Crash Characteristics and Pattern of Motorcycle Related Facial Bone Fractures in a Sub-Urban Nigerian Teaching Hospital

Obitade S Obimakinde, Oyebanji A Olajuyin, Taopheeq B Rabiu, Olusoji J Olanrewaju

INTRODUCTION

It has been documented that injuries will likely become the fourth leading cause of mortality and disability worldwide by 2030.\(^1\) Low- and middle-income countries are said to be disproportionately affected, accounting for a significant proportion of the overall injury-related mortality.\(^{1-4}\) Most of these deaths are attributable to road traffic crashes (RTC) involving the vulnerable road users.\(^{5-8}\) Facial bone fracture constitutes a substantial proportion of trauma globally, and it often results in serious morbidity and sometimes fatal consequence.\(^{3,9,10}\) These injuries pose a huge economic burden due to treatment costs, rehabilitation, disabilities, and man-hour loss occasioned by hospital stay.\(^{3,7}\)

In developing countries, maxillofacial injuries due to RTC continue to rise alarmingly and motorcycle (MC) crash victims form a high proportion of those killed or injured in road mishaps.\(^{11-16}\) The high incidence of oral and maxillofacial injuries has been attributed to the heavy reliance on MC as a mode of transportation in the low- and middle-income countries.\(^{2,7,11,14-17}\)

There is dearth of information on crash characteristics, epidemiology, and sociodemographics of victims

Keywords: Facial bone, fractures, motorcycle
of MC-related facial fractures in Nigeria and other countries in Sub-Saharan Africa. Thus, the present study was designed to examine the relationship between crash characteristics, pattern of fractures, and sociodemographics of patients with facial bone fracture due to MC crashes in our institution.

**Subjects and Methods**

The data of patients who sustained facial bone fractures due to MC crash between January 2010 and December 2014 were collected on individual proforma. The patients presented either through the accident and emergency ward or maxillofacial surgery clinic of our institution.

The information gathered included patient’s sociodemographics (age, sex, and occupation), crash characteristics (type and nature of crash), pattern of fracture, radiologic diagnosis and treatment offered. Patient’s status (rider, pillion passenger, pedestrian) and the number of persons on the MC at the time of crash were also documented. Level of consciousness was determined using Glasgow Coma Scale.

Diagnosis of maxillofacial fractures was achieved through clinical and radiologic evaluation. All patients had plain radiographs for radiologic evaluation. In addition, computerized tomography scan was done for those who could afford it.

Ethical approval for the study was obtained from our institution’s ethical review board.

Data obtained were summarized in figures and frequency tables. Analysis was done using SPSS (Statistical Package for Social Sciences, Chicago, Illinois) version 10. Descriptive statistics and Chi-square test were carried out and the level of significance was set as \( P < 0.05 \).

**RESULTS**

One hundred and fifty-one patients with MC-related facial fractures presented during the study period. There was a male preponderance of 120 to 31 (M: F 4:1). The mean age of the patients was 23.52 ± 9.61, while the peak age range was 20–29 years [Figure 1]. A greater proportion of injured patients were MC riders (64.8%, \( n = 98 \)). Furthermore, most of the victims (56.3%, \( n = 85 \)) in this series were unemployed youths [Figure 2].

The most common mechanism of injury was collision with another MC (51.6% \( n = 78 \)). Collision with motor vehicle and other objects accounted for 17.8% and 24.5%, respectively [Table 1]. Pedestrian injury accounted for just 6.0% (\( n = 9 \)) of the study population. Only 17.2% (\( n = 26 \)) of the victims claimed to have crash helmet on their head at the time of crash. Further examination of the crash characteristics revealed that nearly half (47.0%, \( n = 71 \)) of the patients claimed that the MC was carrying 3 or more persons at the time of crash [Table 2]. However, the number of persons on the MC does not have a statistically significant relationship with fracture pattern (\( \chi^2 = 0.24, P = 0.8 \)).

One hundred and ninety-four fracture sites were reviewed giving an average of 1.3 fractures per patient. The most commonly encountered sites of fracture were in the mandible (58.8%, \( n = 114 \)) compared to the midface (41.2%, \( n = 80 \)). Table 3 showed that the predominant site on the mandible was the body (31.6%) followed by the dentoalveolar region (21.9%) while zygoma (32.5%) was the most...
affected part of the midface followed by Le Fort 1 fractures (22.5%).

A total of 83 patients (54.9%) suffered altered state of consciousness and majority (77.1% \( n = 64 \)) regained full consciousness within 24 h of admission. Further analysis revealed that patient’s status (either rider or pillion passenger) was found to have a statistically significant relationship with loss of consciousness \( (\chi^2 = 12.8, P = 0.02) \) [Table 4]. On the contrary, fracture site, either mandible or midface did not have any significant relationship on altered consciousness \( (\chi^2 = 1.56, P = 0.13) \) [Table 5].

A higher proportion of the patients (57.7%, \( n = 112 \)) were treated conservatively with either mandibulomaxillary...
fixation (MMF), a combination of MMF with internal wire suspension or 0.5-mm stainless steel wire splint without MMF [Table 6]. Eighty-two patients (42.3%) had open reduction and internal fixation which was achieved predominantly with miniplate osteosynthesis (n = 75).

**DISCUSSION**

The poor state of roads, harsh economic condition, lack of efficient public transport system, and rising spate of youth unemployment have popularized the use of MC for road transport in Sub-Saharan Africa. [2,3,7,18] Although previous studies from Nigeria have reported the pattern of facial injuries sustained by MC crash victims,[4,15,16,18] none has been able to relate the crash characteristics to the pattern of injuries and status of patients involved in such crashes. Thus, a holistic appraisal and characterization of MC-related injuries is necessary to develop strategy on prevention and enforce adherence to road traffic safety regulations.

In agreement with similar studies, we found a high male preponderance and the victims were predominantly below 30 years of age.[4,7,11,16,19-21] It has been argued that the male gender tends to be more adventurous and likely to indulge in injury prone adventures such as dangerous driving and use of automobile for commercial purposes. Furthermore, majority of the patients in this research were mostly unemployed youths. This view was also shared by some Nigerian authors[3,4,14,16] and other countries in Sub-Saharan Africa.[2,7] Rising youth unemployment, rural/urban migration, and attendant economic hardship have spurred many youths into riding MCs for commercial purpose in Nigeria.[3,14,22] These MCs are often procured with ease through hired purchase or differed payment system.

In this study, we found that majority of the crashes were due to collision with another MC (51.0%) followed by collision with motor vehicles (18.5%). This is comparable with the findings of Chichom-Mefire et al.[2] and Oginni et al.[16] who reported that collision with other automobiles represented 60% and 58% of all crashes, respectively. The high rate of collision involving MC and motor vehicles in this study corroborates the vulnerability of MC to other motorized road users. Moreover, MC riders are always impatient and often do not obey traffic signs and regulations. Furthermore, most Nigerian roads are designed for motor vehicle use without designated bands for MC, thus the MC shares the available portion with vehicles, thereby predisposing the road users to crash. The classical skid and fall of lone MC crashes were however low in this study.

Although there was a low utilization rate of helmet (17.2%) in this study, it is, however, higher than previous studies which reported poor adherence to protective measures in Sub-Saharan Africa.[2,4,16,18] This differs considerably from the high-income nations where helmet use is strict and mandatory for all MC riders and pillion passengers.[11,23,24] Studies have shown that MC helmets reduce the risk of head injury and mortality following crash, although these effects may be modified by other crash factors such as speed.[11,17,23-25] While the health benefits of crash helmets have been widely reported by various researchers,[11,21,23-27] its use has not been embraced in Nigeria despite preexisting legislation.

The effect of the number of pillion passengers on crash characteristics has not been examined sufficiently by previous reports because it is often assumed that MCs do not carry more than one passenger. Majority of the MCs involved in this series had more than one pillion passenger at the time of crash. This is similar to reports by Chichom-Mefire et al.[2] but contrary to the finding of Oginni et al.[16] Multiple pillion passengers increase the weight carried by the MC beyond its capacity, rendering it less stable and prone to accidents. Although it can be argued that excess passengers reduce the motility of the automobile and hence impact of collision, thereby limiting the severity of injuries sustained in such circumstances.

The pattern of facial bone injuries revealed a higher preponderance of mandibular fractures compared to the midface. Several authors have attributed the higher prevalence of mandibular fractures to the mobility and prominence of the bone.[2,4,6,7,10,14] In agreement with similar reports,[1,14,16] the body of the mandible was the most commonly fractured part of the bone. Furthermore, we found that zygomatic bone was the most commonly fractured bone in the midface. This corroborated the findings of previous facial trauma surveys on the prevalence of zygomatic bone fracture.[3,4,16] The prevalence of zygomatic bone fractures may be due to the prominence of the bone in the midface and hence its proneness to fracture.

In general, the prevalence of head injury is rarely reported in most maxillofacial surveys. Few studies have reported concomitant loss of consciousness in patients with facial bone fractures due to automobile crash.[13,28,29] The proportion of those who suffered loss of consciousness in this study is comparable to similar reports.[28,29] Furthermore, we found that a statistically significant proportion of those who had loss of consciousness were riders. MC riders are often the first person in the line of crash and they are at risk of suffering more fatalities during collision. The incidence of head injury has also been linked to the impact of collision, especially in nonhelmeted individuals.[13]
Seventy-five fractures (38.7%) were treated definitively with miniplate osteosynthesis; this showed that the use of bone plates for maxillofacial fractures in Nigeria has gained ground considerably compared with previous report[6,14] where MMF was the mainstay of facial bone fracture management.

**Conclusions**

Facial bone fractures occur in a significant proportion of MC-related crashes and motorcyclists were predominantly affected. In addition, a larger proportion of commuters rarely wear crash helmet which could have offered protection. Continual advocacy on preventive measures and enforcement of road safety regulations is hereby advised.

**Acknowledgment**

We would like to acknowledge the residents at the oral and maxillofacial surgery department and the emergency room doctors for helping in data collection.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

5. Toroyan T, Peden M. How safe are the world’s roads? Bull World Health Organ 2009;87:736.
15. Fasola AO. “Okada” and Facial Injuries: That All May Live. 2011 Faculty Lecture, Faculty of Dentistry, College of Medicine, University of Ibadan. Nigeria; 2011.