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Assessment of the most feasible method for the management of facial injuries in children without hampering the facial growth: A hospital based prospective study

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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. Material & Methods: The present study was conducted on 100 child patients with facial injuries attending the outpatient department of dentistry. Results: A total of 120 children were afflicted by facial

injuries, the incidence being 3.24%. Among the etiological factors it was evident that fall (45.8%) was the major etiological factor. There was 100% improvement in mouth opening postoperatively treated by both the methods. 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.

Keywords---Acrylic splint, mandible and midface fractures, mini plates.

Introduction

Facial injuries in children always present a challenge in respect of their diagnosis and management. Since these children are of a growing age every care should be taken so that later the overall growth pattern of the facial skeleton in these children is not jeopardized.[1]

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 socioenvironmental, general physical and cranio-maxillofacial anatomic factors. Fracture sites tend to shift from the upper to the lower aspect of the face with the increasing age of the patient.[2]

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.[1]

Maxillofacial fractures in the pediatric age group are not so common, yet they are not less important.[3] 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%.[4] 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.[5]

Material and Methods

The present study was conducted on 100 child patients with facial injuries attending OPD of Modern Dental College and Research Center, Indore, Madhya Pradesh, India. Detailed information consisting of age, sex, socioeconomic status, and chief complaint, history of present illness, past medical history, dental history, and 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.

Methodology

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, orthopantomograph and occipitomenal 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 immediately 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	63	52.5
Mandible + Midface	5	4.2
Midface	6	5.0
Dentoalveolar	35	29.2
Laceration	11	9.2

The incidence of mandibular fracture was found to be 52.5%, midface and mandible to be 4.2%, midface 5%, dentoalveolar 29.2% and laceration 9.2%[Table 1].

Table 2
Etiological distribution

Factor	Total	n%
Fall	55	45.8
RTA	30	25.0
Sport	9	7.5
Hit by object	14	11.6
Miscellaneous	2	1.6
Total	120	80

Among the etiological factors it was evident that fall (45.8%) was the major etiological factor responsible for facial injuries in children followed by road traffic accident (25.0%), sport (7.5%), hit by object resulted 11.6%, while miscellaneous and assaults were responsible for 1.6% 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	n%
Mandible	5	6.09	1	2.63	4	3.33
Mandible + Midface	7	8.53	1	2.63	3	2.5
Midface	48	58.54	15	39.47	63	52.5
Dentoalveolar	14	17.07	9	23.68	20	16.67
Laceration	8	9.75	4	10.53	10	8.33
Total	82	54.67	38	25.33	120	100

Out of a total of 120 child patients with facial injuries, 54.6% were male children as against 25.3% female, giving a male: female ratio of 3:1 [Table 3].

Table 4
Types of mandibular fracture at various sites

Location	Green Stick	Simple	Compound
Parasymphysis	11	17	10
Condyle	4	12	0
Angle	-	4	1
Body	1	1	1
Symphysis	1	1	7
Total	17	35	19

It was seen that 17 patients showed mandible fractures were of greenstick type, 35 had simple type and 19 presented fractures those 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 the teeth	Acrylic splint open occlusal held by <u>circum</u> mandibular wiring	Open reduction and internal fixation	Transosseous wiring	Dental wiring	Elevation of <u>zygoma</u> and mini bone plate fixation with screw at FZS	Suturing	Total
I (0-5yrs)	8	-	-	-	-	19	-	7	1	-	-	1	36
II (6-11yrs)	1	6	2	1	15	10	-	1	1	2	1	10	50
III (12-16yrs)	-	9	-	-	20	1	-	-	-	-	-	5	35

Group I – 8 patients were kept under rest and observation, six 19 required closed occlusal acrylic splint cemented onto the teeth, 1 required suturing. Group II – One patient was kept in rest and observation, 6 patients required splinting, two required replantation, 1 required extraction, 15 required arch bar wiring, 10 had closed occlusal acrylic splint cemented on the tooth, one patient required open reduction and internal fixation, 2 cases required TO wiring, two cases required dental wiring, 1 case carried out elevation of zygoma and miniplate fixation at frontozygomatic suture with screw, 10 patients required suturing. Group III – 9 patients required splinting, 20 patients were treated with arch bar wiring, 1 with closed acrylic splint cemented on the tooth, 5 patients required suturing [Table 5].

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

Preoperative finding	No. of Patients	Postoperative Improvement	Residual Deformity
Disturbed occlusion	44	38	6
Reduced mouth opening	17	17	0
Shifting of midline	12	10	2

There was 86.4% improvement in occlusion postoperatively treated by both methods. Six cases had disturbed occlusion. There was 83.3% improvement in shifting of midline postoperatively and two cases having shifted midline that is 16.7% residual deformity. There was 100% improvement in mouth opening postoperatively treated by both the methods [Table 6].

Discussion

Fractures of the face in children pose problems which are not seen in the adult population. 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 to be 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.

We found a 0.1% incidence of facial fracture in children below five years of age. This low incidence of facial fracture in children below five years of age was also reported by several workers, MacLennan 1%, [7] Hagan and Huelker 1.2%, [8] Rowe and Killey 0.87% [9] and Halazonitis 0.68%. [10] This could be due to the fact that parental care in this age group prevents the children from sustaining severe injuries.

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 nondisplaced fracture is more in pediatric age group. [11]

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. [12]

MacGraw and Cole[7] reported that 42% of facial fractures were due to motor vehicle accidents. Posnick *et al.*, [13] reported that 50% of the fractures resulted from road traffic accidents. We found that falls were the most common cause of fracture in children due to lack of control and judgment, followed by road traffic accidents due to increased automatization. Several authors also mentioned falls to be the common cause of facial fractures in children as studied by Carroll, Hill, Mason; [14] Fortunato, Fielding and Guernsey; [10] Hall; [15] Khalil and Shaladi.

Male children were approximately thrice as frequently affected as female children, the male to female ratio being 3:1. This is probably due to the higher level of physical activity among boys. A similar male to female ratio of 3:1 was also reported by Hall. [15] Among the types of mandibular fractures, the simple fracture was the most common fracture reported during this study (47.82%). Mandibular fractures were the most common (55.46%) fractures reported in our study. The reason for this being that the position of the mandible is more vulnerable to fracture than the midface as suggested by McCoy *et al* Hall [15] and Kaban *et al.* [16]

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. [17]

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. [18]

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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