



# THE CENTRAL AFRICAN JOURNAL OF MEDICINE

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**University of Zimbabwe**

# Jaw fractures in Nigerian children: an analysis of 102 cases

\*HO OLASOJI, \*\*A TAHIR, \*\*\*BUKAR A

## Abstract

**Objectives:** To present the prevalence and pattern of jaw fractures in children aged 15 years and below attending two hospitals serving as referral centres for facial injuries in North Eastern Nigeria.

**Design:** Retrospective Cross Sectional Study.

**Settings:** Department of Oral and Maxillofacial Surgery, University of Maiduguri Teaching Hospital, Borno State, Nigeria.

**Subjects:** One hundred and two patients with jaw fractures aged 15 years and below.

**Main Outcome Measures:** Aetiological factors and pattern of jaw fractures in children aged 15 years and below.

**Results:** We retrospectively reviewed 102 patients with jaw fractures aged 15 years and below seen over a five year period at two referral centres in Maiduguri, Northeastern Nigeria. This constituted 9.5% of the total 1 074 cases of maxillofacial injuries managed during the period. The male to female ratio was 7.5:1 and there was a male reponderance in all age groups. The main causes of fractures were road traffic accident (n=55, 53.7%) followed by falls (n=26, 25%). Other etiological factors such as fights, sports and gunshots accounted for the remaining cases. The mandible was the commonest site with the body commonly fractured (n=74, 72.5%). No Le Fort III fractures were identified in this study.

**Conclusion:** Despite some limitations to our data, such as exclusion of patients who attended private clinics and lack of modern diagnostic methods, this report shows that there is obvious need for concern about the high prevalence of maxillofacial injuries in children caused by road traffic accidents in North Eastern Nigeria.

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## Introduction

Fractures of the facial skeleton occur infrequently in children when compared with the prevalence in adults.<sup>1</sup> While emotional and psychosocial factors have been suggested as possible reasons for this relatively low prevalence, it is generally accepted that facial growth and development can be adversely affected when these injuries are not properly diagnosed and managed. The prevalence and aetiology of paediatric facial fractures varies somewhat from study to study depending on the age-grouping used by the authors, the location of the reporting institution and the population that it serves.<sup>2</sup> In European countries, the prevalence in children younger than 12 years ranges from 1.5% to 8% of all facial fractures (adult and children) in trauma centres.<sup>3</sup> In children younger than five years, the reported prevalence is approximately 1% of all facial fractures.<sup>4</sup> In Africa, Chidzonga<sup>5</sup> reported an incidence of 3.3% in Zimbabwe children while Adekeye<sup>6</sup> recorded 0.5% for children five years and below in Northwest Nigeria.

The most common cause of facial fracture in children in Australia is due to falls,<sup>7</sup> while violence has been reported as the single most important aetiological factor in South Africans under 18 years of age.<sup>8</sup> In Nigeria, there have been several general studies on the prevalence and pattern of maxillofacial injuries but only a few have focused specifically on jaw fractures in the paediatric age group.<sup>6</sup> The purpose of this study is to present the prevalence and pattern of jaw fractures in children aged 15 years and below attending two hospitals serving as referral centres for facial injuries in North Eastern Nigeria.

## Materials and Methods

We retrospectively reviewed the records of children aged 15 years and below who were managed for jaw fractures at the Maxillofacial Unit of the University of Maiduguri Teaching Hospital, Maiduguri and the Dental Department, Borno State Specialist Hospital, Maiduguri between January 1995 and December 1999. These are the two

\* Department of Oral Maxillofacial Surgery  
University of Maiduguri Teaching Hospital, Nigeria

\*\*Department of Radiology  
University of Maiduguri Teaching Hospital  
Nigeria

\*\*\*Department of Dental Surgery  
Borno State Specialist Hospital  
Maiduguri, Nigeria

Correspondence to:

Dr HO Olasoji  
Department of Oral Maxillofacial Surgery  
University of Maiduguri Teaching Hospital  
PMB 1414, Maiduguri  
Borno State  
Nigeria

referral hospitals in North Eastern Nigeria for facial injuries. The information retrieved from the case records included; age of patients at the time of injury; cause of fracture; duration of injury at presentation to the hospital; site of fracture; treatment given; complications and associated injuries. Diagnosis of jaw fracture was based on clinical and radiographic findings. Fractures were classified according to the maxillary-midface system of Le Fort<sup>9</sup> and the mandibular and zygomatic complex system of Killey.<sup>10</sup> Cases of isolated nasal complex fractures were excluded; these patients were treated at the Otorhinolaryngology Unit. Data were analyzed by an IBM compatible computer using the statistical software Epi-Info version 6.<sup>11</sup>

## Results

Over the 60 months review period, 1 074 patients were treated for jaw fractures in these two centres. Within this group 102 patients (9.5%) were 15 years or younger and these make up our sample. The mean age was  $10.64 \pm 3.92$  years (range 1 to 15 years). The overall male: female ratio was 7.5:1 (Table I). There were no statistically significant differences in the sex distribution among the different age groups. The peak age for fracture was in the age 12 to 15 years (52.9%).

Table I: Age and gender distribution of the patients.

Age Range (Years)	Boys No. (%)	Girls No. (%)	Total No. (%)
0-3	5 (5.6)	0 (0.0)	5 (4.9)
4-7	13 (14.4)	2 (16.7)	15 (14.7)
8-11	24 (26.7)	4 (33.3)	28 (27.5)
12-15	48 (53.3)	6 (50.0)	54 (52.9)
<b>Total</b>	<b>90 (100.0)</b>	<b>12 (100.0)</b>	<b>102 (100.0)</b>

Table II: Aetiology of fractures by age group and sex.

	Age (years)						
	Girls No. (%)	Boys No. (%)	0-3 No. (%)	4-7 No. (%)	8-11 No. (%)	12-15 No. (%)	Total No. (%)
<b>Road Traffic Accidents</b>	8 (66)	47 (52.2)	2 (50)	7 (58.4)	15 (46.9)	3 (52.5)	55 (53.7)
Motor vehicle	3 (25)	24 (26.7)	0 (0)	2 (6.7)	4 (12.5)	21 (38.9)	27 (26.7)
Motorcycle	0 (0)	2 (2.3)	0 (0)	0 (0)	1 (3.1)	1 (1.9)	2 (2)
Bicycle	0 (0)	4 (4.4)	0 (0)	2 (16.7)	2 (6.3)	0 (0)	4 (3.9)
Auto-Pedestrian	5 (41.7)	17 (18.9)	3 (50)	38 (25)	8 (25)	9 (16.7)	22 (21.4)
<b>Falls</b>	2 (16.7)	24 (26.6)	0	5 (41.6)	8 (25)	13 (24)	26 (25.7)
From trees	0 (0)	11 (12.2)	0 (0)	0 (0)	4 (12.5)	7 (13)	11 (10.8)
From moving vehicle	0 (0)	4 (4.4)	0 (0)	0 (0)	1 (3.1)	3 (5.5)	4 (3.9)
During play	2 (16.7)	9 (10)	0 (0)	5 (41.6)	3 (9)	3 (5.5)	11 (10.8)
<b>Fights</b>	0 (0)	4 (4.4)	0 (0)	0 (0)	1 (3.1)	3 (5.5)	4 (3.9)
<b>Sports</b>	0 (0)	2 (2.3)	0 (0)	0 (0)	1 (3.1)	1 (1.9)	2 (2)
<b>Miscellaneous</b>	2 (16.7)	13 (14.5)	2 (50)	0	7 (21.1)	6 (11.1)	15 (14.7)
Cow or camel attack	0 (0)	10 (11.1)	0 (0)	0 (0)	4 (12.5)	6 (11.1)	10 (9.8)
Collapse of building	1 (8.3)	1 (1.1)	1 (25)	0 (0)	1 (3.1)	0 (0)	2 (2)
Dane-gun shot	0 (0)	2 (2.3)	0 (0)	0 (0)	2 (6.2)	0 (0)	2 (2)
Pathological fracture	1 (8.3)	0 (0)	1 (25)	0 (0)	0 (0)	0 (0)	1 (0.9)
<b>Total</b>	<b>12 (100)</b>	<b>90 (100)</b>	<b>4 (100)</b>	<b>12 (100)</b>	<b>32 (100)</b>	<b>54 (100)</b>	<b>102 (100)</b>

Table II shows the causes of jaw fractures by sex and age. The most common aetiology was road traffic accidents (53.7%). Among this group, fractures due to motor vehicle accidents were the most frequent, accounting for the injuries in 27 patients (26.4% of the total), followed by auto-pedestrian accidents, which occurred in 22 patients (21.4% of the total). Fractures due to falls occurred in 26 patients (25.7% of the total). Out of the cases of fractures due to falls, 11 (10.8% of the total) were due to falls from mango trees. Ten nomadic children sustained jaw fractures from cow-or camel attacks. The causes of injuries also varied by sex; 85.5 per cent of patients with jaw fractures due to road traffic accidents were male, while all fractures recorded due to falls from trees occurred in males. A total of 74 children (72.5%) had mandibular fractures and 10 (9.8%) had fractures of the dentoalveolar bone in the maxilla. Five patients (4.9%) and one patient (1%) had Le Fort I and Le Fort II fractures respectively. No Le Fort III fractures were identified in this study.

In most cases, simple methods of treatment using either eyelets or arch bars secured with soft stainless steel wires were used to immobilize the fractures after closed manual reduction. All cases of condylar fractures were managed with jaw exercises only. Also, in some children with mandibular fractures, no active treatment was undertaken and they were only placed on a soft diet and randomly observed until bone healing occurred. A temporal approach was used for all fractures of the zygomatic arch while Le Fort midface fractures were treated with plaster of Paris headcaps for extra skeletal fixation. Thirteen patients (12.7%) developed complications during management. Infections (60.3%) accounted for the majority of the cases (Table IV). Only 38 (37.3%) patients reported to the hospital for treatment within 24 hours of sustaining injuries. Sixty three (61.7%) of the 102 patients in this report

**Table III: Pattern of facial and mandibular fractures.**

Site	Number of Patients (%)
Mandible	74 (72.5)
Le Fort I	5 (4.9)
Le Fort II	1 (1)
Le Fort III	0 (0)
Alveolar (Maxilla)	10 (9.8)
Zygoma	8 (7.8)
Zygomatic Arch	3 (2.9)
Split Palate	1 (1)
<b>Total</b>	<b>102 (100)</b>

Mandible	Number of Fractures (%)
Condyle	8 (8.2)
Coronoid	1 (1)
Ramus	3 (3.1)
Angle	15 (15.3)
Molar	33 (20.4)
Parasymphiseal	20 (20.4)
Symphiseal	13 (13.2)
Dento-alveolar	5 (5.1)
<b>Total</b>	<b>98 (100)</b>

sustained other injuries, and facial soft tissue lacerations were the commonest associated injuries recorded (Table IV).

**Table IV: Complications and associated injuries following jaw fractures.**

Type of Complication	Number of Patients (%)
Infection	6 (46.2)
Malocclusion	2 (15.4)
Facial Deformity	1 (7.7)
Blindness	1 (7.7)
Non-union	3 (23)
<b>Total</b>	<b>13 (100)</b>

Associated Injuries	Number of Fractures (%)
Facial Lacerations	38 (60.3)
Head Injuries	6 (9.5)
Eye Injuries	5 (7.9)
Fractures of Upper and Lower Limbs	8 (12.7)
Abdominal Injuries	2 (3.2)
Burns	4 (6.3)
<b>Total</b>	<b>63 (100)</b>

## Discussion

The variable age grouping used by the different investigators and the absence of a standardized approach has been suggested as difficulties in accurately estimating the prevalence of jaw fractures in children.<sup>12</sup> The figure (9.5%) recorded in this study, however, falls within the range (3.3% to 30.2%) reported for different countries.<sup>4,5</sup> The male to female ratio obtained in this series is relatively

higher when compared with similar studies,<sup>13,14</sup> but the preponderance of boys in all age groups is consistent with other reports.<sup>6,15</sup> There were, however, no statistically significant differences in the sex distribution among the different age groups. Most studies<sup>6,14</sup> on jaw fractures in children have reported that the frequency of fractures increases with age. This is consistent with our finding but also contrasts sharply with the report of Keniry.<sup>16</sup> Anatomical factors, direct parental supervision and limited outdoor activities are suggested reasons responsible for the low incidence of facial injuries commonly recorded in the lower age group of children.<sup>5,14</sup>

Road traffic accidents were the main cause of jaw fractures in this study, followed by falls. This observation differs from that of some authors,<sup>5,17</sup> but confirms that of Adekeye,<sup>6</sup> Rowe and Killey.<sup>18</sup> Bamjee *et al*<sup>8</sup> reported violence to be the commonest cause of facial fractures in South Africans under 18 years of age while Hall<sup>7</sup> reported falls and play accidents. In contrast to the findings in some studies,<sup>8,14</sup> no variation was observed in the aetiology of facial injuries in relation to age distribution, as the 12 to 15 year olds were observed to be the most consistently affected in this study. When the maxillofacial region is injured, the mandible is more vulnerable than the midface.<sup>19,20</sup> In this series the ratio was 2.6:1. The few cases of midface fracture in this report are similar to the findings of Adekeye,<sup>6</sup> Thaller and Huange.<sup>21</sup> The relative large size of the mandible and the cranium in children has been suggested as providing protection for the maxilla.<sup>21</sup> In the mandible, the body was the commonest site affected in contrast to the condyle reported by Olson *et al*.<sup>22</sup> The long distances some of our patients have to travel to the referral centres coupled with the fact that the Le Fort group of fractures could progressively become severe with fatal consequences may explain the single case of the Le Fort II and complete absence of Le Fort III fractures recorded in this study, as such patients may never present in the hospital. The 63% associated injury rate we found is comparable to that of another report<sup>6</sup> but lower than the 88% reported by McGraw and Cole.<sup>14</sup> The late presentation of patients for treatment observed in the present study may be due to ignorance, poverty and the socio-cultural belief in seeking treatment from traditional healers and spiritualists in developing countries before attending hospital.

Despite some limitations to our data, such as exclusion of patients who attended private clinics and lack of modern diagnostic methods, this report shows that there is obvious need for concern about the high prevalence of maxillofacial injuries in children caused by road traffic accidents in north eastern Nigeria. Strict enforcement of speed limits and drug and alcohol screening among road users is highly recommended. In addition, provision of more pedestrian footpath/crossing sections on our roads and strict enforcement of their use will help greatly in reducing the prevalence of maxillofacial injuries in children. Our limited human and material resources should primarily be used in taking care of facial injuries in the paediatric age group.

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