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Current Indian scenario of pediatric and adolescent maxillofacial injuries

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ABSTRACT

A retrospective review of maxillofacial trauma cases reported over a period of two years among urban Indian population with age <18 years was done . The following parameters were evaluated : mode of injury, age and sex distribution, pattern of injury (soft tissue or bony or both), sites of injuries and treatment given. RTA was the major cause of trauma in patients of age group 7 – 18 years whereas in younger patients fall was the main cause. The incidence in male population was remarkably higher than females amongst all age groups. Soft tissue injuries only were seen in about 25% of all the cases whereas soft tissue as well as bony injuries was found in 75% of all the cases. Single and multiple fractures were almost equally distributed among the cases presenting with bony injuries. The incidence of multiple fractures was distinctly high amongst patients within age group of 13 – 18 years. Taking into account the number of sites of fractures it was found that mandible was most commonly fractured bone (69%). Midfacial fractures accounted for 31% of the total fractures.

Keywords: Maxillofacial injuries, age, distribution

Introduction

Maxillofacial injuries in the younger population always present as a challenge to the surgeons in respect to their diagnosis and management. With advancing age, the incidence of trauma in this strata increase possibly due to increased outdoor activities, aggressive behavior and less supervision by adults. The main causes are falls, road traffic accidents, sports activities and interpersonal violence. The pattern of injuries varies within different age groups due to the variations in the mode of injury and also due to the constant dynamic changes involving the maxillofacial skeleton.

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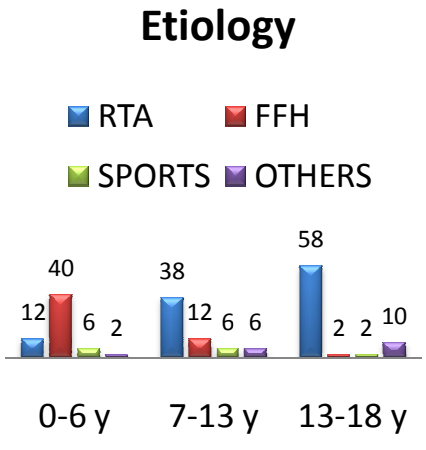
"The incidence of pediatric facial fractures ranges between 1% to 14% for the victims under the age of 16 years and 0.87% for those younger than 5 years.
The incidence of pediatric facial fractures among Indians is 5.5%"[1]**.**Over the years, various studies have been conducted worldwide to collect statistically significant findings regarding such injuries in order to develop a rational clinical approach through a better understanding of the epidemiological parameters. The purpose of this study is to analyze the records of maxillofacial trauma patients with age< 18 years in an urban setting of a developing country in terms of etiology,age andgender distribution, pattern and sites of injury andcompare the results with other previously done studies within the country in order to understand the current scenario. A literature review of recently done similar worldwide studies was also performed to gain an insight into the current globa lpicture. (Table I)

Materials and method

A retrospective analysis of records of 194 maxillofacial trauma patients with age<18 years who were treated at our centre between June 2012 and June 2014 was done. Patients were divided into three age groups. Group 1 : 0-6 years, Group 2 :7-12 years and Group 3 : 13-18 years and following parameters were evaluated:mode of injury, age and sex distribution, pattern of injuries (soft tissue or bony or both), sites of injuries and treatment given. Data pertaining to the patient particulars, mode of injury and clinical examination were obtained and analyzed. Fractures were analyzed using radiographic and CT records.

Results

Of all the patients, majority fell into Group 3(37%, n=72) followed by Group 2(32%, n=62) andthen Group 1(31%, n=60) (Fig.I).The incidence in male population was remarkably higher than females amongst all age groups (male to female ratio: - 4:1)(Fig. II).



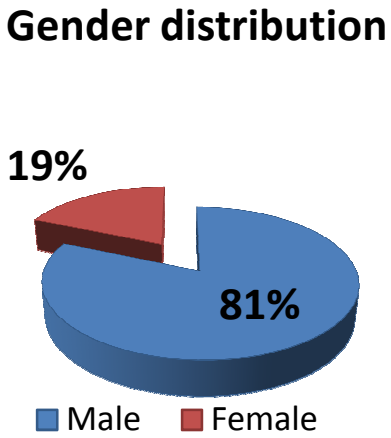


Fig 1: Age group wise distribution of etiology **Fig 2: Gender distribution of the injuries**

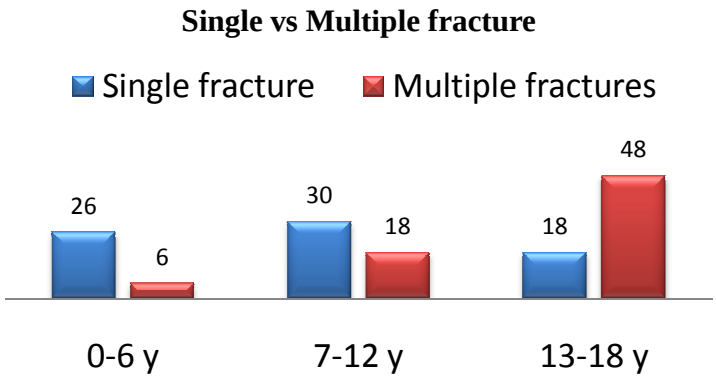


Fig 3: Single vs multiple injuries

Table I: Literature review

Study(Country)	No. of Patients (n)/No. of years	Etiologies					Mean age (yr)	Ratio	
		Traffic (%)	Falls (%)	Violence (%)	Sports (%)	Others (%)		Male (%)	Female (%)
Holland *et al*[13] 2001(Australia))	46/4	63	17	0	0	20	10	67	33
Gassner *et al*[14] 2004(Austria)	381/10	30	24	14	17	15	10	66	34
Arvind *et al*[7] 2013(India)	500/4	35	24	10	22	9	6-16	68	32
Chrcanovic *et al*[12] 2010(Brazil)	464/3	45	22	19	7	7	12	77	23
Eggensperger *et al*[6] 2008(Switzerland)	291/3	22	64	5	9	0	6	60	40
Kambalimath *et al*[2] 2013(India)	112/10	11	71	0	15	3	0-14	64	36
Karim *et al*[3] 2010(India)	45/3	29	53	11	7	0	0-12	67	33
Kim *et al*[11] 2012(Korea)	741/4	12	31	38	16	3	13	85	15
Kumaraswamy *et al*[1] 2009(India)	95/5	30	41	4	22	3	0-16	65	35
Ogunlewe *et al*[8] 2006(Nigeria)	37/7	65	24	11	0	0	0-15	60	40
Scariot *et al*[5] 2009(Brazil)	350/14	37	38	14	8	3	10.6	63	37
Present study(India)	194/2	56	28	4	7	5	0-18	81	19

Table 2: Types of injury according to age distribution

Type of injury	0-6 years	7-12 years	13-18 years
Soft tissue only	28	14	6
Soft tissue + bony	32	48	66

RTA was the major cause of trauma (56%) followed by fall from height (28%). Sports related injuries accounted for 7% of the cases. Other modes of injuries included assault, animal bite and seizures and they comprised 9% of all the cases. In patients of Group 2 and 3, RTA was the major cause (71%) whereas in Group 1 fall (67%) was the main cause (Fig. I). Soft tissue injuries only were seen in about25%of all the cases whereas soft tissue as well as bony injuries was found in 75%of all the cases (Table II).

Single and multiple fractures were almost equally distributed among the cases presenting with bony injuries (51% and 49% respectively)(Fig. III). The incidence of multiple fractures was distinctly high among patients in Group 3 (single vs multiple fractures ratio=1:3). Taking into account the number of sites of fractures it was found that mandible was most commonly fractured bone (69%). Dento-alveolar fracture was the most common type of fracture with 28% incidence, followed by parasymphysis (26%), condylar/subcondylar (16%), body(11%), angle (8%), and symphysis (8%) region. Only one case each of coronoid and ramus fracture was observed (Table III). Midfacial fractures comprised 31% of the total fracture sites with zygomaticomaxillary fractures (29%)and

dentoalveolar fractures of maxilla (24%) accounting for majority of these fractures.LeFort, blow-out and nasal fractures were seen in 18%, 7% and 13% cases respectively and palatalsplit was observed in 9% ofthe cases (Table III).36% of the cases were managed conservatively whereas closed reduction to treat the fractures was the treatment approach in 32% of the cases. Open reduction and internal fixation was adopted as the main treatment modality in 32% of the cases.

Discussion

The incidence of maxillofacial trauma shows a direct relationship with age in the young population. Children less than 5 years of age are kept in protected environment under direct supervision of adults. Also, the bony structure of the paediatric maxillofacial skeleton is more elastic and has a higher proportion of cortical to cancellous bone. So, the resulting injuries are less in severity and mainly result from falls. With neuromotor development the child gets more involved in independent as well as outdoor activities and hence becomes more susceptible to direct trauma and road traffic accidents. Increased social interactions predispose the children to injuries caused by sports related accidents and interpersonalviolence. In our study we found that the incidence did not vary much within studied groups as the total number of cases in every age group did not differ much numerically (Fig. I). However, the mode of injury was both consistent as well as in disagreement with findings of other studies. We concluded that overall, road traffic accidents were the main cause of injury (Fig. I).Kumaraswamy *et al* [1], Kambalimathetal [2], and Karim *et al* [3] did similar studies on Indian population and concluded that fall from height was the major cause of injury. Qudah*et al* [4], Scariot*et al* [5] and Eggensperger *et al*[6] arrived at the same conclusion in their studies on Jordanian,Brazilian and Swiss children respectively. In another study done in Tamilnadu, India; Arvind *et al* [7] found RTA to be the major cause. Ogunlewe *et al* [8], Rahman *et al* [9]and Iida *et al* [10] did similar analysis in Nigerian, Malay and Japanese population respectively and found that motor vehicle accidents accounted formajority of maxillofacial injuries.In their study on Korean population, Kim *et al* [11] have shown that violence is the major cause of such injuries. The incidence is much higher in males compared to their female counterparts (male to female ratio was 4:1) as has already been proved by a large number of studies [1-14] (Table I).This could be possibly due to more outdoor activities involvement among boys than girls. The inherent aggressive behavior among the boys further supports the statistical findings. Individuals involved in road traffic accidents are prone to sustain multiple injuries rather than those involved in falls and sports related accidents. This could be explained by the fact that road traffic accidents usually involve impacts at high speed resulting in more severe injuries. In our study groups we observed that the incidence of multiple fractures was more common within the age group of 13-18 years where road traffic accidents were the main cause of trauma (Fig. III). Mandibular fractures were the most common type of fracture with dentoalveolar fractures and parasymphysis fractures accounting for majority of these fractures. This is in accordance with several studies [1-3, 5,7,8,12]. Midfacial fractures accounted for about one third of all cases. This finding was relatively higher when compared to the studies of Kumaraswamy *et al* [1], Karim *et al* [3]and Kambalith*et al* [2]on similar population. However, nasal fracture incidence was found to be lower in our study population compared to others studies. This could be possibly due to the fact the nasal fractures are often missed during examination in younger children due to their uncooperative behavior at the time of examination. Another reason could be that a large number of patients reporting to our centre belonged to families with low socioeconomic status and could not afford advanced imaging techniques like CT scan and nasal fractures are often missed on routine radiographs. Also a majority of such cases are managed in outpatient setting.The management was done keeping in mind the type of injury (soft tissue or bony), age of the patient, anatomical location and complexity of injuries. Soft tissue injuries only were treated by debridement and suturing as needed. Dentoalveolar fractures were managed by splinting (rigid or semi-rigid) after proper alignment of teeth and reduction of fractured segments under local or general anesthesia. Fractures in children <10 years of age were mostly managed with closed reduction by intermaxillary fixation for a short period or use of custom made splints in order to avoid damage to the developing tooth buds and prevent any reduction in pace of active growth of maxillofacial skeleton which may happen when the treatment is given via open approach.Conservative treatment was given in mandibular fractures without displacement or malocclusion. Open reduction was done in 32% of the cases most of which fell into Group 2 or 3 and involved use of titanium miniplates and screws for fixation of the reduced fracture segments.This study shows that RTA is the major cause of maxillofacial injuries which are both financial as well psychological burden for

patients and their families. Road traffic accidents are increasing everyday in our country due tofast growing economy and constantly increasing number of vehicles on road. But legislative measures to ensure road safety are lagging behind. A large fraction of our sample population who were involved in road traffic accidents were driving vehicles which werenot permissible for them to drive at that age. This should raise concern for both parents as well as the authorities.One interesting finding that we came across was that a large number of patients belonging to age group 0-6 years,who sustained injuries after fall from height, fell from unfenced roofs of their house during sleep or play. This,again;should raise the concern regarding adoption of proper safety measures during construction of buildings .Keeping in mind the financial status of the patients, diagnostic imaging techniques like CT should be madeavailable to the patients at a lower cost as a majority of diagnosis based on clinical examination and radiographs only remain incomplete. This affects the treatment as well as the outcome and associated complications thus, further increasing the overall cost of treatment.“All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000 “

Table 3: Distribution of fractures according to anatomical location

Site of fracture	No of sites
Mandible	204
Dentaalveolar	58
Symphysis	16
Parasymphysis	54
Body	22
Angle	18
Condylar/subcondylar	32
Caranoid	2
Ramus	2
Midface	90
Dentaalveolar(Maxilla)	22
Palatal split	8
Le fort	16
Zyaamaticomaxillary	26
Blowout	6
Nasal	12

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