MANAGEMENT OF MANDIBULAR PARASYMPHYSIS FRACTURE IN A FIVE-YEAR-OLD CHILD: A CASE REPORT

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Abstract: Mandibular fracture in pediatric patients is rare when compared with the number of mandibular fractures that occur within the adult population. Because of the unique anatomy, dentition and growth of a child, management of a pediatric mandibular fracture is complicated. There are various treatment modalities present to manage a mandibular parasymphysis fracture which have their own complications. Knowledge of the association of dental injuries and maxillofacial fracture is a basic tool for their prevention. In the present case report, we have discussed our approach to manage a mandibular parasymphyseal fracture of a five year old child with circummandibular wiring and follow up was done for 6 months.

Keywords: Parasymphysis Fracture, Children, Circum Mandibular Wiring

Introduction: Facial trauma in children can be difficult to manage with long term consequences involved and psychological impact.[1]The incidence of maxillofacial fracture is rare in children younger than five years of age which is around 0.6% -1.4%.[2]Investigations have shown that mandible is the most commonly fractured facial bone in paediatric patients.

They constitute about 56% of facial skeletal injury in hospitalized paediatric trauma patient.[3] The condyle is the most common fracture site in paediatric patients, accounting for 40% to 70% of mandibular fractures. Unilateral condylar fractures are more common than bilateral condylar fractures, with bilateral fractures seen approximately 20% of the cases. Symphyseal fractures account for approximately 2% to 30% of all mandible fractures. Fractures of the body, angle, and ramus account for the remainder of the fracture locations.[4]

The leading causes of mandibular fractures in paediatric population worldwide are falls from height, road traffic accidents, sports related injuries, and bicycle accidents, victim abuse.[5-6]Paediatric facial bones are more resistant to fracture due to their higher elasticity, poor pneumatization, thick surrounding adipose tissue and internally stabilized by the interrupted teeth in maxilla and mandible.[7]Mandibular fractures in children lead to complications like asymmetric mandibular growth, temporomandibular joint ankylosis, and malocclusion.[5]

Most fractures have been treated conservatively by occlusal cap splint with circummandibular wires. Cap splints provides close reduction and stabilization of mandibular fracture and allows hygiene maintenance without disturbing tooth buds. A long-term follow-up is necessary to monitor the growth of tooth buds and related abnormalities.[8]

This paper reports the management of mandibular parasymphysis fracture in a five year old patient with acrylic cap splint and circummandibular wiring.

Case Report: A five-year-old male patient reported to the Out Patient Department of Pediatric and Preventive Dentistry with chief complaint of pain and swelling on the right side of the face with limited mouth opening and difficulty in chewing food. There was history of trauma to his face due to collision with a motorized vehicle while playing five days ago. After the injury, the patient did not lose consciousness, had no history of vomiting or convulsions.

Extraoral examination revealed bruises and erythema on the left side of the face. Facial asymmetry was also present. Intraoral examination revealed the mouth opening was restricted with presence of grade I mobility in 83 and 84.On the right side of the canine region, there was a step deformity and discomfort along the lower border of the mandible. The occlusion was deranged with presence of open bite.

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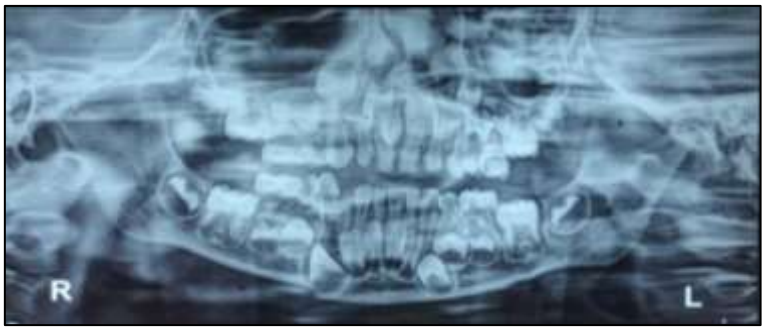

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Procedure: Before surgery, impressions of maxillary and mandibular arch were made for the patient and models were prepared. The fracture site was identified on the mandibular cast and a mock surgery was performed. After the mock surgery, the dental casts were held in their reduced positions and proper occlusion with the opposing maxillary cast was confirmed.

Both the casts were stabilized and mounted onto an articulator. An acrylic splint was prepared using self-cure acrylic resin involving labial and buccal flanges.

The surgery was done under general anesthesia. The mandibular arch was reduced manually and stabilized with occlusion in the guidance position, and the acrylic splint was tried in. Stab incisions were placed in the submandibular and submental region to allow the passage of a Kelsey-Fry mandibular bone awl, which was passed lingually along the body of the mandible through a stab incision and piercing the lingual mucosa. The awl was fed a 26-gauge orthodontic wire. Once the wire was fastened to the awl, it was pulled back until the awl's tip reached the lower border of the mandible. Carefully passed on to the buccal sulcus along the body of the mandible, with care taken to prevent soft tissue injury. One wire was passed on each side, taking precaution to avoid injury to the mental neurovascular bundle. The splint was secured by circummandibular wiring.

The patient was kept on liquid and soft diet and advised to take prescribed antibiotics and analgesics. Oral hygiene instructions were given which included supervised brushing and oral rinsing after every meal.

The patient was recalled after 2 weeks and the acrylic splint was removed. Clinical examination revealed the occlusion was stable with no mobility of the fractured segments. A postoperative orthopantomogram was advised which revealed bony apposition of the fractured site.

Discussion: Maxillofacial trauma is one of the leading causes of mortality and morbidity in pediatric patients. Mandibular fractures at young ages lead to functional impairment and disfigurement. Patterns and aetiologies of mandibular fractures vary by geographical location, cultural characteristics, and socioeconomic status.[5]

The gender allocation exhibited more prevalence in boys in all age groups. Mukhopadhyay et al stated in his study that only 20.2% of fractures were reported in children below five years of age. This could be attributable to the fact that the younger age groups experience more parental supervision and less independence than older children. The retruded position of the face in relation to the skull, a greater cranium to face ratio in infants and toddlers, absence of pneumatization of nasal bones and greater flexibility of facial bones may contribute to a lower incidence of maxillofacial fractures in this age group.[5]

The incidence raises from birth to 16 years of age.[2] Several factors, like facial skeleton growth, participation in school activities, and an increase in social interaction may increase the risk of maxillofacial trauma in this age group.[9]Concomitant injuries are observed in 25–75% of the children with maxillofacial fractures.[2]

Symphyseal and parasymphyseal fractures occur more often in children than in adults, which is due to the presence of developing canine tooth buds resulting in a stress point at the inferior border of the mandible. Following eruption of the canine, bone fills this location which is vulnerable, making it more durable. On reaching adolescence, the patterns of

fracture locations become similar to those of an adult, with an increase in fractures of the body of the mandible. Multiple fracture sites occur in approximately 40% to 60% of cases and are more frequent in adolescent children.[10-12]

Management of mandibular fractures in children differs from that of in adults because of concern of possible disruption of growth.[13] In children, the final result is determined not only by initial treatment but also by the effect that growth has on the form and function.[4] Bone fragments can unite, as early as 4 days in children and it is difficult to reduce fractures by the 7th day. So it becomes imperative to reduce fractures in children as early as possible and also for shorter duration of time.[15]

There are different techniques available for the management of paediatric mandibular fracture such as,

1. Circumferential Wiring
2. Cap Splint
3. Open Reduction
4. Resorbable Plates
5. Orthodontic Resin
6. Modified Orthodontic Brackets [1]

Bone plating is carried out during open reduction with the aid of titanium and stainless steel plates, which may negatively impact the permanent tooth bud. This can cause growth restriction. Hence acrylic cap splint was an ideal solution in this case.

The majority of fractures have been treated conservatively using circummandibular wires, rubber elastics, and dental splints with occlusal caps. Cap splints are a diverse treatment option for paediatric mandibular fractures since they: re-establish function and aesthetics with limited morbidity; does not impede developing tooth and jaw growth; and can be used for wider age of patients.[16]

However, a long-term follow-up is necessary to monitor the growth of tooth buds and related abnormalities. Cap splint has limited use in severely displaced fractures and reduced compliance in children since the splint has to be placed in position for at least two weeks.[17] Hence, this form of treatment is effective for paediatric patients with mixed dentition and so continues to be a cutting-edge approach for the treatment of paediatric mandibular fractures.[17]

Intermaxillary fixation with arch bars is also a method for closed reduction for mandibular fractures. However it is not a feasible treatment because primary teeth present with a loose anchorage system of resorbed roots. Significant drawback of IMF is that it restricts the normal dietary intake which results in weight loss and reduced tidal volumes, and there is risk of aspiration of gastric contents, should the patient vomit. The wires can cause soft tissue as well as periodontal injury.[17-19]

Conclusion: The majority of paediatric mandibular fractures in the parasymphysis region are minimally displaced and can be managed with conservative measures. The clinical outcome in the present case indicates that a cap splint is an effective and reliable treatment method in the management of paediatric mandibular parasymphysis fracture with regard to occlusion

guided fracture reduction, wide age group safe usage, ease of maintenance of oral hygiene, and comfort for young patients.

References

1. Singh M M, Rajpal S , Priya N , Ali M G, Akhtar S , CAP splint: An armour to safeguard developing dentition in paediatric mandibular fractures- A case series. IP Indian J Orthod Dentofacial Res 2021;7(1):77-81
2. Sharma A, Patidar DC, *et al.* Mandibular Fracture in Children: A New Approach for Management and Review of Literature. Int J Clin Pediatr Dent 2019;12(4):356–359.
3. Nezam S, Kumar A, Shukla JN, Khan SA. Management of mandibular fracture in pediatric patient. Natl J MaxillofacSurg 2018;9:106-9.
4. Wolfswinkel, Erik & Weathers, William &Wirthlin, John & Monson, Laura & Hollier, Larry &Khechoyan, David. (2013). Management of Pediatric Mandible Fractures. Otolaryngologic clinics of North America. 46. 791-806. 10.1016/j.otc.2013.06.007.
5. Santanu Mukhopadhyay: A retrospective study of mandibular fractures in children. J Ko- rean Assoc Oral MaxillofacSurg 2018
6. Rowe NL. Fractures of the facial skeleton in children. J Oral Surg 1968;26(8):505-515.
7. Khairwa A, Bhat M, Sharma A, Sharma R. Management of Symphysis and Parasymphysis Mandibular Fractures in Children Treated with MacLennan Splint: Stability and Early Results. Int J Clin Pediatr Dent 2015;8(2):127-132.
8. Nezam S, Kumar A, Shukla JN, Khan SA. Management of mandibular fracture in pediatric patient. Natl J MaxillofacSurg 2018;9:106-9
9. Zimmermann CE, Troulis MJ, et al. Pediatric facial fractures: recent advances in prevention, diagnosis and management. Int J Oral MaxillofacSurg 2006;35:2–13. DOI: 10.1016/j.ijom.2005.09.014.
10. Goth S, Sawatari Y, Peleg M. Management of pediatric mandible fractures. J CraniofacSurg 2012;23(1):47–56.
11. Thoren H, Iizuka T, Hallikainen D. Different patterns of mandibular fractures in children. An analysis of 220 fractures in 157 patients. J CraniomaxillofacSurg 1992;20(7):292–6.
12. Kaban LB, Mulliken JB, Murray JE. Facial fractures in children: an analysis of 122 fractures in 109 patients. PlastReconstrSurg 1977;59(1):15–20.
13. Glazer M, Joshua BZ, et al. Mandibular fracture in children: Analysis of 61 cases and review of the literature. Int J PediatrOtorhinolaryngol 2011 Jan;75(1):62–64. DOI: 10.1016/j.ijporl.2010.10.008.
14. Tanaka J, Uchide N, Suzuki K, Tashiro T, Tornitsuka K, Kimijirna Y, et al. Maxillofacial fractures in children. CraniomaxillofacSurg 1993;21:289-93.
15. Sharma S, Vashistha A, Chugh A, Kumar D, Bihani U, Trehan M, *et al*. Paediatric mandibular fractures: A review. Int J Clin Pediatric Dent 2009;2:1- 5.

16. Swayampakula H, Colvenkar S, Kalmath B, et al. (January 03, 2023) Management of Pediatric Mandibular Fracture With Acrylic Cap Splint. Cureus 15(1): e33324. doi:10.7759/cureus.33324
17. Michael Glazer, Ben Zion Joshua, Yitzhak Woldenberg, Lipa Bodner,Mandibular fractures in children: Analysis of 61 cases and review of the literature, International Journal of PediatricOtorhinolaryngology,Volume 75, Issue 1, 2011, Pages 62-64, ISSN 0165-5876,
18. Tanaka J, Uchide N, Suzuki K, Tashiro T, Tornitsuka K, Kimijirna Y, et al. Maxillofacial fractures in children. CraniomaxillofacSurg 1993;21:289-93.
19. Garg I, Samal S, Kumar A. Management of paediatric mandibular parasymphysis fracture with open cap splint: a definitive conservative treatment modality. Int J Health Sci Res. 2020; 10(7):198-202.