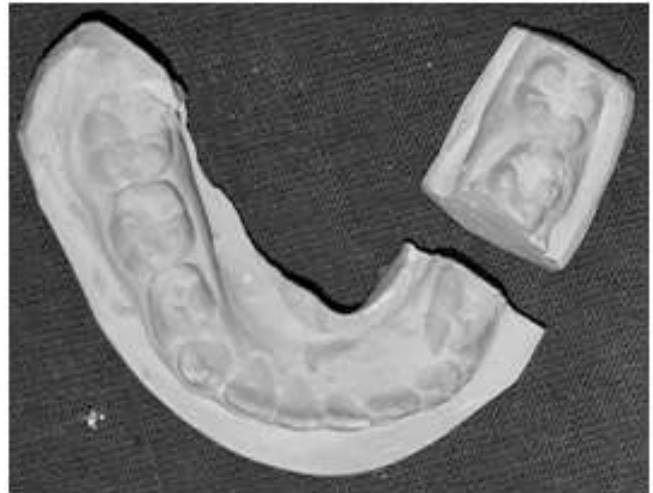


Figure 4  
Sectioned cast according to fracture line

The patient was administered General Anesthesia by nasal intubation. Digital pressure was used to reduce the mandibular arch. The prefabricated splint was placed in the mandibular arch. Occlusion was checked and the splint was stabilized with the help of circum-mandibular wiring using pre-stretched 28-gauge SS wires. [figure 6]. Displaced tooth bud of permanent pre-molar did not caused difficulty during reduction, so removal was not done. Postoperative recovery was uneventful and occlusion achieved was satisfactory. On the third postoperative week, the splint was removed under local anesthesia. No mobility was present at the fracture site. Patient was reviewed monthly for 3 months.



Figure 5a



figure 5b

MacLennan splint



Figure 6

Circum-mandibular wiring



Figure 7

Post-operative radiograph

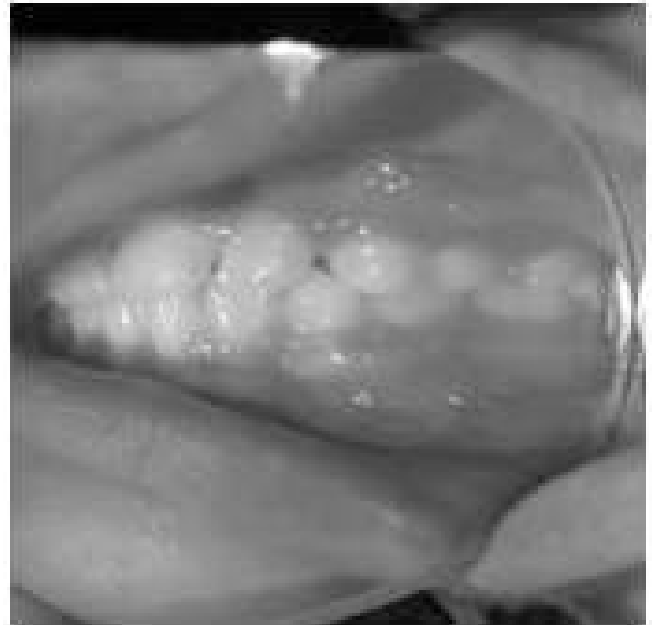


Figure 8

### Occlusion after 3 months

#### DISCUSSION:

Pediatric maxillofacial fractures are very uncommon. They demonstrate different clinical features when compared with that of adults. Treatment principles of mandibular fractures differ from that of adults due to concerns regarding mandibular growth and development of dentition. Most of the pediatric fractures are firmly united in 2 and 3 weeks, because of the increased osteogenic potential of periosteum and increased metabolic rate in children. In children, treatment of mandibular fractures is depicted by the fracture site and the stage of skeletal and dental development. Fracture of mandible limited to the alveolar process usually treated by open or closed reduction and immobilization by splints and arch bars for 2 to 3 weeks.<sup>[1]</sup>

In pediatric patients, presence of tooth buds within the mandible limits internal fixation with plates and screws. Fixation of fractures can be achieved with a mandibular splint fixed to the teeth by interdental wiring, cementation or circummandibular wiring. After the age of six, in displaced symphysis fracture, open reduction and rigid fixation through an internal incision can be done as the permanent incisors have already erupted. In parasymphysis fractures open reduction internal fixation (ORIF) is possible after the age of nine, when the buds of canines have moved up from their inferior position at the mandibular border. Similarly, in body

fractures, the inferior mandibular border can be plated, when the buds of the permanent premolar and molar have migrated superiorly towards the alveolus.<sup>[1]</sup>

For the management of pediatric mandibular fractures suggested methods are as follows:

0 to 2 years: Treated as edentulous problems with MacLennan type of splint.

2 to 4 years: If deciduous teeth are well-formed eyelet wiring can be used. Cap splint.

5 to 8 years: MacLennan cap splint

9 to 11 years; Cap splints, arch bars, plating or transosseous wiring at lower border.<sup>[3]</sup>

Alternative devices for closed reduction, in pediatric mandibular body fractures are pre-fabricated acrylic splints and Modified orthodontic brackets.

MacLennan Cap splint is preferred because it covers both lingual and buccal cortical plates and hold the mandibular cortices securely.<sup>[2]</sup> It also provides open occlusion, unimpaired function, smaller adjustment at the time of insertion and remodeling due to functional stresses.<sup>[3]</sup>

#### Conclusion:

MacLennan splint for treatment of pediatric mandibular symphysis/parasymphysis/body fractures are reliable treatment modality with regard to occlusion-guided fracture reduction. We can also manage the pediatric dentoalveolar fracture with minimum invasion and minimum cost by this splint.

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