

AFRICAN JOURNAL OF MEDICINE

and medical sciences

VOLUME 30, NUMBERS 1 & 2, MARCH AND JUNE 2001



**EDITOR:
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**ASSISTANT EDITOR:
A. O. UWAIFO**

ISSN 1116 — 4077

Facial bone fractures in Nigerian children

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Summary

A ten year review of ninety-three patients aged 16 years or less treated for facial bone fractures at the University College Hospital, Ibadan was studied. Of the total number of 1203 patients of all ages treated for facial fractures, 93 (7.7%) were within the age range of the study. The male to female ratio was 2.6:1 and majority of the patients (50, 53.8%) were within age group C (11-16 years). The mandible (106, 83.5%) was more involved than the middle third of the facial skeleton (21, 16.5%). Road traffic accidents (51.6%) were the most common cause of facial fractures while the most common concomitant injuries were soft tissue injuries (74.5%).

Keywords: Facial fractures, Nigerians, children

Résumé

Une revue de dix ans de quatre vingt treize patients ages de 16 ans une moins soigné des fractures des os de la face au Centre Hospitalier Universitaire d'Ibadan avait été étudé. A partir d'un total de 1203 patients tout age confondu traités des fractures faciales, 93 (7.7%) étaient de la tranche d'âge de cette étude. La ration male et female était de 2.6:1 et la majorité des patients était dans le groupe d'âge C (11 à 16 ans), les mandibules (106, 83.5%) étaient peu affectées que le milieu du trois du squelette facial (21.16%). Les accidents routiers (51.6%) étaient la cause première de ces fractures pendant que les blessures associées les plus fréquents étaient celles des tissus mous (74.5%).

Introduction

Facial bone fractures in children form a small percentage of the total jaw fractures which occur in the whole population. The incidence of facial fractures in children has varied from country to country. In Zimbabwe [1], paediatric jaw fractures constitute 3.3%, 5.5% in India [2], 8.0% in Sweden [3], 13.0% in USA [4] and between 21.0% and 30.2% in the United Kingdom [5,6,7]. In Nigeria, where very few studies have been done on facial fractures in children, the incidence was 5.9% [8].

This present study evaluates the pattern of facial bone fractures in Nigerian children presenting at the accident and emergency department of the University College Hospital, Ibadan and updates information relating to the prevalence of facial fractures in Nigerian children. The results obtained are compared with previous studies in Nigeria and other countries.

Materials and methods

This retrospective study gathered data from the records of all children with facial bone fractures who were treated at the Department of Oral and Maxillofacial Surgery, University College Hospital, Ibadan between January, 1989 and December, 1998.

Information recorded included age at the time of injury, sex, aetiology of injury, anatomic site of fracture, concomitant injuries, method of treatment and complications.

All patients who were older than 16 years and those with isolated dental and alveolar fractures were excluded from this study. The sample was divided into three age groups: group A comprised patients aged 7 months – 5 years; group B, patients aged 6-11 years and group C, patients aged 12-16 years.

Results

Prevalence

Of a total number of 1203 cases of maxillofacial fractures seen over the 10-year period, 93 (7.7%) affected the age group of 0-16 years.

Age and Sex

In this series, the age range of the patients was from 7 months - 16 years. The number of cases (50) was greatest for group C (53.8%). Group B accounted for 31 cases (33.3%) and Group A for 12 cases (12.9%). There were 67 males (72%) and 26 females (28%) (M:F = 2.6:1) (Table 1).

Table 1: Age and sex of study sample

Age Group (years)	Sex		Total	%
	Male	Female		
A 0 - 5	7	5	12	12.9
B 6 - 11	22	9	31	33.3
C 11 - 16	38	12	50	53.8
	67	26	93	100.0

Male - Female = 2 - 6 - 1

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Table 2: Aetiology of Injury according to Sex distribution

Aetiology	SEX			
	Male	Female	Total	%
<i>Road Traffic Accidents</i>				
Motor vehicle	14	9	23	24.7
Pedestrian struck by motor vehicles and cycles	9	11	20	21.5
Motorcycle	2	1	3	3.2
Bicycle	1	1	2	2.2
				51.6
<i>Falls</i>				
From tree tops	10	1	11	11.8
From steps/windows	5	1	6	6.5
From bicycles	5	0	5	5.4
				23.7
Assaults	7	1	8	8.6
Sports accidents	10	1	11	11.8
<i>Miscellaneous injuries</i>				
Gunshot injuries	3	0	3	3.2
Pathologic fracture	1	0	1	1.1
				4.3
Child abuse	0	0	0	0
	67	26	93	100.0

Aetiology of Injury

Table 2 shows the aetiology of injury by sex and age. The most common aetiology was motor vehicle accident. This accounted for 24.7% (23 patients) in all groups. Falls were next with 23.7% of cases (22 patients). The third most common cause was pedestrians hit by motor vehicles/motorcycles which comprised 21.5% of the patients (20). Other causes were sports injuries, assaults and miscellaneous injuries. There was no case of child abuse. The aetiology of the injury varied according to the age group.

The most common cause of facial fracture in Group A was motor vehicle accidents (5,41.6%) and in Group B falls (8,25.8%) and pedestrian type of accidents (9,29.0%). In Group C, the most common cause was motor vehicle accidents (23,24.7%). Majority of the cases of sport injuries, assaults and gun shot injuries occurred in Group C.

*Anatomic site of facial fractures***Table 3:** Anatomic site of facial fractures

Type	No. of patients	No. of fractures	%
Mandibular	72	106	83.5
Nasal Complex	7	7	5.5
Zygomatic Complex	6	6	4.7
Orbital Blow Out	4	4	3.1
Zygomatic Arch	1	1	0.8
LeFort I	1	1	0.8
LeFort II	1	1	0.8
LeFort III	1	1	0.8
	93	127	100.0

Table 4: Site and relative frequency of mandibular Fractures

Site	No. of fractures	% mandibular fractures
Body	46	43.4
Parasymphysis	21	19.8
Symphysis	18	17.0
Angle	12	11.3
Condyle	8	7.6
Ramus	1	0.9
Total	106	100.0

The anatomic site of facial fractures is as shown in Table 3. Table 4 depicts the relative frequency of occurrence of mandibular fractures. The most common site of facial fractures in all age groups was the mandible accounting for 83.5% of all fractures. Nasal complex fractures occurred in 5.5% of cases while zygomatic complex fractures were seen in 4.7% of patients. The others were orbital blow out (3.1%), LeFort (2.4%) and zygomatic arch fractures (0.8%).

The body was the most common site of mandibular fractures constituting 43.4% of the total number of all mandibular fractures. Parasymphyseal fractures occurred in 19.8% of the cases while fractures of the symphysis were seen in 17.0% of patients. Less commonly involved regions were the angle of the mandible (11.3%), the mandibular condyle (7.6%) and the ramus (0.9%). There was no fracture of the coronoid process.

Concomitant injuries

Concomitant injuries were seen in 55 (59.1%) of the 93 children in this study. Forty-one patients sustained soft tissue injuries, six had cranial injuries while orthopaedic injuries were seen in two patients. The other concomitant injuries are shown in Table 5.

Table 5: Concomitant injuries in 93 cases of facial fractures in children

Concomitant injuries	No. of patients	% Total No. of patients
Soft tissues (lacerations, contusions, abrasions)	41	44.1
Cranial (concussion, intracerebral bleeding)	6	6.5
Orthopaedics (fracture of extremities)	2	2.1
Cervical spine/neck	2	2.1
Ophthalmic (blindness)	2	2.1
Abdominal trauma	1	1.1
Thoracic	1	1.1
Total	55	59.1

Method of Treatment

Most of the patients in this study underwent simple methods of immobilization. Mandibular fractures were treated in 30 (32.3%) patients by using eyelet wires with intermaxillary fixation only while eyelet wires with arch bars were used in 18 (19.3%) patients. Arch bar fixation only was utilized in 12 (12.9%) patients while no fixation was employed in 8 (8.6%) patients.

Complications

Complications were seen in 10 (10.7%) patients. Three patients developed dentoalveolar abscess and two had temporomandibular joint ankylosis. Osteomyelitis and malunion were also responsible for two cases each while one patient had malocclusion.

Discussion

Maxillofacial fractures are less common in children than adults. Factors such as elasticity of a child's facial bones, relative lack of exposure to alcohol associated motor vehicle accidents and the anatomic protection provided by the protuberant calvarium explain the low incidence of fractures of the facial skeleton in children [9,10]. This low incidence has contributed to the little knowledge about injuries to the face in childhood.

A prevalence rate of 7.7% was noted for paediatric jaw fractures in this study. This is higher than 3.3% in previous studies in Zimbabwe [1], 5.5% in India [2] and 5.9% in Nigeria [8]. This increase might be due to increased exposure of children to commercial outdoor activities as a result of harsh economic situation. The prevalence is however lower than 14.5% in USA [11], 14.7% in Holland [12] and 30.2% in the United Kingdom [7]. The high rate by Hill *et al.* [7] had been attributed to the referral rate in their hospital [13].

The male to female ratio observed in this study was 2.6:1 (Table 1). This conforms to the 2.1:1, 2.3:1 and 2.9:1 recorded by authors in Nigeria [8], South Africa [13] and Spain [14] respectively. In contrast, an equal sex distribution of facial fractures in children was reported by McLennan [15].

The increased male prevalence was attributed to the fact that there is a higher degree of physical activity amongst boys [10]. In this study, the observed sex ratio might be that injuries in female children as a result of falls, assaults and sports were few (Table 2).

Table 1 shows that most of the children seen in this study were in age Group C (53.8%). This is in agreement with previous studies [13,14]. The low incidence in Group A had been attributed to strict supervision, limited outdoor activity and greater resilience of bone in this age group [8,15]. The high incidence in children in Groups B and C was due to facial fractures sustained in road traffic accidents. Children in these age groups are usually the ones sent on errands. Moreover, these children are engaged in commercial activities such as bus conductors and street hawkers, thereby exposing them to the risk of being knocked down by motor vehicles.

Road traffic accidents was the commonest cause of facial fractures in our study (Table 2). This represents 51.6% (48 patients) of the total number. This corresponds to the studies done in the United Kingdom [9], Nigeria [8] and Spain [14] but differs from the data obtained in USA [10] where falls were the commonest cause and Zimbabwe [1] and South Africa [13] where assaults were the commonest

cause. Poor education of motor drivers with respect to traffic rules and regulations, worsening road conditions and poorly maintained vehicles are factors that contributed greatly to road traffic accidents in this study. Until laws like the use of seat belt and speed limit are enforced in developing countries as in some European countries and USA, road traffic accidents will continue to be the commonest cause of paediatric maxillofacial fractures.

Falls were responsible for 23.7% of the total number of cases. This is similar to 24.0% reported by Cossio *et al.* [14] but greater than 15.0% in South Africa [13]. Children in the age groups B and C are likely to be involved in high risk activities such as tree climbing and riding multi-speed bicycles. Falls from steps or windows were seen mostly in group A. In this age group, injuries occur when children fall down while crawling on the floor, climbing on to the window edge, running from room to room or moving through the staircase. Moreover, the deteriorating economic condition had forced the two parents in many families to work to keep the families going. Therefore, children are often left alone at home or with those who gave inadequate care. The resultant effect is an increase in falls amongst children.

Sport injuries accounted for 11.8% of the total number of patients. This is higher than 1.2% reported by Adekeye [8]. The enormous budgetary resources spent and monetary rewards attached to age group sport competitions have made sports an attractive career for older children (group C). The pursuit for supremacy resulted in corresponding increase in incidence of fractures.

Assaults were seen in 8.6% of the patients; all of them within the school age. The prevention of assault in the society should be viewed with serious concern. Establishment of antibullying campaigns and proper investigation of threats of assaults by pupils would help to reduce assaults in children [16]. No case of facial bone fracture due to child abuse was seen in this study. Cases of child abuse have been reported by some authors occurring from brutality to quieten a sobbing child [13, 17].

Tables 3 and 4 show that the most common site of fracture in the mandible was the body (36.2%). This conforms with other similar studies [8,9,18]. Cossio *et al.* [14] and Siegel *et al.* [17] stated that the condyle was the most common site of mandibular fracture. The difference might be due to the relative frequencies of the aetiological factors in these studies.

Concomitant injuries were seen in 59.1% of patients (Table 5). Soft tissue injuries constituted 75.4% of the associated injuries. This is not surprising as road traffic accidents which is the commonest cause result in tremendous force which is dissipated to other parts of the body. It is therefore important that thorough examination of other parts of the body should be done in a patient with maxillofacial injury so that the appropriate specialists could be informed. Two cases of blindness were seen; following high velocity road traffic accidents during a night journey which resulted in a zygomatic complex fracture in one case and a LeFort III fracture in the other.

Simple methods of immobilization were used in this study because of the nature of fractures and the peculiarity of the facial bones and the teeth at the growing stage. This is in agreement with previous studies [8,9,10,15,17]. Eyelet wires with intermaxillary fixation were used in 32.3% of cases while eyelet wires and arch bar with intermaxillary fixation were used in 19.3% of patients. Open reduction with fixation was avoided in most of the patients because of

the risk of damage to the tooth buds. However, lower border wires were used in cases where fractures were unfavourable in Group C patients.

Complications were seen in 10.7% of the total number of cases. Dentoalveolar abscess was seen in three patients while two developed temporomandibular joint ankylosis. These complications arose as a result of delayed treatment, lack or improper use of antibiotics and late mobilization of condylar fractures. It is very important to mobilize the joint early in condylar fractures, especially in children.

In conclusion, the results obtained in this study have shown that there is an increase in the incidence of facial fractures in Nigerian children. Since facial appearance is of great value in all communities, minor changes in the facial appearance can inflict severe psychological effect on the child [19]. This effect will last long into adulthood and a child may be limited to achieve his full potential in the society [16].

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