

MANAGEMENT OF MANDIBULAR FRACTURE IN PEDIATRIC PATIENT USING VACUUM-FORMED SPLINT: A CASE REPORT

Arti Dolas,¹ Anand Shigli,² Nupur Ninawe,¹ Ritesh Kalaskar¹

¹Department of Pedodontics and Preventive Dentistry Government Dental College and Hospital, Nagpur, Maharashtra, India

²Department of Pedodontics and Preventive Dentistry, Dr D.Y Patil Dental School, Pune, India

ABSTRACT

Mandibular fractures are less prevalent in children as compared with adults. This is due to the anatomic differences present in children. Treatment of mandibular fractures ranges from conservative noninvasive treatment to open reduction and fixation of fracture site. A case of 12-year-old boy with left parasymphiseal fracture managed by closed reduction using a vacuum-formed splint is reported here.

Keywords: mandibular fracture, vacuum-formed splint, closed reduction

INTRODUCTION

Trauma to orofacial structures in children is different than in adults. The overall frequency of facial fractures in children is around 4 to 6% in total.¹ Infants have observed the lowest prevalence of facial fractures. The frequency of facial fractures which occur in children younger than age 5 is 0.87 to 1%, while 1.0 to 14.7% facial fractures occur in patients older than 16 years.²⁻⁴ Among all the facial fractures observed in children, mandibular fracture is the most common type of fracture observed. The most common mandibular fracture site in children is subcondylar fracture and the angle mandible fracture followed by parasymphiseal fracture, while the body fractures are comparatively rare.^{1,5} The frequency of mandibular fractures usually is observed at two peaks, one at the age of 6 to 7 years, that is the beginning of school going phase, and other at 12 to 14 years, where there is increased physical activity and participation in sports during puberty and adolescence.^{2,4,6} The treatment options in pediatric mandibular fractures range from closed reduction

which include conservative treatment like advising soft diet, dental splints, and intermaxillary fixation to open reduction and internal fixation using resorbable or nonresorbable bone plates.⁷ The goal of treatment of these fractures is to restore the underlying bony architecture to preinjury position, in a stable fashion, as noninvasively as possible, with minimal residual esthetic and functional impairment.^{1,6,8} Hence, conservative approach is advocated. Vacuum-formed splints include improved patient comfort, reduced bonding time, protection of injured teeth, elimination of custom wire bending, ease of access to oral hygiene, and lack of dietary restrictions. The purpose of this article is to present the significance of vacuum-formed splint in mandibular fractures.

CASE REPORT

A 12-year-old boy reported to the Department of Pedodontics with history of fall 1 day back. The patient was conscious, well oriented, and had no history of convulsions or vomiting. He presented with a step deformity

Correspondence address:

Dr. Arti Dolas, MDS
46, Khankhoje Nagar
Manewada Road
Nagpur
Maharashtra, India
Email – dolasarti@gmail.com

in left parasymphyseal region corresponding to left mandibular canine region intraorally.

On intraoral examination, laceration wound was seen in between left mandibular permanent lateral incisor and canine region associated with mobility of fractured segment. Derangement of occlusion was seen with a step at 32 and 33 region (**Figure 1**).

Preoperative orthopantomogram as well as postero-anterior view of skull revealed an oblique fracture line passing from distal aspect of root of mandibular left lateral incisor, crossing canine, and reaching to lower border of left mandible (**Figure 2**). There was no other fracture line on temporomandibular joint or other bony structures seen. No individual tooth fracture was present and none of the teeth in line of fracture were mobile or missing.

Under local anesthesia, upper and lower impressions were made using rubber base impression material. Cast was poured using dental stone (Goldstone stone plaster type III). The casts were then occluded to check

occlusal discrepancy. The fracture site was marked on mandibular cast and cast was split into two segments using a saw (mock surgery was performed). Then cast was held in their reduced position and proper occlusion with opposing maxillary cast was confirmed with the help of plaster of Paris (**Figure 3**). BiocrylR close cap splint (Bioacrylic sheet 1.5*1.25mm Duran Scheu-Dental, Gmbh, Germany) was fabricated with a vacuum forming unit (BiostarR) on cast and tried in patient's mouth. Under local anesthesia, closed reduction was done and the splint was cemented with type I glass ionomer cement (**Figure 4**). The patient was administered tetanus toxoid along with antibiotics and analgesics medications. Soft diet was advised to the patient for the next 4 weeks. Oral hygiene instructions were given which included brushing and oral rinsing after every meal. Patient was recalled after



Figure 1: Intraoral photograph showing line mesial to canine.

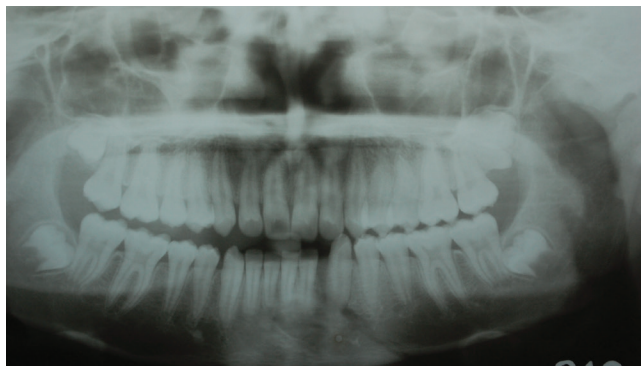


Figure 2: Panoramic radiograph showing fractured line extending from distal of lateral incisor to lower border of body of mandible.



Figure 3: Photograph of maxillary and mandibular cast in occlusion after performing mock surgery.



Figure 4: Intraoral photograph showing vacuum-formed splint cemented in oral cavity.

4 weeks for removal of splint. Splint was removed by the end of 4th week. On clinical examination, no signs of inflammation and a healthy healing were observed. No mobility of fractured segments was elicited.

Panoramic radiograph after 6 months revealed complete healing fracture site and continuity of lower border of mandible (**Figure 5**).

DISCUSSION

Almost half of the pediatric facial fractures occur in mandibular region. Treatment of mandibular fractures is done keeping various goals in mind like restoration of occlusion, restoration of function, but most importantly restoration of normal growth and development of mandible as well as developing permanent teeth. The factors which affect the treatment plan include patient's age, duration between trauma and treatment, location and extent of injury, stage of root formation, and the presence of bony fracture.⁷ The available treatment options for mandibular fractures include closed reduction with intermaxillary fixation, open reduction with intraosseous wires, and miniplates and screws for internal rigid fixation.⁵ Other treatments include tape muzzles, circumferential wiring, acrylic splints, percutaneous skeletal fixation, nickel titanium staples, orthodontic resin, modified orthodontic brackets, and rubber elastics in combination with orthodontic brackets.^{9,10} This case report describes an oblique fracture line extending between the left lateral incisor and left canine to lower border of mandible which would have been difficult and complicated to treat with other methods. Recently, vacuum-formed splints are also being used to treat mandibular fracture.



Figure 5: Postoperative panoramic radiograph after 6 months.

Jain et al reported a case with right parasymphseal fracture, which was treated using a modified acrylic closed cap splint.⁹ They used a 19-gauge orthodontic wire on buccal and lingual surface to reinforce the splint. Choubey et al reported a case of 9-year-old boy having an unfavorable parasymphseal fracture on right side of mandible which was first treated with arch bar stabilization and was unsuccessful. Then, it was stabilized with vacuum-formed splint and healing was seen as early as 4 weeks.⁸ In the present case, vacuum-formed splint was used for treating the fracture which not only simulates the occlusal morphology and helps in maintaining occlusion but also stabilizes the fractured segment.¹¹ Other advantages of vacuum-formed splints include improved patient comfort, reduced bonding time, reduced chairside time, less laboratory time, noninvasive, protection of injured teeth, elimination of custom wire bending, ease of access to oral hygiene, and enhanced patient compliance.

CONCLUSION

Vacuum-formed splint is a novel, cost-effective, easy to apply, and remove method which gives a less traumatic experience to child with maximum stability during the healing period thus increasing patient compliance.

References

1. John B, John RR, Stalin A, Elango I. Management of mandibular body fractures in pediatric patients: a case report with review of literature. *Contemp Clin Dent* 2010;1(4): 291–296
2. Zimmermann CE, Troulis MJ, Kaban LB. Pediatric facial fractures: recent advances in prevention, diagnosis and management. *Int J Oral Maxillofac Surg* 2006;35(1):2–13
3. Ferreira PC, Amarante JM, Silva PN, et al. Retrospective study of 1251 maxillofacial fractures in children and adolescents. *Plast Reconstr Surg* 2005;115(6):1500–1508
4. Khatri A, Kalra N. A conservative approach to pediatric mandibular fracture management: outcome and advantages. *Indian J Dent Res* 2011;22(6):873–876
5. Mittal HC, Pathak C, Yadav S. Management of mandibular body fracture in a young child. *J Paediatr Dent* 2016;4:29–32
6. Sanu OO, Ayodele A, Akeredolu MO. Management of pediatric mandibular fracture using orthodontic vacuum-formed thermoplastic splint: a case report and review of literature. *Niger J Clin Pract* 2017;20(5):637–641
7. Aboelgheit M. Management of mandibular fracture in pediatric patient: a case report. *Asian Pac J Health Sci* 2017;4(4):81–83

8. Choubey S, Shigli A, Banda N, Vyawahare S. Vacuum formed splints: novel method for managing oro-facial trauma. *J Indian Soc Pedod Prev Dent* 2014;32(4):353–356
9. Jain P, Yeluri R, Gupta S, Lumbini P. Management of pediatric mandibular parasymphiseal fracture with acrylic closed cap splint: a case report. *Ann Dental Speciality* 2015;3(1):45–47
10. Madan N, Bajaj N. Conservative treatment of pediatric mandibular fracture with removable acrylic splint. *Indian J Dent Sci* 2010;2(4):22–24
11. Talreja N, Shashikiran ND, Thakur R, Singla SS. Vacuum formed splints: easing the management of dentoalveolar fractures. *Int J Sci Res* 2017;6(9):202–204