Review Article

Paediatric Condylar Fracture: A Review.

Gupta K, Kohli A, Katiyar A, Singh G, Sarkar B

Abstract: Fractures represent a particular kind of pathology in children, as they take place within a rapidly growing organism. Condylar fractures must be focused upon with regards to future disorders in the dentofacial development, skeletal deformities and articular dysfunctions. The treatment of condylar process fractures has generated a great deal of discussion and controversy in oral and maxillofacial trauma and there are many different methods to treat this injury. For each type of condylar fracture, the techniques must be chosen taking into consideration the presence of teeth, fracture height, patient's adaptation, patient's masticatory system, disturbance of occlusal function, deviation of the mandible, internal derangements of the temporomandibular Joint (TMJ) and ankylosis of the joint with resultant inability to move the jaw, all of which are sequelae of this injury.

Keywords: Condylar Fracture; Restitutional remodeling; Three-Dimensional Computed Tomographic Scan.

INTRODUCTION

Facial skeleton fractures in children represent 4% to 6% of all body fractures.[1]Among facial bone fractures, the mandible fracture has a highest incidence next to nasal bone fracture and condyle fracture most frequently occurs in mandible fracture.[2] In children the most common form of mandibular fracture are condylar, subcondylar and angle fracture and they make up to 80% of all cases.[2] while symphysis and parasymphysis fracture account for only 15% to 20% and body fractures are rare.[3,4] In Paediatric patients, the condylar region (36%-50%) is affected most commonly.[2, 5, 6,7]

Condyle fracture accounts for approximately 30% and 37% of mandible fracture in dentulous mandible patients and edentulous mandible patients, respectively.With increase in the age of the child, the location of the mandibular fractures changes, and in adolescents the mandibular angle is fractured most commonly.[6] The reason for a high incidence of mandibular condyle fracture is attributable to the binding of the mandibular ramuswith high stiffness and mandibular condyle head with low stiffness.

In reality, recent epidemiological studies indicate that the frequency of condylar fractures is probably higher than that reported in current literature, and especially in children under the age of 6 years it might be even higher than in adults.[5]In children under the age of 2 years small size and the vascular nature of the condylar head, combined with its thin cortex, make this area prone to intra-articular flattening (crush injuries). As the mandible grows and develops between the age of 7 and 8 years bearing structural resemblance to the adult one, fractures are more often extra-capsular and involve the neck of the condyle.[1]

The reasons for the statement that facial fractures are rare in children in comparison to adultsare based primarily on social and anatomical factors.Usually children are under the supervision of parents and thus less exposed to major trauma, occupational accidents or interpersonal violence, which are common causes of facial fractures in adults. Boys are more commonly affected than girls by a ratio of 2:1 and the majority of injuries occur in teenagers.[8]Low incidenceof facial fractures is also due to the early stage of development of the facial skeleton and of the sinuses, leading to a craniofacial disproportion.

The flexibility of the facial skeleton and the relative protection offered by existing fat in the subcutaneous tissue around the bones of the face also contribute to reduce the incidence of fractures, especially facial fractures.[9,10,11] Fractures of mandibular condyle can be counted among the most controversial issues in maxillofacial traumatology regarding classification, diagnosis and therapeutic management.[1,12]

Condylar fractures usually are classified by:

(1) Location, i.e., intracapsular (condylar) or extracapsular (sub-condylar)
(2) Unilateral or bilateral; and
(3) Relationship of the proximal fragment to the glenoid fossa and the mandible.

Diagnosis

The history of a mandibular fracture usually includes a fall or a blunt injury to the chin. There is often an accompanying laceration or abrasion.[13]The child may have pain in one or both temporomandibular joints, indicating injury to the joint in the form of hemarthrosis or fracture. Often, the child or parents complain that teeth are not in occlusion. It is imperative to determine how the occlusion is different:

- Check for anterior open bite.
- Check if the jaw is more retruded.
- Check for proper occlusion and deviation if any.

Panoramic radiograph is the most useful diagnostic aid as here we get to see the temporomandibular joint, ramus, angle, body and symphysis of the mandible in one film. Computed tomographic scans are also useful in cases where patient is not cooperative. However it has its own limitations and may miss some fractures. So, the best is to get three- dimensional computed tomographic scan. These help in documenting the position of the proximal segment in patients with condylar or subcondylar fractures.

Management

Management of mandibular fractures in children differs somewhat from that in adults because of anatomy variation, rapidity of healing, degree of patient cooperation, and the potential for interference with mandibular growth. Management of pediatric mandible fractures also differs from that of the adult injury because of presence of multiple tooth buds throughout the substance of the mandible, as well as to the potential injury to future growth. These issues complicate the management of pediatric mandible fractures.

The paediatric patients also have the potential for restitution or anatomical remodeling, as opposed to the sclerotic, and functional remodeling seen in adults. All these things must be taken into consideration during the evaluation of and approach to this injuries.[14, 15, 16]

To manage jaw injuries in children, jaw function is encouraged to promote growth by virtue of the high regenerative and remodeling potential which is inherent in childhood. Inadequate treatment or overtreatment may lead to growth retardation or excessive growth in mandible, while excessive immobilization may result in mandibular hypomobility.[17]It is mentioned before that majority of all mandibular fractures are seen in the condyle because the impact drives the mandibular condyle postero-superiorly in the joint, against the skull base. The resultant injury may range from a capsular tear, to hemarthrosis, to a fracture of the condylar head or neck. Occasionally, there is a crush injury to the condylar head producing a comminuted fracture.

Fractures in the condylar region in children demonstrate the greatest potential for growth disturbance &Children less than 3 years of age with trauma to the condyle are at high risk for ankylosis.[18] Therefore the goals of treatment in such patients should be: (1) Preservation of function and (2) Maintenance of normal ramus height.

When these are achieved, normal growth usually occurs.The guiding factors for treatment in a child patient are interincisal opening and dental age that is whether the child has primary dentition, or mixed or permanent dentition. However, equally important are the occlusal plane and pain the child has.It has been noted that the non-surgical options such as exercise, maxilla-mandibular fixation, training elastics and bite opening splints for condylar fracture in children are more popular. Open reduction is usually not indicated Thus the usual recommended treatment for fractures of the mandibular condyle has been conservative, with reestablishment of normal occlusion

with or without maxilla-mandibular fixation (MMF) followed by physiotherapy.

Primary And Mixed dentition stage: For patients in the primary and mixed dentition stage with unilateral subcondylar fractures, analgesics and liquid diet for 5 to 7 days is usually adequate treatment. Minor malocclusions will correct spontaneously during this period. Deviation on opening is treated with midline opening exercises.[19,20] If there is severe pain and severe malocclusion then in such cases short duration immobilization for 7-10 days may be carried out. In children in the primary and mixed dentition stage with bilateral subcondylar fractures, a relatively normal opening and stable occlusion may be present. In these cases analgesics and a blenderized diet for 7 to 10 days followed by soft diet for 2 weeks may be adequate.

It has been mentioned before that minor malocclusions will correct spontaneously during growth phase butbilateral subcondylar fractures, especially if associated with dislocation, often produce an open-bite malocclusion because of the resultant short ramus and action of the suprahyoid muscles. In such cases, the jaw should be immobilized for 7 to 10 days. After the removal of fixation an orthodontic treatment using guiding elastics is used.

Permanent dentition stage: In older children there is less capacity for the bone to adapt and remodel, and the ramus height may not be regained.[12]Therefore the Children in the permanent dentition stage with unilateral or bilateral condylar fractures, especially if the fracture is dislocated, and who have persistent malocclusion after a course of intermaxillary fixation for 7 to 10 days, should be considered for an open reduction to restore ramus length and to prevent progressive deformity.
Restoration of normal symmetric jaw function provides the best chance for normal growth. [2] Retrospective studies in adults show that the outcome of open reduction may be superior to that of nonsurgical therapy.[21] Minimally invasive endoscopic approaches for subcondylar fractures may make surgeons less averse to open reduction and rigid fixation of condylar.[22,23]

Although open reduction of condylar fractures avoids maxilla-mandibular fixation (MMF) and may improve the functional outcome, most authors recommend a closed reduction because of problems of surgical approach, such as infection, injury of nerve and blood vessel, and scar formation.

Minimally invasive techniques like Open Reduction and Internal Fixation (ORIF) of condylar fractures under endoscopic visualization may gain acceptance due to the advantages associated like anatomical reduction, occlusal stability, rapid function, maintenance of vertical support, avoidance of facial asymmetry, less postoperative TMJ disorder incidence and no maxilla-mandibular fixation. Several studies have recommended the use of prefabricated acrylic splints as a treatment for pediatric mandibular fractures. Theses splints are more reliable than open reduction or MMF techniques with regard to cost effectiveness, ease of application and removal, reduced operation time, maximum stability during the healing period, minimal trauma for adjacent anatomic structures and comfort for young patients.[24]

CONCLUSION: Mandibular fractures in children most commonly occur in the condylar region, followed by the symphysis and angle. The fractures tend to be minimally displaced and in the majority of cases, they can be treated without an operation, with a short period of immobilization. Significantly displaced mandibular fractures (especially in children in the permanent dentition stage) are reduced and immobilized using rigid internal fixation according the principles that are used in adults. Fractures in the condylar region usually are treated using non-operative therapies, especially in children in the primary and mired dentition stage. In most children, the fracture heals and the condyle is remodeled with successful anatomic and functional results.

Author affiliation: 1. Dr. Kirtija Gupta, MDS, Reader, 2. Dr. Anil Kohli , MDS, Professor & Head, 3. Dr. Ashish Katiyar, MDS, Reader, 4. Dr. Garima Singh, MDS, Reader, 5. Dr Barun Sarkar, PG Student, Department Of Paediatric

And Preventive Dentistry, Rama Dental College Hospital & Research Centre, Lakhanpur, Kanpur. U.P.

REFERENCES

1. Chacon GE, Dawson KH, Myall RW, Beime OR. A comparative study of 2 imaging techniques for the diagnosis of condylar fractures in children. J OraI Maxillofac Surg 2003 Jun;61(6):668-672.
2. Kaban LB. Facial trauma II. Dentoalveolar injuries and mandibular fractures. Paediatric oral & maxillofacial surgery, Philadelphia, 1990, WB Saunders, 233-260.
3. James D. maxillofacial injuries in children. In Rowe NL, Williams J: maxillofacial injuries, Edinburg, 1985, Churchill Livingstone, 538-559.
4. Lehman JA, Saddawi ND: Fractures of the mandible in children, J Trauma 1976,16: 773-777.
5. Iida S, Matsuya T. Pediatric maxillofacial fractures: their aetiological characters and fracture patterns, J Cranio Maxillofac Surg 2002; 30:237-241.
6. Kaban LB, Mulliken JB, Murray JE: Facial fractures in children: an analysis of 122 fractures in 109 patients. Plast Reconstr Surg 1977;59:15-20.
7. Cossio IP, Galvez EF, Perez GJL. Mandibular fractures in children. A retrospective study of 99 fractures in 59 patients. Int J Oral Maxillofac Surg 1994;23:329-331.
8. Miloro M. Peterson's principles of oral and maxillofacial surgery. 2nd ed. Hamilton, DC: Decker, Inc.; 2004. p. 527–45.
9. Anderson PJ. Fractures of the facial skeleton in children. Injury. 1995;26:47–50.
10. Ferreira PC, Amarante JM, Silva AC, Pereira JM, Cardoso MA,Rodrigues JM. Etiology and patterns of pediatric mandibular fractures in Portugal: a retrospective study of 10 years. J Craniofac Surg. 2004;15:384–391.
11. Qadri GW, Mokhtar SM. Paediatric mandibular fractures: report of a case. Dent Traumatol. 2008;24:67–70.
12. Remi M, Christine MC, Gael P, Soizick P, Joseph-Andre J. Mandibular fractures in children: long term results. Int J Pediatr Otorhinolaryngol 2003;67(1):25-30.
13. Laham JL, Cotcamp DH, Gibbons PA, et al. Isolated head injuries versus multiple trauma in pediatric patients: do the same indications for cervical spine evaluation apply?. Pediatr Neurosurg 1994;21:227-226.
14. Demianczuk AN, Verchere C, Phillips JH. The effect on facial growth of pediatric mandible fractures. J Craniofac Surg. 1999;10:323–328.
15. 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;115:1500–1508.
16. Marano R. Mandibular fractures in children under 3 years: A rare case report. Rev Port Estomatol Med Dent Cirmaxilofac. 2013;54(3):166–170.
17. Kenji Arita. Functional Treatment of Condylar Process Fractures in Children. J.Hard Tissue Biology. 2005;14(2):51-52.
18. Dodson TB. Mandibular fractures in children, OMS Knowledge Update (part II):95-107, 1995.
19. Hovinga J, Boering G, Stegenga B. Long-term results of nonsurgical management of condylar fractures in children. Int J Oral Maxillofac Surg 1999; 28(6), 429 – 440.
20. BruckmoserE,Undt G. Management and outcome of condylar fractures in children and adolescents: A review of the literature. Oral Surg, Oral Med, Oral Pathol and Oral Radiol.2012;114(5): S86 - S106.
21. Cucurullo R, Giannuzzi I, Clivio A, Biagi R. A Case Of Unilateral Condylar Fracture. Eu J Paediatr Dent. 2009;10(2):95-101.
22. Paenget al,.Endoscopic-Assisted Open Reduction and Internal Fixation (EAORIF) for Condylar Fracture. J Hard Tissue Biology.2005;4(2)45-46.
23. Kellman RM. Endoscopic approach to subcondylar mandible fractures. Facial Plast Surg. 2004;20(3):239-247.
24. Chuong R, Piper MA. Open reduction of condylar fractures of the mandible in conjunction with repair of discal injury: a preliminary report. J Oral Maxillofac Surg. 1988;46:257–263.

Corresponding author:
Dr. Barun Sarkar
Flat No-010 Staff Quarters, Rama Dental College Campus
Lakhanpur, Kanpur-208024 U.P.
Contact no- 09415340144
Email:drbarunsarkar@rediffmail.com

How to cite this article: Gupta K, Kohli A, Katiyar A, Singh G, Sarkar B. Paediatric Condylar Fracture: A Review. Rama Univ J Dent Sci 2015 Dec;2(4):23-26.

Sources of support: Nil **Conflict of Interest**: None declared