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Original Research Article

Frequency of paediatric facial trauma in a tertiary care dental hospital

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ABSTRACT

Background: The objective of the study was to determine the frequency of various patterns of pediatric facial trauma in the patients attending a tertiary care hospital.
Methods: After written informed consent, 191 cases were taken using non- probability purposive sampling. Demographic profile (age, gender, address) was taken. Diagnoses of the distribution of facial fracture were made with help of history, clinical and radiological examination, plain radiographs, OPG (Orthopantomogram), Occipitomental, PA view of face and CT scan, according to the requirement. Pattern of facial trauma i.e. upper third of face (frontal bone, orbital bone), mid facial bones (Maxilla, Zygomatic, NOE noso-orbito-ethmodial complex), dentoalveolar and mandible was noted on the proforma attached. Data was entered and analysed using SPSS 20.0.
Results: The mean age of the patients was 6.50±3.72 years. In this study, 112 (58.63%) were males and 79 (41.37%) were females. So, the male to female ratio were 1.41:1. The mandible was the most commonly fractured bone 58 (30.36%) followed by dentoalveolar, maxilla, zygomatic, NOE complex, orbital and frontal bones fractures.
Conclusions: Mandible is the most prone to fracture in paediatric patients.

Keywords: Maxillofacial surgery, Pediatric facial trauma

INTRODUCTION

Trauma is the leading cause of morbidity and mortality in children.[1] Facial bone fractures are less common in children than adults and they are more often minimally displaced.[1-4] This is because a thicker layer of adipose tissue covers the more elastic Bones and the Sutures lines are more flexible. In addition, stability is increased by the presence of tooth buds within the jaws and lack of sinus pneumatization. Pediatric trauma patients differ from their adult counterparts, When Compared to adults, the Patterns of fractures and frequency of associated injuries are similar, but the overall incidence is much lower. Diagnosis is more difficult than in adults and fractures are easily overlooked. The retruded position of the face relative to the protecting skull is an important reason for the lower incidence of facial fractures in children.[3,5] Overall, facial bone fractures are considerably less common in children then adults. This lower incidence partially reflects the underdeveloped facial skeleton and paranasal sinuses of preadolescent child it gives additional strength to maxilla and mandible unerupted dentition. Social, cultural and environmental factors vary from one country to another and influence the incidence and etiology of facial trauma.[6] Facial fractures in pediatric population comprise less than 15% of all facial fractures.[4,7] They are rare below 5 years of age (0.6-1.4%).[3] Incidence is higher in boys worldwide in all age groups.[7-9] This Male preponderance, which has remained constant all over time. Falls, Road Traffic Accidents, Motor vehicle accidents, sports-related injuries, bicycle

related injuries, child abuse and fire arm injuries constitute the most frequent causes of facial fractures in children.[9,10] Interpersonal violence is also rare cause of facial trauma in children. Common cause of facial taruma changes with age related activities.[1-3] The site and pattern of fracture depends on the inter relationship between etiology, force and magnitude of the impact, and the unique anatomic features of the child's stage of development.[3] While infants below 2 years of age are more likely sustain injuries of Frontal region, older children are more prone to injuries of chin/lip region. Mandibular fractures are most common (73.9%), midfacial fracture (15.2%), Dentoalveolar fractures (7.6%), Upper third facial fractures (3.2%).[3] Less data is available nationally on the frequency of various patterns of pediatric facial trauma by using age, gender, cause of trauma as variables therefore the aim of my study is to collect a data which provides information regarding the frequency of various patterns of pediatric facial trauma in a local population.[8,9] The outcome of the study helps in identifying the current magnitude of the problem in relation to socio-demographic characteristics, so that appropriate preventive and best management strategies can be developed on the basis of this data.

METHODS

This descriptive cross-sectional study was carried out in the Outdoor Patient Department and the Department of Oral and Maxillofacial Surgery, Nishtar Institute of Dentistry, Multan, from a period of January 2015-December 2016, after approval from the Institutional Review Board. Following non- probability purposive sampling technique, 191 subjects were selected according to inclusion and exclusion criteria.

Inclusion criteria

- Patients with facial fracture diagnosed by through history, clinical examination and radiographic interpretation within 15 days.
- Patients between ages 1-12 years.
- Patients of either gender.

Exclusion criteria

- Patients with history of uncontrolled systemic illness like epilepsy.
- Known syndromic patients, Down syndrome and Crouzon syndrome.

Data collection procedure

Patients fulfilling the inclusion criteria were selected on the basis of history, clinical and radiographic examination. Study protocols and use of data for research were explained to patients to get an informed consent.

Data will be collected by a structured proforma. Diagnoses of the distribution of facial fracture made with the help of clinical examination, plain radiographs (OPG, PNS) according to the requirement. Pattern of the fracture like dento-alveolar, upper third, middle third and mandible will be diagnosed clinically by mobility of teeth, hematoma formation, swelling, mobility of bones at the fractured areas, occlusion, circumorbital eccymosis, diplopia and tenderness over fractured bones in association with plain radiographs (OPG and PNS).

Data analysis

Data was entered and analyzed by using SPSS version 20.0. Quantitative variables like age were presented as mean and standard deviation. Qualitative data like sex and patterns of facial fractures that is upper third of face (frontal bone, orbital bone), mid facial bones (noso-orbito-ethmodial complex, zygomatic bone and maxilla), dentoalveolar and mandible was presented as frequency and percentage.

RESULTS

The mean age of the patients was 6.50 ± 3.72 years with minimum and maximum ages. There were 88(46.07%) patients who were less than 4 years old, 58 (30.36%) patients were 4-8 years, 45 (23.56%) were 8-12 years old (Table 1).

Table 1: Demographic characteristics of the study subjects.

Characteristics	Percentage
Gender	
Male	112(58.64%)
Female	79(41.64%)
Age (Years)	
Mean	6.5
Standard Dev.	±3.72
Age groups (Years)	
<4	88(46.07%)
4-8	58(30.36%)
8-12	45(23.57%)

In this study, 112 (58.63%) were males and 79 (41.37%) were females. So, the male to female ratio were 1.41:1 (Table 1).

Among the facial fracture upper third of face (frontal bone) was seen in 13 (6.80%) patients (Table 2).

In 15 (7.85%) patients upper third face (orbital bone) was involved, while it was absent in 176 (92.14%) of the patients (Table 2). The frequency of middle face bones (N.O.E complex) was seen in 17 (10.99%) patients and in 174 this type of fracture was not seen (Table 2).

In 19 (12.04%) patients were Zygomatic bone was involved while in 172 (9.9%) patients this type of fracture was not seen (Table 2).

Table 2: Clinical features of the study subjects.

		Frequency	%
Upper third of Face (Frontal Bone)		13	6.80
	No	178	93.20
Upper third of Face (Orbital Bone)	Yes	15	7.85
	No	176	92.15
Mid Facial bones (N.O.E Complex)	Yes	17	8.90
	No	174	91.10
Mid Facial bones (Zygomatic bone)	Yes	19	9.95
	No	172	90.05
Mid facial bones (Maxilla)	Yes	31	16.23
	No	160	83.77
Mandible	Yes	58	30.37
	No	133	69.63
Dentoalveolar	Yes	38	19.90
	No	153	80.10
No. of bones fractured	1.00	86	45.03
	2.00	58	30.37
	3.00	35	18.32
	4.00	12	6.28

The Maxilla bone was fractured in 31 (16.23%) patients and in 160 (83.76%) maxilla bone was not fractured (Table 2).

The mandible bone was fractured in 58 (30.36%) of the patients while in rest of 133 (69.63) patients mandible was not seen (Table 2).

Moreover, dentoalveolar was fractured in 38 (19.89%) of the patients and in 153(80.10%) patients dentoalveolar was saved (Table 2).

Lastly, in this study one bone was fractured in 86 (45.06%), 2 bones were fractured in 58 (30.36%), 3 bones were involved 35 (18.32%) and 4 bones were involved in 12 (6.28%) of the patients (Table 3).

Table 3: Frequency distribution of all facial fractures.

Facial bones fractured	Frequency	Percentage
Dentoalveolar	38	19.9
Frontal	13	6.8
Mandible	58	30.4
Maxilla	31	16.2
Naso-ethmoidal	17	8.9
Orbit	15	7.9
Zygoma	19	9.9

DISCUSSION

Today the problem is injury or trauma. Changing social conditions, better housing and nutrition, immunization, and quarantine of infectious cases all helped reduce the threat from infectious diseases. Over the same time period, new environmental factors, notably the introduction of the automobile, Motor vehicles increased the risk of injury. Our present understanding of the epidemiology of trauma in our society began in the 1960s with the publication of a monograph entitled "Accidental Death and Disability: The Neglected Disease of Modern Society" by the Committees on Trauma and Shock of the National Academy of Sciences.[10,11] This report pointed out that accidental injuries were the nation's most important environmental health problem. This was followed by another important publication "Injury in America" which documented in much greater detail the impact of injuries on American society and suggested a broad approach to the problem encompassing epidemiology, prevention, biomechanics, acute treatment, and rehabilitation.[12] Since these two important publications appeared, much progress has been made both in prevention and treatment of injuries. During the 1980s and 1990s, the mortality rate from pediatric trauma in the United States fell by about 50%. No doubt this resulted from improvements in both prevention and treatment. But, there are many reasons why we will have to increase our prevention efforts if we hope to see another 50% reduction in the next 20 years.[12] Generally, between 4%-12% of maxillofacial fractures occur in children with 4% incidence rate.[13-15] The low incidence of facial fractures among children is due to physiological and environmental factors enumerated as; greater resilience of the pediatric skeleton, higher bone to tooth ratio direct parental supervision of the activities of young children and limited outdoor activity. As they grow older, the incidence of facial fractures rises.[16-21]

Maxillofacial fractures occur twice as often in boys as in girls.[13,14] In a report from Ile-Ife, a semi-urban town in southwestern Nigeria, the male to female ratio was 3:2 possibly due to the predominance of road crash-related fractures in their environment.[15] In this study the male to female ratio is 2.22:1 that is similar to the earlier findings of Adekeye.[13] In the 1980, 15.3% of the children seen with facial fractures were 5 years old or below.[13] The current study investigated the higher frequency of facial fracture under five years of age, i.e. 24.5% of the patients.

The bimodal peak seen in the earlier report (age 8-9 years 23.5%, age 12-13 years 32.9%) has shifted to age 9-12 years (33.3%). While the risk of fractures generally increases with age, it is speculated that the age-related variations in injuries sustained are attributable to head-body relationship changes and development status of facial structures especially teeth and sinus.[22-24] There were 53 (27.74%) patients who were less than 4 years old, 68 (35.60%) patients were 4-8 years, 70 (36.64%) were 8-12 years old.

The main etiological factors according to Adebayo et al. are falls (57%) and road crashes (29%) unlike in the 1980 report (falls 30.5%, road crashes 54.1%).[25] Another study reported the similar etiological pattern Eastern Nigeria and Australian children.[26] Despite differences in etiological pattern between the pediatric and adult

population, the jaw distribution of fractures is similar. More mandibular fractures are recorded in children than in the middle-third of the face.[13-15] The reasons for this distribution have been previously reported.[27] Adekeye found that mandibular fractures were in the symphysis (24%), body (21%) and dentoalveolar (21%) and condylar (12%) regions. While symphyseal mandible is within our definition of anterior, more of our cases were in the anterior (n=7, 30% of mandibular sites) with the rest as dentoalveolar (n = 6, 26%) and posterior (26% of mandibular sites).[13]

The pattern of facial fractures is reported by many authors as follows fractures of the angle of the mandible were the most common (22%) followed by parasymphyseal fractures (21%), and the lowest were in the coronoid region (1%).[28] In Jordan, the most common fracture site in children was the condyle.[29] In Brazil, nasal fractures were most common (51.3%), followed by the zygomatic-orbital complex (25.4%).[30]

But in the present study mandible bone was fractured in 58 (30.36%) of the patients, followed by, detoalveolar in 38 (19.89%) Maxilla bone was fractured in 31(16.23%) patients, in 19 (12.04%) patients zygomatic bone was involved. The frequency of N.O.E complex was seen in 17 (10.99%) patients and in 15 (7.85%) patients orbital bone, and 13 (6.80%) frontal bone was involved. The pattern of facial fracture is variable in our setup as compare to the above cited studies, which is may be due to the different environmental factors, different physical activities and safety measures.

Lastly, pediatric facial trauma patients differ from adults with similar injuries in several ways. First, the pediatric patient has the advantage of an accelerated ability to heal with a minimum of complications, especially in the well vascularized tissues of the face. Second, through growth and the inherent ability of the child to adapt, recovery of damaged orofacial tissues can be maximized, and loss of function can be minimized.

Despite these advantages, certain characteristics of the pediatric facial trauma patient must be kept in mind. These include the anatomy of the immature face, the facial injury patterns from mechanisms typical of the pediatric patient, and the potential effect of trauma on growth, which makes long-term follow-up of these patients mandatory. Because of these factors, children with facial trauma cannot be managed in the same way as adults.

CONCLUSION

The frequency of various patterns of pediatric facial trauma were as under, the mandible bone was most fractured bone followed by dentoalveolar, maxillary, zygomatic, N.O.E complex and orbital bone & frontal bones.

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