Maxillofacial trauma in Tamil Nadu children and adolescents: A retrospective study

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ABSTRACT

Aim: The aim of this retrospective study is to describe the incidence, aetiology, complexity and surgical indications of maxillofacial injuries in children and adolescents population of Tamil Nadu state of india during period of 4 years. **Materials and Methods:** A retrospective review was conducted among 500 children and adolescents patients of age group 6 years to 16 years suffered or suffering with maxillofacial and skull fractures presenting to ten Level I trauma centers over a 4 year period.The data collected for this study included age, gender, etiology, associated maxillofacial trauma, anatomic site of fracture and treatment. **Results and Conclusion:** In our study the most common cause of trauma was traffic 35%, followed by falls 24% and sports 22%. Mandible was commenest bone prone to fracture, followed by maxilla and nasal bone. Mandible fractures accounted for 72% of all maxillofacial fractures.

KEY WORDS: Maxillofacial, paediatric injuries, trauma

Maxillofacial injuries of children and adolescents is less common than adults.[1] The facial injury leaves everlasting impact on psychological development and behavior of patients. Although many make a good recovery, morbidity includes temporary or permanent disfigurement, loss of function and psychosocial problems. Facial trauma may, rarely, be life-threatening. The spectrum[2] of craniofacial injuries is related to the specific developmental stage of the craniofacial skeleton. Falls during leisure activities, both at home and on the playground, collisions, bicycle accidents[3,4] and different sports activities have been reported as the primary causes of facial injury in young children and teenagers worldwide. In contrast to adults, interpersonal violence is a rare cause of facial fractures in children. These injuries occur more commonly in adolescents various,[3,5] studies have shown males experience significantly more maxillofacial trauma than females. The reported prevalence of traumatic maxillofacial injuries differs widely in the literature due to various factors such as type of study, patient selection method, trauma classification, diagnosis criteria applied, injury registration procedure, research methodology, age group, geographical characteristics, socio-economic status and cultural and behavioral factors. Never less the methodology and data collection may vary, but the results and conclusion of most of the studies have been more similar. Our study is a retrospective study conducted over period of 4 years aimed to describe the incidence, etiology, complexity and surgical indications of maxillofacial injuries in children and adolescents population of Tamil Nadu state of India.

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Materials and Methods

This study was conducted in ten different trauma centers. Level 1 trauma centers present in ten district headquarters of Tamil Nadu state was selected. The study included access to patient records of personal details and treatment history. Our study included data collection of patients details over the period of 4 years from May 2008 to October 2012. Over 1100 case records were accessed but patient suffering from facial injuries as major triage were selected. Head injury with neural intervention and mortal cases were not included in our study. Patient with fracture of maxillofacial region was selected. Soft-tissue injuries of maxillofacial region was included in the study. This was done to limit the sample to those whose treatment need was more maxillofacial. Patient belonging to age group of 6 years to sixteen years of age were included in our study, others were excluded.

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The data of trauma history and treatment were obtained from trauma center and verified with patient and or patients parents. The data collected includes. Name, age, gender, history of incident, etiology of trauma, anatomical site of fracture, associated injuries and treatment rendered. The cause of injury was divided into five main categories: (i) traffic injuries, which included accidents involving automobiles, motorcycles and bicycles, as well as pedestrians; (ii) violence, which included interpersonal violence, fire and white weapons violence; (iii) falls; (iv) sports injuries; and (v) others, which included pathological fractures, domestic accidents, suicide attempts, accidents with animals, sudden illness (epileptic fit), fractures caused by teeth extraction and unknown etiology.

Three dependent variables were analyzed: Presence or absence of maxillofacial fractures, fractures etiology and type of treatment. The independent variables for the presence/absence of fractures were: Gender, age and etiology. The independent variables in the fracture etiology included age, gender, number of fractures and type of treatment. Finally, the type of treatment included the independent variables of gender and age.

Results

Of the 500 patients selected in our study 341 were male and 159 were female in gender shown in Table 1. A total of 386 suffered with one or more fracture involving maxillofacial bones. 114 patients suffered from soft tissue injuries, which was treated with debridement and suturing. The maxillofacial fractures were present and treated for among 77.2% of patients surveyed. The male gender was more prone for injury accounting for 68.2% of total patient with maxillofacial injury. Traffic accidents including bicycle and automobile were the most common cause accounting for 126 male and 48 female patients maxillofacial injury. The cause of trauma was as follows traffic 34.8%, falls 23.8%, sports 21.8%, violence 10.2% and others 9.4%. Traffic and falls were the highest cause of injury among female patients, while traffic and sports injury was commonest cause in male patients. Parasymphysis and symphysis was the commonest site of fracture [Table 2]. It accounted for 93 patients maxillofacial fracture. 61 patients had only parasymphysis and symphysis fracture alone, while in 32 patients, it was associated with other bone fracture, commonest was maxilla and condyle. Mandible fractures accounted for 72% of all maxillofacial fractures, followed by maxilla and nasal bone.

Table 1: Distribution of etiology in gender

Etiology	Male	Female
Traffic	126	48
Violence	35	16
Falls	73	46
Sports	80	29
Others	27	20

Table 2: Distribution of fractures anatomical site

Anatomical site	No. of patients with single anatomical bone/ site fracture	No. of patients with multiple facial bone fracture
Symphysis and para symphysis of mandible	61	32
Angle of mandible	26	26
Body of mandible	17	19
Condyle and coronoid of mandible	22	21
Maxillary bone (includes lefort 1, 2, 3)	36	28
Nasal bone	38	19
Zygomatic bone	17	28
Other facial bones	9	6

Discussion

Our study consisted of 500 patients admitted and treated for maxillofacial injuries alone in ten different Level 1 trauma centers present in ten district headquarters in the state of Tamil Nadu, south India. Of the 500 patients 68.2% were male and 31.8% female. Only patients in age group of 6 years age to 16 years of age were included. The results showed that the frequency of maxillofacial fractures in children in the studied population was relatively higher than findings from earlier studies[2,4,6] which showed that fractures in children are uncommon. This may be due to the fact that we had more valid access to data of patients who were admitted in the ward during the four years and the inpatient records were inconsistent. The other contributing factor for this difference can be attributed to the fact that minor maxillofacial soft injuries may have been treated for in Level 2 and primary health care centers and rarely referred to district headquarters Level 1 centers. The data collected showed fracture was more common in elder group of patients, especially in the age of 10-16 years, which accounted for 80% of maxillofacial fractures. The most common age of the injured was 14 years (mode), while average (mean) was 12 years. The peak incidence of facial fractures could be observed in the 13- to 18-year-old group, which, although the age groups may vary from study to study.[6,7] Chrcanovic *et al.*[8] study showed percentage of maxillofacial fracture rate of 6.15% in children from 0 year to 10 years of age. Most of the studies showed that increase in age increases the incidence of maxillofacial injury. This statistic can be explained by increased activity, by more aggressive sports activities as well as by altercations in this age group. When children become adolescents, the incidence of maxillofacial trauma is similar to that in adults. The distribution of fractures in the day of the week showed a predominant distribution of accidents causing facial fractures particularly on Sunday and Monday (43%). Several studies[3,4] found vehicles accidents to be the main etiological factor of fractures in children and adolescents, as can be confirmed in the present study. This is related to the increase in traffic density. Considering the fact that most of the injuries were bicycle accidents, it can be related to the use of bicycles as common mode of transport by children to school in Tamil Nadu, and here government offers free bicycle to students who are studying in government run or aided schools. While young childrens usually sustain injuries from low-velocity forces (e.g., falls), older children are more likely to be exposed to high-velocity forces (e.g., in road traffic accidents, sports related trauma). The mandible was the most common fracture site in children

and adolescents (72%), followed by the maxilla and nose (16% each). The nasal bones are the least resistant of the facial skeleton. This, combined with the relative prominence of the nose, which increases with growth, makes it most likely area to sustain injury in older children. The most common fracture region in the mandible was the symphysis and parasymphysis. Unlike other studies zygomatic fractures and condylar fractures were less noticed in our study. Only Jaber and Porter[4] showed that mandibular fractures occurred at a significantly higher rate than those of the condylar region. A study from Finland[6] showed that the proportion of condylar fractures decreased and the proportion of the body and angle increased with increasing age. No statistically significant difference could be observed concerning the association between treatments in patients with fractures and gender.

Most of the fractures of mandible were treated using intermaxillary fixation methods that includes arch bar, Risdon, eyelet wiring. Some were treated with open reduction and internal fixation using mini plates. Lesser age of 10 years the fractures were treated using splints. Custom made cap splints were treatment of choice. Conservative management of nasal fractures, consisting of the repositioning of the nasal bone, evacuation of the septal hematoma and repositioning of the septum in the midline was the treatment of choice. Radical nasal reconstruction in children is not commonly recommended and in fact be harmful to the child's subsequent nasal function.

In the treatment of fractured jaws in children, two principles were unanimously considered: A short period of fixation and early mobilization and training exercises. Mandibular fractures without displacement and malocclusion are managed by close observation, a liquid to soft diet, avoidance of physical activities and analgesics.

Conclusions

The nature of a retrospective study inherently results in flaws, with problems manifested by the gaps in information and incomplete records. Furthermore, all data rely on the accuracy of the original examination and documentation. Hence, when items have been excluded from the initial examination or not recorded in the chart, the study is thereby compromised and limited. Most of the inpatient records were without final diagnosis and radiographic confirmations, these were excluded from our study. This may be the cause of increased rate of incidence of fracture among maxillofacial patients.

Preventive measures must be addressed to reducing the number of accidents and or minimize the severity of injuries. The incidence, severity and mortality of craniomaxillo-facial injuries in adults and children can be reduced significantly by using helmets. We forwarded our study to the government of Tamil Nadu and recommend them to supply free helmets along with bicycles and ask teachers to teach and advise the use of helmets. Public health professionals who inform parents and caregivers about proper restraint practices can use this information in their educational efforts. To decrease the occurrence of injuries caused by falls, strategies should include awareness campaigns, parent's education about the mechanisms of falls, increased parental supervision during playing activities and legislative measures to ensure the safety of windows and balconies. In sports, the use of preventive measures is less frequent than in motor vehicles. The importance of preventive measures should be emphasized. Supervising adults, i.e., coaches, administrators, teachers and parents should be educated.

The median age of patients with maxillofacial fractures was statistically superior to those without fracture. Male gender is predominantly prone for maxilla facial injuries and fracture. There were more accidents causing facial fractures on sunday and monday.

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