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Original Research Article

Prospective Study to Access the Most Feasible Method for the Management of Facial Injuries in Children without Hampering the Facial Growth

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Abstract

Aim: To access the most feasible method for the management of facial injuries in children without hampering the facial growth.

Materials and Methods: The present study was conducted on 100 child patients with facial injuries attending the outpatient department of dentistry in JNKTMCH, Madhepura, Bihar, India for 1 year. Detailed information consisting of age, sex, socioeconomic status, chief complaint, history of present illness, past medical history, dental history, duration of injury, etiological factors and associated injuries were recorded. After recording the history, a thorough clinical examination as well as radiological interpretation was done for every patient for establishing the diagnosis.

Results: In our study fall was the predominant cause for most of the facial injuries in children. A total of 100 children were afflicted by facial injuries, the incidence being 2.81%. The incidence of mandibular fracture was found to be 51%, midface and mandible to be 5%, midface 5%, dentoalveolar 34% and laceration 8%.

Conclusion: Most of the mandibular fractures were found in the parasymphysis region. Simple fracture seems to be commonest in the mandible. Most of the mandibular and midface fractures in children were amenable to conservative therapies except a few which required surgical intervention.

Key words: Acrylic splint, mandible and midface fractures, mini plates

Introduction

Maxillofacial fractures in the pediatric age group are not so common, yet they are not less important.[1] The incidence of pediatric facial fractures ranges between 1 and 14% for victims under the age of 16 years and 0.87 to 1% for those younger than 5 years. The incidence of pediatric facial fractures among Indians is 5.5%.[2] Most frequently boys are involved (53.7-80%). The cause is most often a motor vehicle accident (5-80.2%), violence (3.7-

61.1%), falls (7.8-48%), bicycle accidents (7.4-48%), play (10-42%), and others.[3]

Maxillofacial injuries are much less common in younger children than in adolescents and adults. This lower incidence of facial trauma in infants and young children is a result of socio environmental, general physical and craniomaxillofacial anatomic factors. Fracture sites tend to shift from the upper to the lower aspect of the face with the increasing age of the patient.[4]

However, rapid wound healing among children emerges as a promising sign to start with. The growth potential of children is much more as compared to adults and they also possess potential of self-correction of minor discrepancy in occlusion due to the remodeling process. Meanwhile mixed dentition presents a problem for intermaxillary fixation in child patients.[5]

The purpose of this study was to access the most feasible method for the management of facial injuries in children without hampering the facial growth.

Materials and Methods:

The present study was conducted on 100 child patients with facial injuries attending the outpatient department of dentistry JNKTMCH, Madhepura, Bihar, India for 1 year. Detailed information consisting of age, sex, socioeconomic status, chief complaint, history of present illness, past medical history, dental history, duration of injury, etiological factors and associated injuries were recorded. After recording the history, a thorough clinical examination as well as radiological interpretation was done for every patient for establishing the diagnosis.

Clinical and investigational examination of the patients was done to see the status of intraoral or extra-oral swelling, facial lacerations or abrasions, bleeding, involvement of the cerebrospinal fluid soft tissue injuries, facial deformity, ophthalmic involvement, degree of mouth opening, dentition, molar gagging, deviation of midline, bite-type, missing teeth, midpalatal split, disturbed occlusion, fractured or avulsed teeth, retro-positioning of maxilla, infection, etc. The X-ray PA view, lateral oblique 30° of the mandible left or right, orthopantograph and occipitomental view of skull 30° of midface, and computerized tomography was ordered for complicated injuries.

On the basis of examination and investigations a suitable management approach involving rest and observation, open or closed reduction and immobilization, TO wiring, mini bone plate fixation, splinting and replantation, elevation and fixation of zygoma, etc. was carried out.

These patients were followed immediate postoperatively, at first week, third week, first month, second month, third month, and sixth month intervals. The information so collected was tabulated and subjected to analysis.

Results:

Table 1: Incidence of different injuries in patients attending OPD

Injuries	No. of cases n%
Mandible	51
Mandible + Midface	5
Midface	5
Dentoalveolar	34
Laceration	8

A total of 100 children were afflicted by facial injuries, the incidence being 2.81%. The incidence of mandibular fracture was found to be 51%, midface and mandible to be 5%, midface 5%, dentoalveolar 34% and laceration 8%[Table 1].

Table 2: Etiological distribution

Factor	Group I n%	Group II n%	Group III n%	Total n%
Fall	10	28	15	53
RTA	3	17	8	28
Sport	0	6	1	7
Hit by object	0	9	1	10
Assault	0	0	0	0
Miscellaneous	0	1	1	2
total	13	60	27	100

Among the etiological factors it was evident that fall (53%) was the major etiological factor responsible for facial injuries in children followed by road traffic accident (28%), sport (7%), hit by object resulted 10%, while miscellaneous and assaults were responsible for 2% of fractures, as shown in Table 2.

Table 3: Sex-wise distribution of type/ pattern and number of different injuries

Site	**Male n%**	**Female n%**	**Total**
Mandible	**3**	**1**	**4**
Mandible + Midface	**2**	**1**	**3**
Midface	**48**	**15**	**63**
Dentoalveolar	**11**	**9**	**20**
Laceration	**6**	**4**	**10**
Total	**70**	**30**	**100**

Out of a total of 100 child patients with facial injuries, 0% were male children as against 30% female, giving a male:female ratio of 3:1 [Table 3].

Table 4: Types of mandibular fracture at various sites

Location	**Green Stick n%**	Simple n%	Compound n%
Parasymphysis	9	15	9
Condyle	4	10	0
Angle	-	3	2
Body	1	1	1
Symphysis	1	1	5
Total	15	30	17

It was seen that 15% mandible fractures were of greenstick type, 30% were of simple type and 17% fractures were compound type as shown in Table 4.

Table 5: Various treatment methods employed in different age groups

Group	**Rest and observation**	**Splinting**	**Replantation**	Extraction	**Arch bar wiring**	**Acrylic splint (closed occlusal) cemented on**	**Acrylic splint open occlusal held by circummandibular**	**Open reduction and internal fixati**	**Transos-seous wiring**	**Dental wiring**	**Elevation of zygoma and mini**	**Sutre-ng**	**Total**

						the teeth	**wiring**	**on**			**bone plate fixation with screw at FZS**		
I-No. (0-5yrs.)	7	-	-	-	-	16	-	8	2	-	-	1	34
II-No. (6-11yrs.)	1	5	2	1	13	9	-	1	2	3	1	8	46
III-No. (12-16yrs.)	-	6	-	-	15	2	-	-	-	-	-	4	27

Group I – 7% patients were kept under rest and observation, six 16% required closed occlusal acrylic splint cemented onto the teeth, 1% required suturing.

Group II – One patient was kept in rest and observation, 5 patients required splinting, two required replantation, 1 required extraction, 13% required arch bar wiring, 9% closed occlusal acrylic splint cemented on the tooth, one patient required open reduction and internal fixation, 3 cases required TO wiring, two (3.33%) cases required dental wiring, 1 case carried out elevation of zygoma and miniplate fixation at front zygomatic suture with screw, 8 patients required suturing.

Group III – 6 patients required splinting, 15 patients were treated with arch bar wiring, two with closed acrylic splint cemented on the tooth, four patients required suturing [Table 5].

Table 6: Postoperative findings in mandibular fractures treated by both the methods

Preoperative finding	**No. of Patients n%**	**Postoperative Improvement n%**	**Residual Deformity n%**
Disturbed occlusion	**40**	**36**	**4**
Reduced mouth opening	**15**	**15**	**0**
Shifting of midline	**10**	**9**	**1**

There was 90.2% improvement in occlusion postoperatively treated by both methods. Three cases had disturbed occlusion of which one case with cross bite. There was 91.11% improvement in shifting of midline postoperatively and one case having shifted midline that is 8.12% residual deformity. There was 100% improvement in mouth opening postoperatively treated by both the methods [Table 6].

Discussion:

This study was undertaken to review the incidence, type of facial fractures in children and to formulate a comprehensive treatment modality. In our study the incidence of facial fractures in children up to 16 years of age was found tobe 1.09%. This is in conformity with Rowe. [6] According to Rowe the relative elasticity of bones in children and the facial skeleton in young children being less prominent than the cranium probably contribute to the low incidence of facial fracture in children.[6]

The mandible and maxilla continue to grow throughout childhood, maintaining a high cancellous-to-cortical bone ratio and resulting in greater elasticity of the jaws. As a result, incidence of greenstick fracture and non displaced fracture is more in pediatric age group.[7]

The shape of the deciduous crown is also not favorable for retention of wires and splints, being bell-shaped with little undercut area. Elasticity of the bone in children, the relatively small size of the face and the growth process in the young bone are also among the factors that influence the pattern of fracture, its management and the postoperative period of fixation. Ankylosis of the temporomandibular joint causing impairment of function is more common in children and damage to the condylar growth center can result in facial deformity.[8]

The facial skeleton in children is well protected by the cranium and in the case of maxilla, is not separated from the cranial base by wellpneumatizedair sinuses and not weakened by the air sinus and further protected by the thick adipose layer of soft tissue in young children. This is in conformity with the findings of Rowe.[6]

MacGraw and Cole[9]reported that 42% of facial fractures were due to motor vehicle accidents. Posnicket al., [7]reported that 50% of the fractures resulted from road traffic accidents.

Posnicket al.,[8] reported that the condyle was the most common site of mandibular fracture, in contradiction to this, we in our study found that parasymphysis was most commonly involved. It may be because of the presence of permanent tooth buds in the pediatric mandible presenting high tooth to bone ratio, bony thinness and anatomical curvature of mandible encourages fractures through the developing tooth crypt in this region.[7]

The maxilla is the least frequently injured pediatric facial bone (1.2-20%). Closed reduction with maxilla-mandibular fixation for 2 to 3 weeks is effective to re-establish the occlusion in minimally displaced fractures. If an open reduction with semi rigid internal fixation is chosen, the approach should be made through a circumvestibular incision.[10, 11]

Fractures treated with closed occlusal acrylic splints in Group I and Group II patients showed satisfactory union. Fifty percent of the dentoalveolar fractures were stabilized with arch bar. This was in compliance with the work of MacLennan. [12]

Kabanstated that the most common treatment for condylar fracture in children continues to be rest, a liquid to soft diet in cases where occlusion is not disturbed or a short immobilization for 7-10 days in case of malocclusion.[13]

In our study we followed the same procedure for treating the condylar fractures followed by several months of active jaw immobilization. We obtained a morphologically and functionally acceptable condyle without any complication, supporting the fact that the conservative method is best suited for condylar fractures.[14]

Conclusion:

Most of the mandibular fractures were found in the parasymphysis region. Simple fracture seems to be commonest in the mandible. Most of the mandibular and midface fractures in children were amenable to conservative therapies except a few which required surgical intervention.

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