



Paediatric Mandibular Fracture: A Dilemma to Surgeons

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Authors' contributions

This work was carried out in collaboration among all authors. Author BCS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AJ and KRR managed the analyses of the study. Author AA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The present study analysed 10 cases of paediatric mandibular fractures, epidemiology and treatment strategies. A systematic retrospective analysis of 10 paediatric patients who had undergone surgery for maxillofacial trauma in our department of oral and maxillofacial surgery, PMNM Dental College and hospital, North Karnataka were included in this study. The data collected was analysed to determine the prevalence of mandibular fracture with respect to particular age group, sex, etiology, commonest fracture site and the method of management. The most common is parasymphysis fracture which account for 61.53% of cases followed by condylar fracture (23.07%). Multiple fractures (20%) are less common. Paediatric mandibular fractures (5%) are rare compared to adults. The reasons cited include relatively small volume of facial mass compared to calvarium, resilience of paediatric skeleton and the protected environment in which the children live. Management of paediatric mandibular fractures is certainly a dilemma to surgeons due to developing dentition, growing mandible, deficit of co-operation due to age, future complications, and compromise in esthetics and function which may develop.

Keywords: *Paediatric mandibular fractures; parasymphysis; maxillofacial trauma; etiology.*

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1. INTRODUCTION

Facial fractures in paediatric patients are rare, accounts for approximately 5% of facial fractures [1]. One half of all paediatric facial fractures involve mandible [2]. Most common etiology were fall (64%), road traffic accidents (22%), and sports-related accidents (9%) [3]. There is considerable difference in the management of fractures in children as compared to adults because of anatomic variation, stage of development of tooth, patient age and degree of co-operation, mandibular growth, rapidity of healing etc [4]. Open and closed reduction methods are advocated for treated for paediatric mandibular fractures. Each method has its own indications and contraindications, also has its own advantages and disadvantages. Here we have analysed 10 cases of paediatric mandibular fractures, epidemiology and treatment strategies.

2. MATERIALS AND METHODS

A systematic retrospective analysis of 10 paediatric patients who had undergone surgery for maxillofacial trauma in our department of oral and maxillofacial surgery, PMNM Dental College and hospital, North Karnataka were included in this study.

Detailed information consisting of age, sex, socioeconomic status, chief complaint, history of present illness, past medical history, etiology & associated injuries were collected and analysed. Also radiographs were analysed to rule out multiple fractures and to confirm the clinical diagnosis.

The data collected was analysed to determine the prevalence of mandibular fracture with respect to particular age group, sex, etiology, commonest fracture site and the method of management.

3. RESULTS

A total number of 10 paediatric patients with 13 fractures of mandible were analysed from 1st Jan 2009 to 31st Dec 2019.

3.1 Age Predilection

The age range of the patients included in the study is 0–12 years. The most commonly affected age group is between 0 and 4 years.

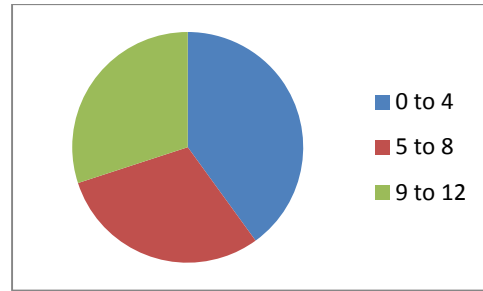


Fig 1. Age predilection

3.2 Sex Predilection

Among 10 patients, 5 (50%) were male patients and 5 (50%) female patients. Gender differences are less significant in paediatric fractures. Etiologies appear to be common in both sexes in younger age.

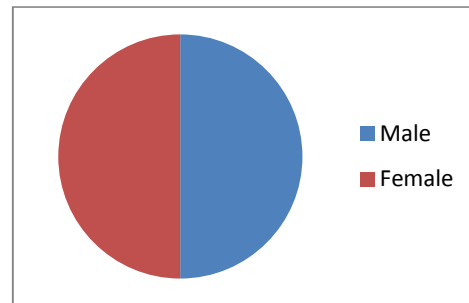


Fig. 2. Sex predilection

3.3 Etiology

Self fall was the most common etiology (70%) followed by road traffic accidents (30%).

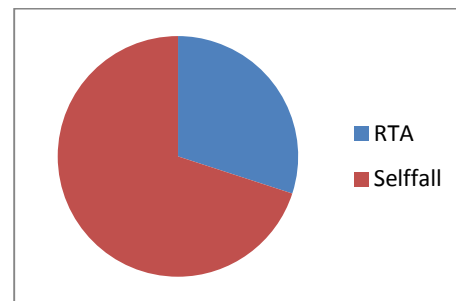


Fig. 3. Etiology

3.4 Site Predilection

A total of 10 cases with 13 fractures in mandible were analysed. From which, the most common is

parasymphysis fracture which account for 61.53% of cases followed by condylar fracture (23.07%). Multiple fractures (20%) are less common.

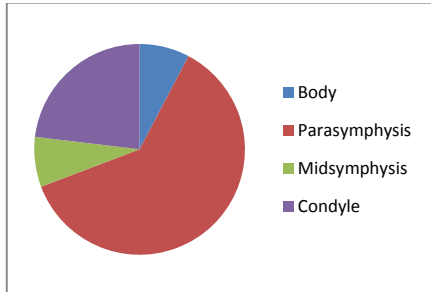


Fig. 4. Site predilection

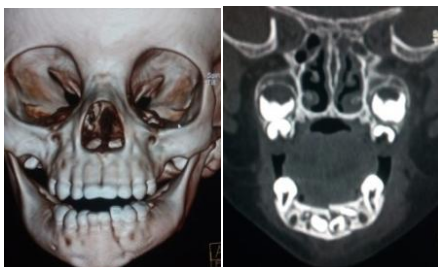


Fig. 5. Preoperative 3D CT Face

3.5 Modes of Management

1. Closed reduction using cap splint and circummandibular wiring



Fig. 6. Intraoperative photographs

Representative Case: 2 year old male patient diagnosed with left parasymphysis fracture of mandible.

After induction of general anesthesia, a small stab incision is placed in the left submandibular region and an awl was inserted through it. The awl was directed medially and was taken out through floor of mouth. 26 gauge wire was placed in the awl and it was passed through

lingual side until lower border of mandible is reached. Awl was then guided laterally to exit through lower buccal vestibule. Same procedure was carried out on the contralateral side. Cap splint positioned and secured. Occlusion checked and pressure dressing given.

2. Open reduction and internal fixation under general anesthesia

Representative case: 4 year old female patient diagnosed with right parasymphysis fracture of mandible.

After induction of general anesthesia, the displaced segments were reduced using wires. Sulcular incision placed extending from 83 to 74 region. Mucoperiosteal flap raised. Fracture site identified and reduced manually. Fixation done with 2 mm continous plate and 2 x 6 mm screws. Closure done with 3-0 Vicryl.

4. DISCUSSION

Pediatric mandibular fractures (5%) are rare compared to adults. The reasons cited include relatively small volume of facial mass compared to calvarium, resilience of paediatric skeleton and the protected environment in which the children live [5]. The retruded position of the face relative to skull is an important reason for the lower incidence of mandibular fractures and higher incidence of cranial injuries in young children (less than 5 years of age) [6]. With increasing age, facial growth occurs in a downward and forward direction; the midface and mandible become more prominent and the incidence of facial fractures increases, while cranial injuries decrease [7].

The incidence of mandibular fracture increases with age and they are the most common facial fracture seen in hospitalized children [7,8,9]. Most commonly paediatric mandibular fractures are caused by self falls and sports-related injuries [10]. Young children usually sustain injuries from low-velocity forces, such as falls, while older children are more commonly exposed to high-velocity forces(bicycle accidents, sports) [11].

The general principles of managing mandibular fractures are same in children and adults that is, anatomical reduction and immobilization. However the techniques in children are necessarily modified by anatomical, physiological and psychological factors [12].

Unique physical properties of bone in paediatrics coupled with space occupying developing dentition give rise to patterns of fracture different from adults. Bone fragments in children may become partially united in 4 days and fractures become difficult to reduce by 7th day [13]. However there are chances of disruption of growth. A conservative modality of treatment is the first and best approach to consider for pediatric mandibular fractures, as these fractures heal rapidly, and the children grow normally [14]. It includes soft diet, analgesics, antibiotic prophylaxis and is particularly useful in cases of undisplaced fractures. However, in very young children, because of insufficient cooperation in following postoperative instructions healing might get prolonged [15].

Displaced fracture however require closed reduction using splints, circummandibular wiring etc and immobilization using arch bars and elastics. Splints are cost effective, easy to apply and remove, causes less patient discomfort and less injury to adjacent anatomic structures [1]. Long term immobilization more than two weeks has the disadvantage of causing temporomandibular joint ankylosis and damage to developing teeth [14].

With unstable fractures that cannot be secured with closed reduction techniques, open reduction and internal fixation become necessary and it is particularly useful when dentition has erupted and root formation has matured enough. Absorbable plates and screws little side effects on the growing facial skeleton but there is risk of damaging unerupted teeth during the drilling process [14]. Chances of plate getting infected and the need for removal is another disadvantage of this method.

In children the final outcome of treatment is determined not merely by initial treatment but by the effect growth has on form and function [12]. In all our cases, bone healing was satisfactory without any complication. However long term follow up is necessary to evaluate growth, function and future complications.

5. CONCLUSION

Management of pediatric mandibular fractures is certainly a dilemma to surgeons due to developing dentition, growing mandible, deficit of co-operation due to age, future complications, and compromise in esthetics and function which may develop. Individualized treatment strategies

should be formulated depending on age, patient co-operation, location of fracture etc to optimize superior results.

CONSENT

As per international standard, parental written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Khatri A, Kalra N. A conservative approach to pediatric mandibular fracture management: Outcome and advantages. *Indian J Dent Res.* 2011;22:873-6.
2. Iida S, Matsuya T. Pediatric maxillofacial fractures: Their etiological characters and fracture patterns. *J Craniomaxillofac Surg.* 2002;30:237-41.
3. Dodson TB. Mandibular fractures in children. *OMS Knowledge Update.* 1995;1:95-107.
4. Kaban LB. Facial trauma I: Midface fractures. In: Kaban LB, Ed. *Pediatric Oral and Maxillofacial Surgery.* Philadelphia, PA: W.B. Saunders. 1990;209-232.
5. Eppley BL. Use of resorbable plates and screws in pediatric facial fractures. *Oral Maxillofac Surg.* 2005;63:385-91.
6. McGraw BL, Cole RR. Pediatric maxillofacial trauma. Age-related variations in injury. *Arch Otolaryngol Head Neck Surg.* 1990;116:41-45.
7. Zimmermann CE, Troulis MJ, Kaban LB. Pediatric facial fractures: Recent advances in prevention, diagnosis and management. *International Journal of Oral and Maxillofacial Surgery.* 2005;34(8):823-33.
8. Acton CH, Nixon JW, Clark RC. Bicycle riding and oral/maxillofacial trauma in young children. *Med J Aust.* 1996;165:249-251.
9. Demianczuk AN, Verchere C, Phillips JH. The effect on facial growth of pediatric

- mandibular fractures. J Craniofac Surg. 1999;10:323-328.
10. Patrick Cole, Yoav Kaufman, Larry H. Hollier Jr. Managing the pediatric facial fracture. Craniomaxillofac Trauma Reconstr. 2009;2(2):77-83.
 11. Gussack GS, Luterman A, Powell RW, Rodgers K, Ramenofsky ML. Pediatric maxillofacial trauma: Unique features in diagnosis and treatment. Laryngoscope. 1987;97:925-930.
 12. Sharma S, Vashistha A, Chugh A, et al. Pediatric mandibular fractures: A review. Int J Clin Pediatr Dent. 2009;2(2): 1-5.
 13. Kaban LB, Mulliken JB, Murray JE. Facial fractures in children: An analysis of 122 fractures in 109 patients. Plast Reconstr Surg. 1977;59(1):15-20.
 14. Ferreira PC, Amarante JM, Silva PN, Rodrigues JM, Choupina MP, Silva AC, et al. Retrospective study of 1251 maxillofacial fractures in children and adolescents. Plast Reconstr Surg. 2005;115:1500-8.
 15. Agarwal RM, Yeluri R, Singh C, Chaudhry K, Munshi AK. Management of pediatric mandibular fracture: A case series. Compend Contin Educ Dent. 2014;35(8): 578-82.

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