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Incidence of Mandibular Condylar Fractures in Children and Comparison of Periodontal and Orthodontic Outcomes in Closed Reduction and Open Reduction Technique

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ABSTRACT

Background: Fractures of the mandibular condyle (MCFs) account for about 16 percent of all facial fractures in children and 40% of all mandibular fractures. Because of the missing dentition and the development of the mandible, mandibular condylar fractures in children are somewhat different from mandibular fractures in adults. Managing MCFs in children is still a point of contention. Few surgeons have advocated ORIF because of concerns that the placement of rigid hardware around the condylar growth centre would cause growth disruption because paediatric MCFs have a greater ability to remodel than adult fractures.

Methods and Materials: Children upto the age of eighteen years with facial trauma from January 2019 to December 2019 were selected for the present study. Patients under the age of 18 were split into two categories. Category one: mandibular condylar fracture managed by closed reduction technique and category two: mandibular condylar fractures managed by open reduction technique. These patients were followed up on for one to six months after surgery, and the information gathered was statistically analysed. Periodontal outcomes was analysed with the help of plaque index and gingival index. Orthodontics outcome was analysed on the basis of maximal incisal opening (MIO), and occlusion analysis.

Results: The incidence of mandibular condylar fracture in children upto eighteen-year age group was 1.01 percent. When the mean maximal incisal opening was compared in both the groups then its value was slightly greater in category two but the difference was not statistically significant. On comparing the mean plaque index values and mean gingival index values it was found that the values were greater in the category one as compared to category two and the difference was significant statistically. Then there was comparison of the number of cases in which occlusal derangement was found. It was observed that the difference between the two groups were not significant statistically. On the other hand, the number of cases in which mobility of teeth was observed was greater in category one as compared to the category two

Conclusion: It can be concluded from the current study that both closed reduction and open reduction are effective in management of mandibular condylar fracture but the periodontal problems and mobility of teeth are lesser in open reduction as compared with closed reduction. Given the healing abilities and technical problems in repairing the segments, as well as the expected remodelling in young ages, surgery before puberty should be designated for special circumstances.

Keywords: Mandibular condylar fractures, children, open reduction, closed reduction.

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INTRODUCTION

Fractures of the mandibular condyle (MCFs) account for about 16 percent of all facial fractures in children and 40% of all mandibular fractures. As a result, MCFs are an essential part of paediatric facial traumatology.[1] Pediatric MCFs have gotten a lot of coverage in the literature, not just because of how common they are, but also because of the potential long-term consequences. Previous facial trauma, in general, and MCFs, in particular, have been linked to mandibular deficiency or asymmetry. Because of the missing dentition and the development of the mandible, mandibular fractures in children are somewhat different from mandibular fractures in adults.[2]

Fractures of the mandibular condyle account for 11–16 percent of all facial fractures and 30–40 percent of all mandibular fractures. The majority are affected by indirect forces transmitted to the condyle from a blow elsewhere, rather than by direct trauma. As a result, the most common fractures missed are mandibular condylar fractures (MCFs).[3]

MCFs have a prominent place in oral and maxillofacial surgery because, despite good initial clinical results in many cases, serious late problems such as pain, limited mandibular movement, muscle pain and deviation of the mandible, malocclusion, periodontal problems, developmental defects in the temporomandibular joint (TMJ), avascular necrosis, and facial asymmetry have been recorded.[4] Managing MCFs in children is still a point of contention. Few surgeons have advocated ORIF because of concerns that surgical manipulation of the fracture segments or the placement of rigid hardware around the condylar growth centre would cause growth disruption because paediatric MCFs have a greater ability to remodel than adult fractures.[5] However, it has been suggested that ORIF could be beneficial.[5]It has been suggested also that if these fractures are not adequately treated, they can cause severe complications, such as facial growth disruptions on the injured side and TMJ disorders on both the injured and non-injured side.[6] MCFs are thought to be involved in 5–10% of all serious cases of mandibular deficiency or asymmetry caused by dysplastic growth following injury. Dysplastic growth was recorded in 22% of cases with massively displaced condylar fracture after MCFs.[7]The present study was carried out with the purpose to evaluate the incidence of mandibular condylar fracture and comparison of orthodontic and periodontal outcomes of the open reduction technique and closed reduction technique.

METHODS AND MATERIALS

Children upto the age of eighteen years with facial trauma attending the outpatient department of Sarjug Dental College and Hospital from January 2019 to December 2019 were selected for the present study. The institutional ethical committee approved the study design. Age, gender, socioeconomic factors, chief complaint, history of current disease, past medical history, dental history, injury duration, causative factor, and related injuries were all reported in detail. Each patient underwent a detailed clinical evaluation as well as radiological interpretation to determine the diagnosis. Patients under the age of 18 were split into two groups.

Category one : Mandibular condylar fracture managed by closed reduction technique
Category two: Mandibular condylar fractures managed by open reduction technique
The patients' intra - oral and extraoral swelling, facial lacerations or abrasions, bleeding, CSF discharge, soft tissue trauma, malformations of the face, ophthalmic interference, open bite/cross bite, midline deviation, mouth opening, occlusion, avulsed/ broken tooth, and so on were all examined clinically and experimentally. PA was recommended for children with a reported mandibular fracture. Right and left views of the mandible, lateral oblique thirty degree, a transpharengeal right/left radiograph was recommended for those with suspected condylar or subcondylar fractures. In cases of complicated injuries/fractures, an orthopantograph and occipitomental view of the midface skull, as well as computerised tomography, is recommended. Open or closed reduction and immobilisation, wiring, mini bone plate fixation, splinting and replantation, elevation and fixation of zygoma, and other procedures were used to treat the injury based on clinical and radiographic findings. These patients were followed up on for one to six months after surgery, and the information gathered was statistically analysed.

Table 1: Comparison of mean maximal incisal opening in category one and category two.

Category	Mean maximal incisal opening values (mm)	SD (±mm)	P value
Category one	26.9	2.8	0.5
Category two	29.3	1.7	

Table 2: Comparison of mean plaque index values in category one and category two

Category	Mean plaque index values	SD	p value
Category one	3.62	0.23	0.01
Category two	1.12	0.41	

Table 3: Comparison of mean maximal incisal opening in category one and category two

Category	Mean gingival index values	SD	p value
Category one	3.41	0.32	0.01
Category two	1.21	0.32	

Table 4: Comparison of occlusal derangement and mobility of teeth in category one and category two.

	Category one	Category two	p value
No of cases with occlusal derangement	02	01	0.08
No of cases with Mobility of teeth	04	01	0.01

Periodontal outcomes was analysed with the help of plaque index and gingival index. Orthodontics outcome was analysed on the basis of maximal incisal opening (MIO), and occlusion analysis.

RESULTS

The incidence of mandibular condylar fracture in children upto sixteen year age group. was 1.01 percent. When the mean maximal incisal opening was compared in both the groups then its value was slightly greater in category two but the difference was not statistically significant. (Table1). On comparing the mean plaque index values and mean gingival index values it was found that the values were greater in the category one as compared to category two and the difference was significant statistically. (Table 2&3). Then there was comparison of the number of cases in which occlusal derangement was found. It was observed that the difference between the two groups were not significant statistically. On the other hand the number of cases in which mobility of teeth was observed was greater in category one as compared to the category two and the difference was significant statistically. (Table 4).

DISCUSSION

In this report, the prevalence of facial injuries in children aged 6 to 16 years was found to be 1.01 percent. These results support Rowe's theory that children have a lower rate of mid-facial fractures than adults due to the influence of the cranium and the flexibility of facial bone. 8.9 The current study's incidence of facial fracture was lower than that recorded in other countries, but it was consistent with McLennan and Donaldson's results. The protected environment and evolving facial anatomy of the infant according to Posnick, influence the decreased incidence and unusual trend of facial fractures in infants.[12]With age, the antra and

paranasal sinuses develop more completely. The frontal prominence decreases, and the facial skeleton emerges from the cranial base's defence. The mandible is in a far more vulnerable and fracture-prone role.[13]

Cascone et al. observed sixteen children with MCFs for at least two years (aged between 4 and 16 years). They conducted CTR on ten patients, ORIF on three patients (anyone whose neck and subcondylar fractures left a stump large enough to enable the condylar head to be repositioned with pins), and condylectomy on three patients (those whose displaced condyle caused serious functional obstacle on one side), and condylectomy on three patients (those whose displaced condyle caused serious functional impediment on one side. They discovered a lot of radiological abnormalities. However, gnathographic functional tests revealed that mandibular movements had recovered well, with no differences in outcomes based on the type of therapy used (CTR, ORIF, or condylectomy), and the mean maximum opening of the mouth was 44.3 mm. They advised surgery in cases where CTR failed to overcome intervention during mandibular activities.[14,15]

They claimed that condylectomy may be suggested in fractures of the head of the condyle and the neck where rigid external fixation is not possible due to anatomical or structural factors (fractures with several fragments or when the fragment is too small). They also indicated that the more conservative treatment should be an option for the younger the patient.[16,17]

Deleyiannis et al. looked at the long-term clinical and radiologic effects of treating dislocated MCFs in six children aged 14 or under with ORIF over a 67-month period. On the dislocated side, both patients had signs of remodelling of the condylar process and shortening of the ramus, according to the findings of the study.[18,19] Four patients had objective and/or subjective signs of TMJ malfunction. When the mouth was opened, both of the patients' jaws deviated to the dislocated side. Four of the six dislocated MCFs could not be reduced without cutting the proximal segment and reattaching it to the ascending ramus as a free graft.[20,21]

Their findings have revealed that some dislocated fractures would have a poor outcome regardless of whether they are treated nonsurgically or surgically. As a result, they concluded that CTR should be considered the first treatment choice for a dislocated paediatric MCF before ORIF demonstrates a clear functional advantage.[22,23] Landes et al. contrasted the ORIF of misplaced or dislodged MCFs with the CTR of nondisplaced, nondislocated condyle fractures in 24 children under the age of 14. They found that using this distinction, 83 percent of children had mainly good MCF management. Facial discrepancy, locking, and occlusal imbalance are less common in displaced and displaced fractures managed with ORIF. Patients with dislocated high condylar/condylar head fractures who were managed with ORIF, however, also had a high percentage of postoperative functional impairment..[24,25]

ORIF, on the other hand, has its supporters, and some writers recommend ORIF of MCFs in children due to MMF disadvantages. Jaw immobilisation in children is linked to a variety of technical issues, including the patient's actions and reaction, as well as the quality of their dentition.[26,27]These procedures are less suitable due to the prevalence of unerupted teeth, the added morbidity of suspension wiring, the use of dental splints in the operating room, and the need for additional periods of general anaesthesia. Furthermore, MMF may not be necessary when a normal dental occlusion can be obtained.

The positioning of these MMF devices or eyelets is technically difficult due to the conical shape of primary teeth, their large cervical margins and tapered occlusal surface, and the presence of partially erupted permanent teeth. MMF has also been shown to limit normal dietary intake in infants, resulting in substantial weight and protein loss, decreased tidal volume, and an increased risk of aspiration of gastric contents if the patient vomits.[30,31]

The wires themselves are inconvenient and cause periodontal tissue damage. The ORIF technique allows for stable three-dimensional reconstruction, facilitates primary bone healing, reduces treatment time, and removes the need for MMF early release. Reduced MMF reliance increases postoperative respiratory treatment, food intake, and oral hygiene.[32,33]

CONCLUSION

It can be concluded from the current study that both closed reduction and open reduction are effective in management of mandibular condylar fracture but the periodontal problems and mobility of teeth are lesser in open reduction as compared with closed reduction. Given the healing abilities and technical problems in repairing the segments, as well as the expected remodelling in young ages, surgery before puberty should be designated for special circumstances such as missile injuries, extensive dislocation and lack of contact between the fragments.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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