

Maxillofacial fractures in a semi-urban Nigerian teaching hospital

A review of 442 cases

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Abstract. A retrospective review of 442 patients, seen by one maxillofacial unit over a twelve-year period, is presented. Data concerning the patients' demographics and the aetiology, pattern, treatment and complications of the fractures were obtained and evaluated. Approximately 72% of the patients sustained fractures from road traffic accidents and 39% of the fractures occurred in the 21–30-year range. There was a male preponderance and 8% of all cases had postoperative infections. Over 20% of the patients sustained associated body injuries and only one-third reported for treatment within 24 hours of injury. Road traffic accidents continue to be the leading cause of maxillofacial fractures. The late presentation for treatment appears to be related to the rural and semi-urban dwelling of the patients and the attendant transportation and economic difficulties.

Key words: maxillofacial fractures; semi-urban; Nigerians.

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Facial fractures constitute quite a significant portion of the workload of the oral and maxillofacial surgeon. Fractures of the facial skeleton alone are rarely fatal but concomitant injuries to internal organs can be a complicating factor¹⁶. The vast majority of facial fractures in peacetime result from road traffic accidents, especially in developing countries where the tradition and enforcement of highway discipline are yet to be established²¹. Other important causes of maxillofacial fractures include falls from heights, school and domestic accidents involving children, fights and assaults, sports, industrial accidents, injuries from forceps child delivery, gunshots and bomb blasts.

Previous studies carried out in Nigeria suggested that road traffic accidents occurred largely through recklessness

and negligence of the driver, poor maintenance of vehicles, often driving under the influence of alcohol or drugs and complete disregard of traffic laws^{3,20}. In automobile accidents, the facial area is the most frequently injured body region¹³, 20–60% of all persons involved in automobile collisions having some level of facial fractures¹⁸.

It is, however, interesting to note that recent studies indicate an increase in the incidence of maxillofacial fractures from road traffic accidents in Nigeria. Fatalities resulting from such accidents are also quite alarming^{1,2,4,21}. ODUSANYA²¹ has attributed this increase to the sudden increase in national wealth from oil, inadequate and poor maintenance of intercity highways and noncompliance with the use of seat-belts. Earlier studies in Nigeria have focused mostly

on the urban population groups^{1–3}. The present report is on 442 cases of facial fractures seen by the maxillofacial unit of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria, over a period of 12 years. This is the only tertiary health facility in a semi-urban location in the southwestern part of Nigeria with a maxillofacial unit.

Patients and methods

All 442 patients with fractures to the orofacial region treated from 1982 to 1995 by the Maxillofacial Unit of OAUTHC were included in the present study.

Information extracted from the patients' case records included age at the time of injury, cause of fracture, date of presentation in the hospital for treatment, interval between injury and presentation in the hospital, clin-

ical features (including radiographic interpretation of the anatomical site of the fracture), treatment given, complications, and associated injuries.

For the purpose of this study, mandibular fractures were classified into condylar, coronoid, ramus, angle, molar, premolar, canine, symphyseal and alveolar fractures. Fractures of the middle third were subdivided into Le Fort types I, II and III, zygomatic arch, zygoma, blow-out fracture of the orbit, split palate, and alveolar fractures. Isolated complex nasal fractures were excluded from this study.

All data were analysed by computer using epi-info (version 6) statistical software⁸.

Results

The age and sex distribution of the patients is shown in Table 1. The mean age of the patients was 30.32 ± 13.17 years (range 1–70 years). The largest number of fractures (39.1%) occurred amongst the 21–30 year age group. There was a male preponderance in all age groups with an overall male: female ratio of 4.1:1. There was no statistically significant difference in the age distribution between the sexes. $X^2=8.99$, $df=6$, $P=0.17$.

Table 2 reveals that road traffic accidents were responsible for the majority (71.9%) of fractures. Only males sus-

tained fractures from sporting activities (3.2%) and gunshot incidents (2.7%).

The site distribution of the fractures showed that 64% occurred in the mandible, 20.8% in the maxilla, 12% in the zygoma and 3.25% in the zygomatic arch. Of the 358 fractures that occurred in the mandible (Table 3), 74.1% were located in the body, with the molar region (24.9%) being the most common site.

Of the 159 middle third fractures recorded (Table 4), the most common were dentoalveolar fractures (39%), followed by zygoma (33.3%). Eight patients (5%) suffered a split of the palate.

With regard to treatment methods (Table 5), approximately 98% of all patients with mandibular fractures were treated by closed reduction. Open reduction and interosseous wiring were carried out in 1.8% of the cases. Active jaw exercises were recommended for 15.5% of the patients who sustained exclusively condylar fractures. As was the case with mandibular fractures, most of the cases seen with middle third fractures were treated by closed reduction and the use of metal arch bars. In Le Fort I and II cases, circumzygomatic (internal) suspension was also carried out. Le Fort III cases were treated by

closed manual reduction and immobilization using a plaster of Paris head cap and craniomaxillary or cranio-mandibular suspension from a Royal Berkshire[®] (Downs Surgical, Sussex, UK) metal halo frame. The most common surgical technique used in the treatment of zygomatic fractures in this study was the Gillies temporal approach (70.1%).

Complications of fractures of the orofacial skeleton are shown in Table 6.

Infection (8.1%) was the most common complication recorded in this series, however these patients responded to appropriate antimicrobial treatment based on sensitivity tests. Only one case of otitis media occurred.

Table 7 shows that the majority of patients (62.2%) sustained soft tissue lacerations of the face. Upper and lower limb fractures occurred in 4.3% of cases, and chest injuries in 2.5% while 1.6% sustained abdominal injuries. The only case (0.2%) of external carotid artery rupture occurred following gunshot injury, sustained by a suspected

Table 1. Age and sex distribution of patients with maxillofacial fractures

| Age range (year) | Male | Female | Total (%) |
|------------------|------|--------|------------|
| 0–10 | 19 | 6 | 25 (5.7) |
| 11–20 | 60 | 9 | 69 (15.6) |
| 21–30 | 143 | 30 | 173 (39.1) |
| 31–40 | 66 | 27 | 93 (21.0) |
| 41–50 | 45 | 8 | 53 (12.0) |
| 51–60 | 17 | 5 | 22 (5.0) |
| 61–70 | 6 | 1 | 7 (1.6) |
| Total | 356 | 86 | 442 (100%) |

Table 2. Aetiology of fractures according to sex

| Aetiology | Male | Female | Table (%) |
|--|------|--------|------------|
| Road traffic accidents: | | | |
| Automobile (driver/passengers) | 161 | 49 | 210 (47.5) |
| Motor cyclists | 60 | 4 | 64 (14.5) |
| Bicyclists | 8 | 1 | 9 (2.9) |
| Pedestrians hit by automobiles and motorcycles | 21 | 14 | 35 (7.9) |
| Fights and assault | 30 | 7 | 37 (8.4) |
| Falls | 42 | 6 | 48 (10.9) |
| Sports | 14 | – | 14 (3.2) |
| Industrial accident | 8 | 1 | 9 (2.0) |
| Gunshot | 12 | – | 12 (2.7) |
| Fits (epileptic) | 1 | 2 | 3 (0.7) |
| Explosion (fire extinguisher) | 1 | – | 1 (0.2) |
| Total | 348 | 84 | 442 (100%) |

Table 3. Pattern and location of mandibular fractures

| Type | No. of patients (%) |
|---------------|----------------------|
| Single | 139 (49.1) |
| Double | 110 (38.1) |
| Triple | 11 (3.9) |
| Comminuted | 23 (8.1) |
| Total | 283 (100%) |
| Location | No. of fractures (%) |
| Condyle | 44 (12.3) |
| Coronoid | – |
| Ramus | 18 (5.0) |
| Angle | 31 (8.6) |
| Premolar | 89 (24.9) |
| Canine | 62 (17.3) |
| Symphyseal | 40 (11.2) |
| Dentoalveolar | 58 (16.2) |
| Total | 358 (100%) |

Table 4. Type of fractures of the middle third molar

| Type | No. of fractures (%) |
|---------------------------|----------------------|
| Le Fort I | 9 (5.7%) |
| Le Fort II | 6 (3.8%) |
| Le Fort III | 5 (3.1%) |
| Dentoalveolar | 62 (39.0%) |
| Zygoma | 53 (33.3%) |
| Zygomatic arch | 14 (8.8%) |
| Blow out orbital fracture | 2 (1.3%) |
| Split of the palate | 8 (5.0%) |
| Total | 159 (100%) |

Table 5. Treatment methods for maxillofacial fractures

| | No. of patients (%) |
|---|---------------------|
| Treatment (mandibular fracture) | |
| Eyelets | 28 (9.9) |
| Arch bars | 186 (65.7) |
| Interosseous wiring | 5 (1.8) |
| Gunning type splints | 8 (2.8) |
| Active jaw exercise* | 44 (15.5) |
| No treatment | 12 (4.3) |
| Total | 283 (100%) |
| Middle third fractures: | |
| Arch bars | 54 (58.7) |
| Eyelets | 15 (16.3) |
| Circumzygomatic wiring | 9 (9.8) |
| Halo frame/metal cap splints | 7 (7.6) |
| Plaster of Paris head cap | 4 (4.3) |
| No active treatment | 3 (3.3) |
| Total | 92 (100%) |
| Zygomatic fractures: | |
| Gillies temporal approach | 47 (70.1) |
| Bristows' elevator (intraoral approach) | 7 (10.4) |
| Transosseous wiring | 4 (6.0) |
| Anthral packing | 2 (3.0) |
| Elevation with Poswillo hook | 2 (3.0) |
| No treatment | 5 (7.5) |
| Total | 67 (100%) |

* Exclusively for condylar fractures.

Table 6. Patients with complications of maxillofacial fractures

| Complications | No. of patients (%) |
|---|---------------------|
| Infection (postoperative) | 35 (8.1) |
| Limitation of mouth opening (at presentation) | 7 (1.6) |
| Nonunion | 3 (0.7) |
| Bone sequestration due to infection | 5 (1.1) |
| Delayed union | 10 (2.3) |
| Malocclusion | 6 (1.4) |
| Otitis media | 1 (0.2) |
| Malunion | 4 (0.9) |
| Blindness/loss of eyeballs | 4 (0.9) |
| Transient paraesthesia of lower lip | 8 (1.8) |
| Facial deformity | 3 (0.7) |
| Death (1 preoperative, 2 postoperative) | 2 (0.5) |
| Diplopia (transient) | 5 (1.1) |
| Facial palsy | 2 (0.5) |
| Enophthalmus | 6 (1.4) |

armed robber who died within 24 hours of presentation.

About one-third of the patients presented at the hospital for treatment within 24 hours of sustaining injury, while over half (57.8%) reported within

Table 7. Patients with other injuries associated with maxillofacial fractures

| Other injuries | No. of patients (%) |
|--|---------------------|
| Soft tissue lacerations of the face | 275 (62.2) |
| Tongue laceration | 5 (1.1) |
| Fractures of upper and lower limbs | 19 (4.3) |
| Fractures of the cranium and cerebral injuries | 25 (5.7) |
| Chest injuries | 11 (2.5) |
| Abdominal injuries | 7 (1.6) |
| Cervical spine fractures | 2 (0.5) |
| Burns | 6 (1.4) |
| Rupture of the external carotid artery | 1 (0.2) |
| Fracture of the clavicle | 5 (1.1) |
| Dislocation of the hip joint | 3 (0.7) |

48 hours. 83.4% of patients arrived at the hospital within one week and less than 6% presented after one month. Thus, nine out of every ten patients presented for treatment within a period of one month after sustaining injury. The largest number of cases (11.1%) were seen during the month of December followed by 9.9% in January.

Discussion

Although various causative factors have been mentioned with regard to fractures of the facial skeleton, the results of the present study showed that 71.9% of the cases were due to road traffic accidents. This figure is consistent with the results of other studies^{1,4,6,21,26}.

It is interesting to note that the period from the late 1980s up to the present time has witnessed a steady increase in the number of second-hand cars imported into Nigeria. Unfortunately, lack of enforcement of pre-shipment inspection rules and regulations has encouraged the importation of vehicles whose road worthiness leaves much to be desired. The escalating cost of vehicle spare parts has also compelled vehicle owners to seek substandard alternatives, thereby compromising the safety of such vehicles and their passengers. It has also been noted that the majority of commercial vehicle drivers in the country are illiterate and are, therefore, unable to read and properly interpret simple road signs^{3,20}.

Recent studies carried out in South Africa, Scandinavia, Scotland and the United States^{5-7,11,14,17} show increased

interpersonal violence as a major cause of facial fractures, with alcohol consumption and unemployment as contributing factors. The figure obtained for assault and gunshot injuries (10.1%) in the present study may be ascribed to the gradual urbanization and increased number of armed robbery attacks in Ile-Ife and its vicinity, a hitherto peaceful area.

More fractures were seen in males than females, the ratio being similar to that obtained in other studies^{2,3,14,21}. The present economic recession being experienced in Nigeria, however, has compelled women to engage themselves in numerous activities outside the home in a bid to render financial assistance to their families, thus exposing them to various hazards.

The majority of fractures occurred in the 21-30-year age range, thus confirming published reports. This coincides with the period when young men and women complete their postsecondary education and make numerous journeys in search of employment.

As expected, the majority of the fractures (64%) were seen in the mandible, a figure comparable to other published reports^{2,12}. However, SCHUCHARDT et al.²⁴ and LAMBERG¹⁵ reported that the condyle was the most common site. The low figure for condylar fractures (12.3%) observed in this study could be attributed to the low incidence of motorcycle and bicycle accidents.

Although the months of December and January witnessed the highest occurrence of facial fractures, the number of cases recorded during the months of April and May was also appreciable. This period coincides with the end of the fasting period for Moslems and Christians, who in a bid to make up for their dietary restriction, indulge in various social activities where alcohol is freely consumed.

In general, metal arch bars secured with soft stainless steel wires were used for immobilization of fractures after closed manual reduction. These were usually kept in place for three to eight weeks depending on the type of fracture and age of the patient. This method was preferred because arch bars are readily available in our centre and simple to apply.

The current trend towards open reduction and rigid internal fixation of facial fractures has not yet become popular in our region despite the obvious advantages^{9,10,19,22,23,25,27}. These

techniques, however useful they may be, are costly and, therefore, less commonly used in developing countries. The results obtained in our hospital, however, seem to indicate that conservative methods may still provide acceptable results. The relatively low incidence of infection in this highly susceptible group of patients (most patients were seen after 24 hours), attest to the validity of this statement.

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