

Paediatric Mandible Fracture-Variou Treatment Modalities – A Report of Case Series

Akhilesh Kumar Singh¹, Nitesh Mishra², Janani T³, Varun Arora⁴

¹Assistant Professor Faculty of Dental Sciences, IMS, BHU, Varanasi, India

²Senior Resident, Kalpana Chawla Govt, Medical College, Karnal, Haryana, India

³Junior Resident, Faculty of Dental Sciences, IMS, BHU, Varanasi, India.

⁴Resident, Kalpana Chawla Govt, Medical College, Karnal, Haryana, India.

Received: September 2019

Accepted: September 2019

Copyright: © the author(s), publisher. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Paediatric mandible fracture is one of the most challenging scenario in maxillofacial trauma to manage. Strategy for management of paediatric mandible fracture must include factors like age, anatomy, stage of dental de-velopment, fracture site and child ability to cooperate with the proposed treatment plan. The main objective be-hind the treatment of these fractures to restore underlying bony architecture to pre-traumatic state as conserva-tively as possible with minimal functional impairment. Therefore, choice of treatment option depends on vari-ous factors. In the present article we have tried to summarise different approaches towards the management of paediatric mandible fracture by presenting different cases of paediatric trauma.

Keywords: Fracture, Mandible, Paediatric Patients.

INTRODUCTION

Paediatric trauma can be distressing to both guardian and children, causing great degree of discomfort, panic and fear. Most common cause of trauma in child is their restlessness, fall, road traffic accidents, assault, and child abuses which are the most frequent risk of maxillofacial fractures in children.^[1] Maxillofacial trauma in children are less common than in adults and it ranges from 0.6%-1.2%.^[2] Susceptibility of children to craniofacial trauma is due to their higher cranial mass to body ratio. From birth till growth completion change in cranial volume: facial volume is from 8:1 to 2.5:11.About 80% is the occurrence of angle, condyle and subcondyle fractures and rest 15-20% are symphysis and parasymphysis fractures.^[3]

Management of paediatric mandible fracture require meticulous planning and minimal manipulation and may be modified by the stage of skeletal and dental development. Various treatment modalities can be employed be-cause of presence of tooth buds and treatment range from simple splinting, circum-mandibular wiring to internal fixation.

Name & Address of Corresponding Author

Dr. Nitesh Mishra
Senior Resident,
Department of Dentistry,
Kalpana Chawla Government Medical College,
Karnal,
Haryana,
India.

CASE SERIES

Cases Managed with Circum-Mandibular Wiring

A 7 year old female child reported with a chief complaint of pain and bleeding from the lower jaw since past few hours, when she had a fall from the staircase. The patient was conscious, well oriented to time, place and person. History of loss of consciousness, vomiting, ENT bleed and seizure was negative. Routine haematological investigations were sent and emergency treatment was started. Bleeding was controlled with digital pressure. Meanwhile, antibiotics and analgesics were given along with a dose of tetanus toxoid injection. Intravenous fluids were also added since the child was unable to take food orally.

Extra-oral examination revealed a diffuse swelling over the chin and right mandibular body region which was tender on palpation. Step was palpable over the right parasymphysis region.

Intra-oral examination revealed mixed dentition and step deformity between 82 and 83 which lead to malocclu-sion [Figure 1.1]. Mobility was also present in the same region. Right mandibular fracture was made the provi-sional diagnosis and CT was advised to confirm it. CT reports revealed right mandibular parasymphysis frac-ture.

Alginate impression of both the jaws were made before reduction and model was poured. An acrylic cap splint was constructed on the model after

reducing the fracture by model surgery. Under general anaesthesia, the fractured segments were reduced manually and stabilised with the help of the splint. A stab incision of 3mm was placed at the inferior border of the mandible on the right side. A William Kelsey Fry awl was introduced through the stab incision and passed along the medial surface of mandible and taken out lingually. A 26 gauge wire was tied to the tip of the awl and it was guided along the lower border of the mandible and taken out through the buccal vestibule. The ends of the wire was wended together and stabilised. The same procedure was repeated for the left side. [Figure 1.2] On the third post-operative week an OPG was taken [Figure 1.3] and the splint was removed. No mobility was pre-sent in the fracture site and occlusion was satisfactory. The patient was regularly followed every month for one year. [Figure 1.4] [Figures 2.2 to 2.4] shows another similar case of right parasymphysis fracture treated with circum-mandibular wiring.

Cases Managed with Open Reduction and Internal Fixation

A 6 year old male child reported with a history of trauma to the lower jaw. Clinical and radiographic examination revealed left mandibular parasymphysis fracture [Figure 3.1]. Under general anaesthesia, the fracture site was exposed and anatomically reduced. Fixation of the fracture segments was done by a 4 hole with gap 2mm titanium mini-plate. Patient was advised for strict soft and liquid diet. Post operative OPG was taken on the third post-op week [Figure 3.2]. Healing and occlusion was found to be satisfactory.

[Figures 4.1 to 4.3] Shows another case of bilateral mandibular parasymphysis fracture treated by ORIF with 1.5mm system Ti miniplates.



Figure 1.1: Paediatric mandibular fracture showing step deformity between 82 and 83

Case Managed by Splinting

A 5 year old female child reported with a history of fall from height, sustaining injury to the lower jaw.

Clinical and radiographic examination revealed mandibular symphysis fracture. Taking into consideration the age and minimal mobility, the fracture was decided to be managed by direct splinting. The needle of an 18 gauge cannula was used to simulate the arch bar, which was reinforced to the teeth from 73 to 83 using 26 gauge wires. [4] Pt was reviewed every week post-operatively and the splinting was removed on the fourth post-operative week. Occlusion and masticatory efficiency was found to be satisfactory.



Figure 1.2: Intra-op photograph after the placement of acrylic splint and circus-mandibular wiring



Figure 1.3: Post-operative OPG



Figure 1.4: Occlusion on the fourth post-op week after the removal of splint

Case 2



Figure 2.1: Paediatric mandibular fracture showing step deformity between 81 and 82



Figure 2.4: Post-operative photograph showing acrylic cap splint with circum-mandibular wiring

Case 3



Figure 3.1: Pre-operative OPG showing fracture of left parasymphysis of mandible



Figure 2.2: CT 3D view showing fracture of right parasymphysis of mandible



Figure 3.2: Post-operative OPG after ORIF

Case 4

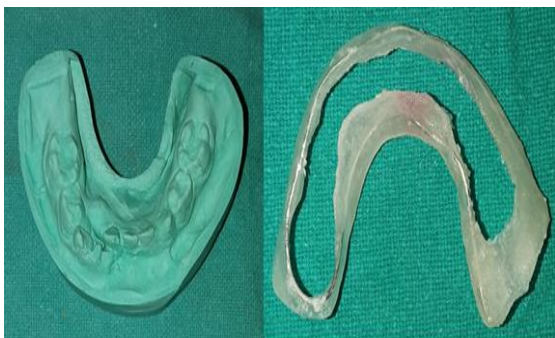


Figure 2.3: Stone cast and acrylic cap splint



Figure 4.1: CT face 3D construction showing fracture of bilateral parasymphysis of mandible



Figure 4.2: Intra-operative photograph showing fixation done with Ti miniplate system



Figure 4.3: Post-operative OPG

Case 5



Figure 5.1: Splinting done using needle of an 18 gauge cannula and 26 gauge wire

DISCUSSION

Paediatric fractures are comparatively rare as compared to adults. This is mainly due to elasticity of bone in them and the short condylar neck, which cause resistance in fracture.^[2] Preservation of developing dentition is the primary concern during management of paediatric maxillofacial trauma.

For the management of paediatric mandible fracture following factors to be considered.^[5]

- 1) Age and cooperation of the patient.
- 2) Duration of treatment.
- 3) Location and extent of injury

- 4) Stages of root development
- 5) Injury to primary or permanent dentition
- 6) Presence of supporting bone
- 7) Periodontal health

Treatment modality in children differs and often open reduction is not considered due to incomplete ossification of mandible and underlying erupting teeth. Different treatment modalities available for management of paediatric mandible fracture are closed reduction with simple splinting; closed reduction with cap splints and circum-mandibular wiring; open reduction with intra-osseous wires; and open reduction with miniplates either titanium or bioresorbable plates and screws for internal rigid fixation.^[6-8] Sometimes conservative follow up is the treatment of choice.^[8] Resorbable plates eliminate the need for the second procedure for the removal of mini-plate but the risk of damage to the tooth bud still exist.^[9,10] Risk of delayed or failed eruption often present when open surgical approach undertaken during mixed dentition period.^[8,10]

Closed observation, soft diet, medication should be considered for undisplaced fractures and fractures which are displaced must be reduced and immobilised.^[12] In minimal to moderately displaced fractures circum-mandibular wiring with cap splints is a definitive treatment modality.^[10,13] It allows early jaw mobilisation which is very much needed in case of associated condylar fractures and hence prevents the development of temporomandibular joint ankylosis. Immobilisation is limited to 2 weeks in younger children and upto 4 weeks in adolescents.^[14] On the other hand, displaced mandible fractures respond well to 2.0-mm miniplate fixation along the inferior mandibular border using monocortical screws, or placement of an acrylic lingual splint. Internal fixation provides better stability and controlled reduction in three dimension. Malocclusion rarely occurs because of maxillary or mandibular fractures. There is typically complete dental compensation for any skeletal malalignment in the young child. In most of the cases of intracapsular condylar fracture, mandibular asymmetry may result due to growth disturbance. 1-7% of condylar fractures in children results in TMJ ankylosis.^[13,15] Bilateral condyle fractures, delayed treatment or prolonged MMF may carry a risk factor for TMJ ankylosis.^[13,15] Open reduction may interfere with growth because of mini-plates fixation.^[16] Allergic reactions to metal and stress shielding effect, especially after rigid plate fixation has been reported and may tend to cause bone weakening after implant removal.^[17]

CONCLUSION

Various treatment modalities are employed for management of paediatric mandible fracture. Thus to judge and to achieve a good outcome a thorough knowledge of the manifestations should be there.

Majority of the cases can be managed conservative because it is relatively safe, minimally invasive with good prognosis and almost complication free outcome than in invasive surgical modality.

REFERENCES

1. R. Lalloo, "Risk factors for major injuries to the face and teeth," *Dental Traumatology*, vol. 19, no. 1, pp. 12–14, 2003.
2. Das UM, Nagarathna C, Viswanath D, Keerthi R, Gadicherla P, Management of facial trauma in children: A casereport. *JIndianSocPedodPrevDent*2006;24:161-3.
3. Patankar AP , Patankar AS, Suman G, Singh V ,Bhosale A. Lateral Compression Open Cap Splint (Mac Len-nan) A treatment Modality for Pediatric Mandibular Parasymphysis Fracture Case Report. *Journal of Oral Medicine, Oral Surgery, Oral Pathology and Oral Radiology* 2016;2(2):102-104.
4. Kumar N, Singh AK, Pandey A, Verma V. An indigenous method for closed reduction of pediatric mandibular parasymphysis fracture. *Natl J Maxillofac Surg* 2015;6:206-8.
5. G. H. Blakey III, R. L. Ruiz, and T. A. Tuarey, "Management of facial fractures in growing patient," in *Oral and Maxillofacial Trauma and Endodontics*, R. J. Fonseca and R. V. Walker, Eds., vol. 2, pp. 1003–1041, WB Saunders, Philadelphia, Pa, USA, 1997.
6. Zimmermann CE, Troulis MJ, Kaban LB. Pediatric facial fractures: Recent advances in prevention, diagnosis and management. *Int J Oral Maxillofac Surg* 2005;34:823-33.
7. 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;1:291-6.
8. Aizenbud D, Hazan-Molina H, Emodi O, Rachmiel A. The management of mandibular body fractures in young children. *Dent Traumatol* 2009; 25:565-70.
9. Myall RW. Management of mandibular fracture in children. *Oral Maxillofac Surg Clin N Am* 2009;21:197-201.
10. Kale TP, Urologin SB, Kapoor A, Lingaraj JB, Kotrashetti SM. Open cap splint with circummandibular wiring for management of pediatric mandibular parasymphysis/symphysis fracture as a definitive treatment modality; a case series. *Dent Traumatol* 2013;29:410-5.
11. Priya Vellore K, Gadipelly S, Dutta B, Reddy VB, Ram S, Parsa A. Circummandibular wiring of symphysis fracture in a five-year-old child. *Case Rep Dent* 2013;2013:930789
12. Zimmermann C.E, Troulis M.J, Kaban L.B. Pediatric facial fractures: recent advances in prevention, diagnosis and management. *Int J. Oral Maxillofac. Surg.*2006;35:2- 13.
13. Baumann A, Troulis MJ, Kaban LB. Facial trauma II: Dentoalveolar injuries and mandibular fractures. *Pediatric Oral and Maxillofacial Surgery*. Philadelphia: Saunders; 2004. p. 441, 445-61.
14. Wolfswinkel EM, Weathers WM, Wirthlin JO, Monson LA, Hollier LH, Khechoyan DY. Management of paediatric mandible fractures. *Otolaryngol Clin N Am* 46(2013) 791-806.
15. Demianczuk AN, Verchere C, Phillips JH. The effect on facial growth of pediatric mandibular fractures. *J Craniofac Surg* 1999;10:323–328
16. Sharma S, Vashistha A, Chugh A, Kumar D, Bihani U, Trechan M. Paediatric mandibular fractures: A re-view. *Int J Clin Paediatric Dent* 2009;2:1-5
17. Devi WB, Yeluri R, Singh DN, Nongthomban RS. Management of paediatric mandibular fracture using cap splint- A report of case series. *Asian J.Pharm.Hea.Sci* 2015;5:1219-22.

How to cite this article: Singh AK, Mishra N, Janani T, Arora V. Paediatric Mandible Fracture-Variou Treatment Modalities – A Report of Case Series. *Ann. Int. Med. Den. Res.* 2019; 5(6):DE07-DE11.

Source of Support: Nil, **Conflict of Interest:** None declared