ORIGINAL RESEARCH

Changing Pattern of Pediatric Maxillofacial Injuries at the Accident and Emergency Department of the University Teaching Hospital, Ibadan—A Four-Year Experience

Victoria N. Okoje, BDS, FWACS;[1] Temitope O. Alonge, MD, FRCS;[2] Olufemi A. Oluteye, BDS;[1] Obafunke O. Denloye, BDS, FWACS[1]

1. College of Medicine, University of Ibadan, Ibadan, Nigeria
2. University College Hospital, Ibadan, Nigeria

Correspondence:
Victoria N. Okoje BDS, FWACS
Department of Oral and Maxillofacial Surgery
Faculty of Dentistry
College of Medicine
University of Ibadan
Ibadan, Nigeria
E-mail: vnokoje@yahoo.com

Keywords: injuries; maxillofacial; pediatric; road traffic; trends

Abbreviations:
RTA = road traffic accident

Received: 01 December 2008
Accepted: 29 December 2008

Web publication: 23 February 2010

Abstract

Introduction: Maxillofacial injuries are common among polytraumatized patients, and in Nigeria, the incidence seems to be on the increase. This probably is related to the drive of industrialization and the increase in the number of road traffic accidents. Delays in attending to severe maxillofacial injuries can be grave because of concomitant injuries that can be life threatening.

Methods: This is a prospective review of maxillofacial injuries in patients ≤16 years of age who were seen at the Accident and Emergency Department between October 2002 and December 2006. In all the patients, the accident and emergency physicians carried out initial resuscitation, and thereafter, they were referred to the maxillofacial unit on call.

Results: A total of 611 patients with maxillofacial injuries were seen during the study period and of this, 134 (22%) were ≤16 years old. The male:female ratio was 1.1:1.0. Road traffic accident (RTA) was the most common etiological factor in 73 (54.5%) cases, while gunshot injuries accounted for 6 (4.4%) cases. Soft tissue lacerations were the most common maxillofacial injuries occurring in 90 (55.9%) cases; mandibular fractures were the most common bony injury in 17 (13.4%).

Conclusions: The upsurge in maxillofacial gunshot injuries in the pediatric age group is alarming and this may be a reflection of the global changes (westernization and drug-related offenses like armed robberies) and the harsh economic conditions in this community.

Okoje VN, Alonge TO, Oluteye OA, Denloye OO: Changing pattern of pediatric maxillofacial injuries at the Accident and Emergency Department of the University Teaching Hospital, Ibadan–A four-year experience. *Prehosp Disaster Med* 2010;25(1):68–71.

Introduction

Trauma is the leading cause of morbidity and mortality in the pediatric age group and the incidence probably is increasing in developing countries because of the high incidence of child labor. Current literature shows great statistical variation regarding the incidence of pediatric maxillofacial injuries in various parts of the world with prevalence varying from 3.3% in Zimbabwe to 30.2% in the United Kingdom.[1] Improperly managed maxillofacial injuries in children grossly affect the development of the facial skeleton, and this results in facial deformities that carry long-term consequences.[2] To minimize the devastating effects of pediatric maxillofacial injuries, children have an inherent anatomical advantage that confers a unique, but protective mechanism for a child, because the presence of unerupted teeth in the jaws produces a more stable facial structure requiring much greater force to deform and ultimately cause a fracture.[3] This variation, coupled with the lack of pneumatization of the paranasal sinuses, reinforces the protective effect of unerupted teeth. Therefore, when pediatric facial fractures occur, the incidence of associated injuries including craniospinal injuries are very high because a high energy impact or force is required to cause these fractures that may cause injuries to the other neighboring regions of the body.

Etiology	Sex	Age group (years) 0–4 n (%)	5–8 n (%)	9–12 n (%)	13–16 n (%)	Total
RTA	Male	3 (8.3)	8 (22.2)	8 (22.2)	17 (47.2)	36 (49.3)
	Female	7 (18.9)	18 (48.6)	6 (16.2)	6 (16.2)	37 (50.7)
	Total	10 (13.7)	26 (35.6)	14 (19.2)	23 (31.5)	73 (100.0)
Puncture Injury	Male	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1 (33.3)
	Female	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	2 (66.7)
	Total	1 (33.3)	1 (33.3)	1 (33.3)	0 (0.0)	3 (100.0)
Fall	Male	17 (53.1)	6 (18.8)	7 (21.9)	2 (6.3)	32 (66.7)
	Female	9 (56.3)	5 (31.3)	2 (12.5)	0 (0.0)	16 (33.3)
	Total	26 (54.2)	11 (22.9)	9 (18.8)	2 (4.2)	48 (100.0)
Assault	Male	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1 (33.3)
	Female	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)	2 (66.7)
	Total	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)	3 (100.0)
Sport Injury	Male	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)
	Female	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)
Gunshot Injury	Male	0 (0.0)	0 (0.0)	2 (50.0)	2 (50.0)	4 (66.7)
	Female	0 (0.0)	0 (0.0)	0 (0.0)	2 (50.0)	2 (33.3)
	Total	0 (0.0)	0 (0.0)	2 (33.3)	4 (66.7)	6 (100.0)
Total		37 (27.6)	40 (29.9)	27 (20.1)	30 (22.4)	134 (100.0)

Table 1—Etiology of maxillofacial injuries in children by sex and age group (RTA = road traffic accident)

In clinical practice, routine evaluation and radiological examination of the child is by no means easy because of the small size of the facial skeleton. This feature also makes fracture fixation more difficult than it is for adults. This study evaluates the changing trend of maxillofacial injuries in the paediatric age group seen in Ibadan, Southwestern Nigeria.

Methods

Between October 2002 and December 2006, all new patients with maxillofacial injuries aged sixteen years and below seen at the Accident and Emergency department of a tertiary hospital in Nigeria were entered in the study. Demographic data, mode of injury and the injuries sustained were documented.

Initial resuscitation of the victims was carried out in the Accident and Emergency Department prior to referral to the on-call Oral and Maxillofacial Team. The patients were subsequently examined and relevant radiographs taken.

Results

A total of 611 patients with trauma to the maxillofacial region were seen within the study period; 134 (21.9%) were aged ≤16 years. There were 75 males (56%) and 59 females (44.6%); the male:female ratio was approximately 1.1:1.0, and no statistically significant differences were observed between the age groups 0–4 years (37; 27.6%) and 5–8 years (40; 29.9%) in regards to the incidence of facial trauma.

The most common etiological factor was road traffic accidents (RTAs), which occurred in 73 (54.5%) cases; of which 30 (22%) were pedestrian RTAs with 20 (15%) occurring in females. Falls from height occurred in 48 (35.8%) patients, gunshot injuries accounted for 6 (4.4%) cases, and sport injury was recorded in only one patient (Table 1).

Soft tissue injuries also were present in 63 (39.2%) cases of which tongue laceration was found in 21 (15.6%). However, mandibular fractures occurred in 17 (13.4%) cases, maxillary fractures in six (4.4%), zygomatic fractures in 12 (8.8%) and nasal bone fracture in only four (2.9%) cases (Figure 1).

https://doi.org/10.1017/S1049023X0000769X Published online by Cambridge University Press

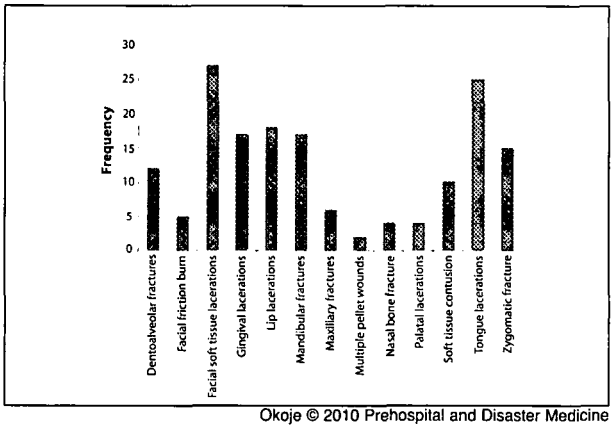

Figure 1—Distribution of maxillofacial injuries

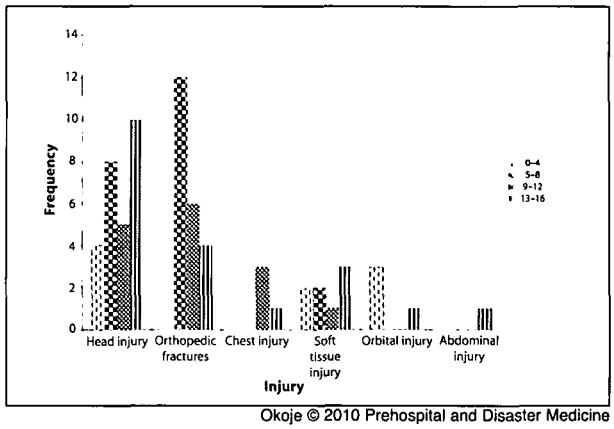

Figure 2—Age and concomitant injury

Pediatric Injuries	Frequency	Percentage
Facial lacerations	2	22.2
Soft tissue avulsions	1	11.1
Comminuted mandibular fractures	2	22.2
Multiple pellet wounds	2	22.2
Fractured anterior teeth	1	11.1
Associated fracture of the humerus	1	11.1
Total	9	100.0

Table 2—Pattern of gunshot injuries in pediatric age group

Oral soft tissue laceration (especially tongue and lips) was the most common injury in the maxillofacial region; it was present in 63 (39.2%) cases, while mandibular fractures occurred in 17 (10.6%) cases, zygomatic fractures in 15 (9.3%) cases, and dento-alveolar fractures occurred in 10 (7.4%) cases. Dento-alveolar injuries occurred in 12 (7.5%) patients (Figure 1).

Most of the patients who were involved in pedestrian RTA also had multiple injuries. Sixty-six concomitant injuries were recorded with head injury occurring in 27 cases (41%), skeletal injuries in 22 cases (33%), soft tissue lacerations outside the facial region in eight cases (12%), chest and orbital injuries in four (6%) cases respectively, and abdominal injury in one case (Figure 2). One death was recorded in a four-month-old, male patient with an associated head injury.

Discussion

Significant injury to the face can be life threatening, causing airway obstruction or provoking severe hemorrhage that can precipitate hypovolemia. Although soft tissue injuries are the most common injuries in facial trauma, facial bone fractures in the pediatric age group generally account for only 5% of facial fractures in all age groups; this percentage decreases considerably in those <5 years of age.[5] The reason for the relatively uncommon incidence of maxillofacial fractures in children includes a higher cranial to facial skeletal size, softer and more elastic bones, protective thick, soft tissues, and lack of pneumatization of the paranasal.[5]

Denloye *et al* found soft tissue laceration in 30% of their cases, mandibular fracture in 20.4%, and maxillary fracture in 14.8% of the patients during a five-year study period.[6] No nasal bone fractures were encountered.

A high incidence of concomitant cranial and orthopedic injuries in maxillofacial trauma was noted in our environment in this and previous studies[7,8] and RTA remains the major cause of injuries, while assault (3; 3.6%) was uncommon as a cause of maxillofacial injuries.

In a study by Hutchison *et al*, 39% of patients with maxillofacial injuries attending the Accident and Emergency Department in the United Kingdom were <15 years of age.[9] Seventy-two percent of the injuries sustained were minor and most were due to falls at home (40%). In their study, 24% were due to assaults while RTAs accounted for only 5% of the cases.

In a more recent study, Arribas *et al* found that falls were the most common cause of facial fractures in the pediatric age group in a Caucasian population. In addition, nasal bone fracture was the most common maxillofacial fracture in their study.[10] In the study by Denloye *et al*, RTAs was the main cause of maxillofacial injuries (48; 45%) followed by falls in 43 (40.6%) cases, but no case of gunshot injury was recorded.[6]

Previous studies on pediatric maxillofacial injuries as a result of RTA in our environment revealed a male preponderance.[6,8,11] However in this study there was a slight increase in the number of female children involved with a male:female ratio of 36:37 cases. This was more so in the pedestrian RTA which involved 20 females of a total of 30 cases.

The difference could be of the fact that more females are involved in street hawking. The male:female ratio of victims of RTA is gradually closing up as more females are becoming more active in recent times exposing them to the danger of RTAs.[8,11]

In the series by Ugboko *et al*, also in Southwestern Nigeria, only one case of gunshot was reported. Therefore,

it is of particular concern that there are 6 (4.5%) cases of civilian gunshot maxillofacial injuries in this present study suggesting an increasing prevalence of these injuries and the injury pattern is shown in Table 2.

Conservative management was the mainstay of treatment in the injuries sustained in this study. The surgical interventions carried out included reduction and immobilization of grossly displaced fractures, splinting of mobile teeth and wound debridement, but operative stabilization of the fractures was not carried out on any of the patients.

Conclusions

Permanent derangement of masticatory and asthetic functions caused by injuries to the face, especially gunshot injuries, can be devastating because facial appearance is of great importance. This study identified an apparent changing trend in the etiology and pattern of maxillofacial injuries in the pediatric age group in Nigeria. An increase in the number of children involved in RTAs with fractures to the facial bones may be attributed to the exposure of these children to the hazard of RTA due to hawking of wares and food on the streets in order to contribute to their upkeep. The six cases of gunshot injuries in the study are quite alarming.

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Editorial Comments—Changing Pattern of Pediatric Maxillofacial Injuries at the Accident and Emergency Department of the University Teaching Hospital, Ibadan–A Four-Year Experience

Ziva Elkabetz-Schwartz, MD; Ada Bone, RN; Itzik Kochav, BSc, EMT-A; Nili Meisel, RN; Yaron Bar-Dayan, MD, MHA

Emergency Medicine Department, Ben-Gurion University, Beer Sheva, Israel

Correspondence:
E-mail: bardayan@netvision.net.il

Web publication: 23 February 2010

Facial trauma may impose functional disabilities, such as difficulties with breathing, eating, drinking, and speaking. Moreover, esthetic changes might cause the patient social and psychological dysfunction. Fractured facial bones may occur following isolated facial trauma, or as a part of multiple injuries trauma that might be caused by: road accidents, domestic or street falls, physical violence, industrial accidents, sports accidents, or gunshot wounds. Fractured facial bones, if not properly treated, may cause irreversible esthetic disturbances and functional disabilities. Early treatment might result in a complete, long-term recovery and might reduce the incidence of complications.[1]

We congratulate Okoje *et al* for their important research. This prospective research examined the frequency and the causes of mouth and jaw injuries among children 0–16 years of age between 2002 and 2006. They found that face and mouth injuries are common among patients suffering from multiple injuries and that the frequency of these injuries has increased during the last decade. The three main causes for mouth and jaw fractures are traffic accidents, falls, and violence. The most common cause of facial injuries was traffic accidents (54.5% of the cases) and 4.4% of the cases were caused by gunshot injuries. The most common injuries were soft tissue injuries (55.9%). The most common bone injuries were mandible fractures (13.4%).[1]

Similar results were found in studies conducted during the last decade in other countries. In Egypt, road crashes were the main cause, followed by falls and assaults. 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%).[2] In South Africa, injuries mainly were caused by falls from a variety of heights and transport-related injuries. Almost 60% of traffic-related injuries involved children as pedestrians being struck by a motor vehicle; 20% were cycle-related. Almost 70% of injuries occurred in or around their own home.[3] In Portugal, motor vehicle accident was the most common cause of injury (53.3%). Mandibular fracture was the most common type of fracture (48.8%). Associated injuries occurred in 558 patients (64.5%).[4] In Jordan, the most common fracture site in young patients was the condyle. The most common causative factor in adults was road traffic accidents, and falls.[5] In England, the main reason for attendance was a fall (70%); 17% of the patients presented after interpersonal violence. Soft tissue injuries accounted for 70% of injuries and 14% presented with a maxillofacial fracture.[6] In Brazil, the most common causes of facial injuries were falls (37.9%) and traffic accidents (21.1%). Nasal fractures were most common (51.3%), followed by the zygomatic-orbital complex (25.4%).[7]

Men in several countries have significantly more frequent face and jaw wounds than do women. In Egypt, the prevalence of mandibular fractures was higher in male subjects in all age groups, and the male:female ratio was 3.6:1.0.[2] In Portugal, the ratio of boys to girls was 3.1:1.4 in Jordan, the male:female ratio was 1.5:1.5 and in England, the ratio of boys to girls was 2.0:1.6 In Brazil, men constituted 78% of the victims who suffered from facial injuries.[7]

A significantly higher prevalence of maxillofacial injuries was related to terrorist attacks (explosions and gunshots) compared with non-terrorist-related casualties in Israel. Most of these casualties suffered multiple injuries. Maxillofacial casualties related to terrorist attacks experience a unique epidemiology, with more severe injuries and higher prevalence of soft and hard tissue injuries. The Israeli experience with terrorist attacks taught us the importance of the availability of a mouth and jaw specialist in order to provide early treatment of facial trauma and to enhance the quality of care. It was suggested that preparedness and awareness to the unique pattern of injuries are needed when terrorists strike.[8]

In Israel, maxillofacial or dental injuries have been observed in 7.4% of the trauma patients, caused by motor vehicle accidents (39.2%), falls (30.9%), and intentional injuries (21.2%). Most occurred on the street/road (46.5%), at home (18.8%), and in public buildings (12.4%). Arab patients suffered more from vehicle accidents while Jewish patients presented with more intentional injuries. Men were hospitalized three times more frequently than women, and young people were at greater risk.[9]

Finally, the main findings of Okoje *et al* were that the most frequent mouth and jaw injuries in children were traffic accidents, and that the frequency of these injuries has been rising during the last decade.[1] The frequency of mouth and jaw injuries caused by gunshot wounds to children also has been rising. Possible explanations of the high incidence facial trauma caused by road accidents might be the elevation in the number of vehicles without establishing a proper transportation infrastructure, children walking unattended in the streets, and low awareness of parents to the danger of road accidents. The upsurge in maxillofacial gunshot injuries in the pediatric age group is alarming and as the authors suggested, may be attributed to global changes (westernization and drug-related offenses like armed robberies) and to the harsh economic conditions in the community.

In conclusion, there are several take-home messages from the article of Okoje *et al*.[1] Mouth and jaw injuries are a significant cause of morbidity and mortality, especially in children. Awareness, education, and prevention of hazards at home and on the streets, require the immediate attention of the parents and authorities. There is a need to reinforce legislation aimed to prevent traffic accidents and to enforce existing laws in order to reduce injuries among children and adults. Children present a clinically different pattern of facial trauma than do adults, a pattern dependent on the etiology and stage of bone maturity. Delayed treatment of such injuries in children might harm the development of facial bones. It is important to have available staff in the emergency department, qualified for facial trauma treatment in children.

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