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

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Received: September 2019
Accepted: September 2019

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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 development, fracture site and child ability to cooperate with the proposed treatment plan. The main objective behind the treatment of these fractures to restore underlying bony architecture to pre-traumatic state as conservatively as possible with minimal functional impairment. Therefore, choice of treatment option depends on various 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 2.5:1.1 About 80% is the occurrence of angle, condyle and subcondyle fractures and rest 15-20% are symphyseal 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.

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 malocclusion [Figure 1.1]. Mobility was also present in the same region. Right mandibular fracture was made the provisional 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 frac-tured 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 winded 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.

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 cannu-la 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.
Case 2

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

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

Figure 2.3: Stone cast and acrylic cap splint

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 3.2: Post-operative OPG after ORIF

Case 4

Figure 4.1: CT face 3D construction showing fracture of bilateral parasymphysis of mandible
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 are 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.[6,7] 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 to damage 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 tends 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