

Management of Parasymphysis Fracture in a Young Child using Arch Bar Fixation: A Case Report.

Dr. Divya Singh¹, Dr. Carrolene², Dr. Neeti Mittal³, Dr. Nidhi Gupta⁴, Dr. Natasha Gambhir⁵, Dr. Rashi Singh⁶

¹Lecturer, Department of Pediatric and Preventive Dentistry, Santosh Deemed to be University, Ghaziabad

²PG 3rd Year, Department of Pediatric and Preventive Dentistry, Santosh Deemed to be University, Ghaziabad

³Reader, Department of Pediatric and Preventive Dentistry, Santosh Deemed to be University, Ghaziabad

⁴Professor and Head, Department of Pediatric and Preventive Dentistry, Santosh Deemed to be University, Ghaziabad

⁵Professor, Department of Pediatric and Preventive Dentistry, Santosh Deemed to be University, Ghaziabad

⁶Reader, Department of Pediatric and Preventive Dentistry, Santosh Deemed to be University, Ghaziabad

DOI: 10.47750/pnr.2022.13.S06.074

Abstract

Any type of facial bone fracture creates a lot of discomfort for the child as well as a lot of stress for the parent or caregiver. The most common facial injury in early childhood is a fracture of mandible, which occurs in the sequence of condylar fracture, symphysis/parasymphysis fracture, and fracture of the mandibular body. Depending on the severity of the injury, the symphysis/parasymphysis fracture of the jaw can be mildly displaced or substantially displaced. This case study demonstrates how arch bar stabilisation can be a simple and effective way to treat a minimally displaced fracture under general anaesthesia.

Keywords: Parasymphysis fracture, arch bar fixation, stabilization, Paediatric mandibular fracture, Close reduction

INTRODUCTION

Children are less likely than adults to suffer from maxillofacial fractures. The extent and type of the fracture are influenced by several factors. The resiliency or the suppleness of the children maxillary or mandibular bone, the presence of forming tooth buds in the alveolar process of maxilla and mandible and the smaller crown structure of the deciduous teeth are some of the factors that influence the fracture pattern as well as the management of the maxillofacial fracture.⁽¹⁾Anatomical benefits such as mandibular elasticity, shorter condyle, and a retruded mandibular jaw contribute to the low incidence of mandibular fractures in children.⁽²⁾

According to McCoy et al. (1966) and Hall (1972) the incidence of mandibular fracture in paediatric population was found to be 20.7 to 40.8%. Posnick et al. (1993) concluded that there was 34% incidence rate of mandibular fracture whereas Tanaka et al (1993) reported an incidence rate of 46.9%. Fractures of the mandible are more prevalent in boys and rise in frequency until they reach the age of 15 years old.⁽³⁾In the Indian population, the total prevalence of traumatic dental damage was 13 per 100 people. Traumatic dental injury was reported to be 15% of children under age of six (males 15%, females 16%) and 12% of children beyond the age of six (males, 13%; females, 8%). Falls were the most frequent cause of traumatic dental injury, and the most common place was at home.⁽⁴⁾

The etiological factors of maxillomandibular fractures differ from cases to cases, although motor vehicle accidents, falls, and sports-related injuries all play a major role.⁽⁵⁾The majority of mandibular fractures (50%) were due to traffic accidents, with falls/collisions (23%) and sports-related injuries (15%) contributing for the rest.⁽⁶⁾Remarkably, a high majority of the patients with mandibular fractures (30 to 60%) also have serious concomitant injuries in the body such as intra-abdominal, neurocranial or orthopaedic injury, demonstrating the energy required to induce such injuries.^(7, 8) Young patients are more prone than adults to develop greenstick or incomplete fractures. This is due to the unusually high plasticity of the mandible's cortical bone and dense enveloping layer of adipose tissue. Furthermore, owing of the existence of developing tooth bud of succedaneous tooth, fractures encountered in children are frequently lengthy and uneven in nature.⁽⁹⁾ Many fractures in children reconstruct with hardly any treatment, according to clinical evidence. This is especially true for the many slightly dislocated condylar neck greenstick injuries that occur in youth. As a result, a choice to perform surgical correction of a mandibular fracture can be determined only after evaluating the child's age and the extent of the fracture.⁽¹⁰⁾ In this article we are presenting a case of a mandibular fracture managed using arch bar fixation under general anaesthesia. Previously the case was intended to be managed using a cap splint which was accidentally broken.

CASE REPORT:

A 3-year-old male patient was brought to the department of Pediatric and Preventive Dentistry referred from the Department of Neurosurgery for the fracture of Mandible. Upon taking history it was found that the child had fallen down from the second floor of a building while playing 10 days back. It was also reported that the child had an episode of unconsciousness for about 20 minutes at the time of incident. The child was immediately transfer to the department of Neurosurgery and after thorough examination, the child was referred to the dental hospital for the treatment of the fracture mandible.

Clinical examination revealed avulsed 63,64 along with luxated 51,61 along step deformity type fracture in the mandible. Extra orally laceration was present in lower lip and at the lower border of the chin. (Figure 1a, 1b)



Figure 1. (a) Avulsed 63,64 and Step deformity in mandible. (b) Laceration of lower lip and chin. On palpation of the lower lip, no fragment of avulsed teeth was found. For the investigation a Computed tomography scan was advised to determine the extent and severity of the fracture. (Figure 2) It revealed a right parasymphiseal fracture with no deformity in condylar as well as subcondylar region.

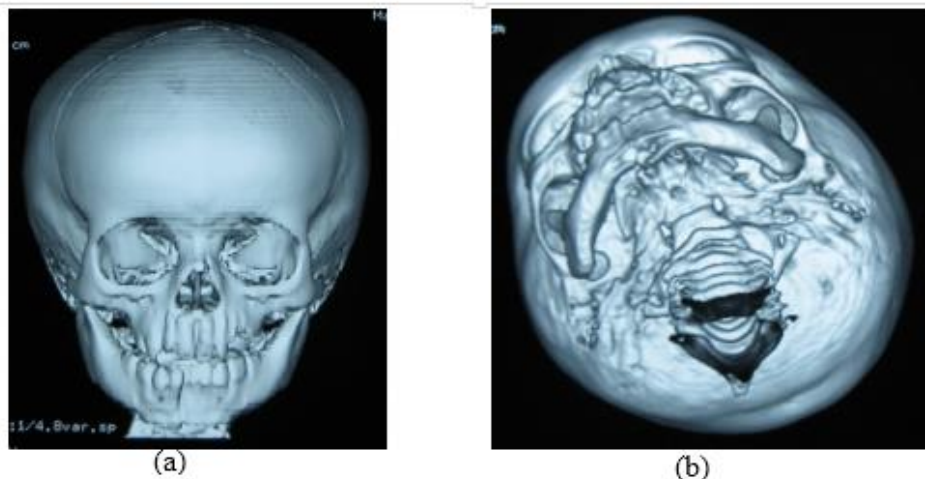


Figure 2a, 2b. CT Scan revealed right parasymphiseal fracture (red arrow) Upper and lower impression was made and poured using dental stone to obtain a separate maxillary and mandibular cast. (Figure 3).

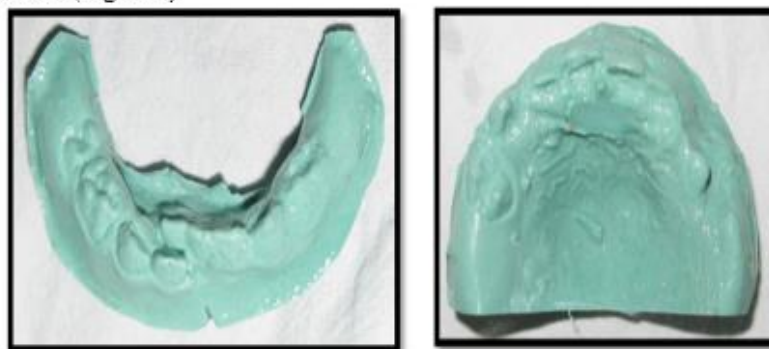


Figure 3. Pre op maxillary and mandibular cast

After proper evaluation of the CT Scan and preliminary cast, close reduction of the fracture mandible was planned using open cap splint and loop wiring between 51 and 61 were planned as a treatment method. A preliminary cast obtained was sectioned properly in the lab and reduced and fixed. (Figure 4)

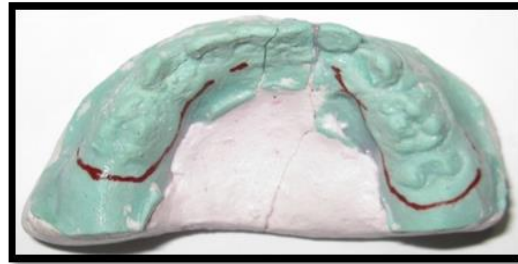


Figure 4. Reduced and fixed mandibular cast

A reinforcing wire loop was made using 19 Gauge orthodontic wire and an open cap splint was fabricated. (Figure 5)

The treatment was performed under the general anesthesia. To fix the luxated 51 and 61 a loop wiring was fabricated. (figure 6).

Unfortunately the open cap splint that was fabricated got broken in the OT room, thus a modification in the treatment was considered by using an arch bar for the reduction of fracture mandibular fragment. (Figure 7)

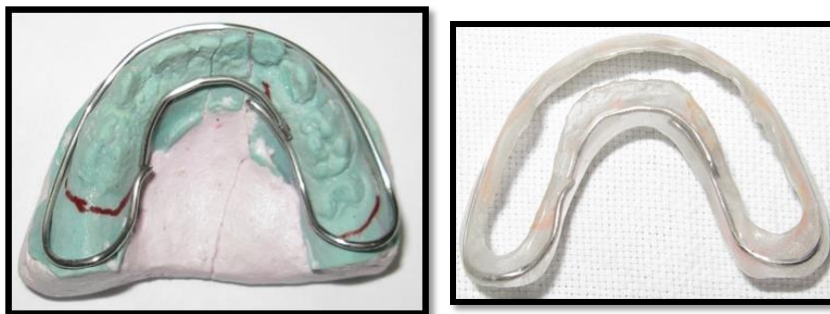


Figure 5. Fabrication of open cap splint



Figure 6. (a) Under general anesthesia (b) loop wiring in 51 and 61



Figure 7. Arch bar fixation of the mandible

The patient was recalled after 5th week and the arch bar fixation along with loop wiring was removed under conscious sedation.(Figure 8)

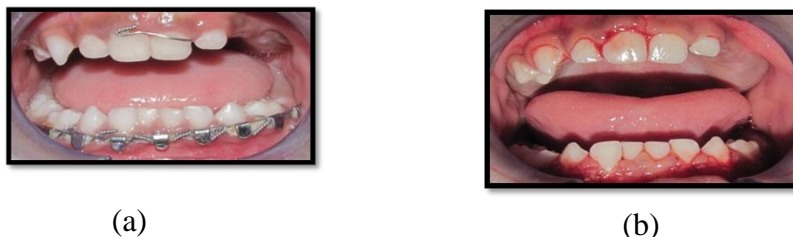


Figure 8. (a) Intra Oral photograph after 5th week (b) after the removal of loop wiring and arch bar.

Discussion:

The anatomic characteristics, rate of healing, level of cooperation, and the possibility for disruption with growth of mandible, the treatment of mandibular fracture in paediatric patient differs from that of a grownup. Paediatric patients have a better power to recover with fewer difficulties than adults, due to proper and efficient blood circulation in the tissues with higher osteogenic regenerative potential than adults. Bony reduction should be completed earlier in children, and immobilisation period should be reduced, i.e. 2-3 weeks versus 4-6 weeks in adults. Although no general agreement exists on the optimum way for fixing mandibular parasymphysis fractures, the most effective and least invasive method is the best.⁽¹¹⁾

According to Haug and Foss 2000, Mandibular fracture are classified into condylar, alveolus, body, symphysis, parasymphysis, angle, ramus, and coronoid.⁽¹²⁾ Children under the age of two are called edentulous because their erupting teeth seldom offer appropriate support for fixation. With the inclusion of circummandibular wires, an acrylic splint may be effective in certain circumstances to assist immobilise the fracture. During 2-5 years, deciduous teeth may be employed for fixation. Deciduous teeth have conical morphology offers itself to interdental wiring. Nondisplaced fractures can be treated with Risdon cables or mini-arch bars.⁽¹³⁾ Tape muzzles, resorbable plates, acrylic splint, open reduction, orthodontic resin, circumferential wiring rubber elastics in combination with orthodontic brackets, percutaneous skeletal fixation, modified orthodontic brackets, nickel titanium staples are some of the techniques used in the treatment of paediatric fractures. Intermaxillary fixation, cap splints, micro plates, or resorbable plates can be commonly used to treat extensively dislocated fractures. Conservative treatment for mildly fractured bones includes a soft diet, analgesics, and antimicrobial therapy. However, healing may be slowed if there is lack of cooperation.⁽¹⁴⁾

The existence of tooth buds throughout the body of the mandible must be considered while performing open reduction and fixation, as injury to forming dental buds may lead to halting of tooth eruption and therefore leading to development of smaller alveolar ridge.⁽¹⁵⁾

In our article we have presented a case where the patient was successfully treated with closed reduction utilizing arch bar. As the custom made open cap splint got accidentally broken in the OT room and due to limited time duration for the general anaesthesia, the adhoc decision was made to use arch bar fixation and fortunately, the fixation technique showed good results with no obvious soft tissue/gingival injuries. The benefits of closed reduction versus open reduction include lower surgical injury to the child and a lower risk of iatrogenic injury to developing teeth and other anatomical structures. Furthermore, the rate of common complications is reduced in closed reduction cases when compared with open reduction.⁽¹⁶⁾

CONCLUSION:

Disruption of the periosteal layer in cases of pediatric mandibular fractures may have unanticipated implications on growth. As a result, if intervention is required, closed reduction is preferred. During the further follow up investigation in the present case, it was found that there was proper healing of the fracture bone with no negative or unfavourable outcome. Thus, we can conclude that arch bar stabilization can be used in cases of mandibular fracture as an alternative to the other treatment modalities available.

REFERENCES

1. Güven O. (1992) Fractures of the maxillofacial region in children. *Journal of Cranio Maxillofacial Surgery*; 20(6):244-7.
2. Karacor-Altuntas Z, Ismayilzade M. (2017) What are the differences in pediatric mandible fractures. *J Aesthet Reconstr Surg*; 3(2):11.

3. Smartt JM, Jr., Low DW, Bartlett SP. (2005) The pediatric mandible: II. Management of traumatic injury or fracture. *Plast Reconstr Surg*; 116(2):28e-41e.
4. Tewari N, Mathur VP, Siddiqui I, Morankar R, Verma AR, Pandey RM. (2020) Prevalence of traumatic dental injuries in India: A systematic review and meta-analysis. *Ind J DentRes*; 31(4):601.
5. Siegel MB, Wetmore RF, Potsic WP, Handler SD, Tom LW. (1991) Mandibular fractures in the pediatric patient. *Arch Otolaryngol Head Neck Surg*; 117(5):533-6.
6. Posnick JC, Wells M, Pron GE. (1993) Pediatric facial fractures: evolving patterns of treatment. *J Oral Maxillofac Surg*; 51(8):836-44; discussion 44-5.
7. Schweinfurth JM, Koltai PJ. (1998) Pediatric mandibular fractures. *Facial Plast Surg*; 14(1):31-44.
8. Thaller SR, Maboutakh S. (1991) Pediatric mandibular fractures. *Ann Plast Surg*; 26(6):511-3.
9. Hall RK. (1972) Injuries of the face and jaws in children. *Int J Oral Surg*; 1(2):65-75.
10. Leake D, Doykos J, 3rd, Habal MB, Murray JE. (1971) Long-term follow-up of fractures of the mandibular condyle in children. *Plast Reconstr Surg*. 47(2):127-31.