Influence of Positions on the Incidence and severity of Middle Third Facial Fractures in Vehicular and Motorcycle Crashes seen in a Tertiary Health Facility

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ABSTRACT

Objective: The incidence of middle third facial fractures due to traffic crashes has increased tremendously. In developed countries, there is a gradual decline in traffic crashes as a result of effective compliance with road safety measures unlike in developing countries where the incidence is increasing due to non-compliance and ineffective enforcement of road safety laws, among other factors. The objective was to present the influence of positioning on the incidence and severity of Maxillofacial injuries in vehicles and motor bike crashes in a Nigerian tertiary health facility.

Methods: A cross-sectional descriptive study of the influence of position of the patient on the incidence of middle third facial fractures presenting at a tertiary institution. Data were analysed using SPSS version 17.

Results: There were more male than female in the ratio of 2.3:8:1 (M:F) and the mean age was 23.2 ± 3.4. Road traffic crash was the major cause of middle third fracture with 231 cases. Pillion passengers and front passengers on both motorcycles and vehicles were the most vulnerable passengers.

Conclusion: There is a strong association between patient positioning and middle third fractures

Keywords: Influence, Position, Middle third, fracture

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INTRODUCTION

The middle third of the facial skeleton is an area bounded superiorly by an imaginary line drawn across the skull from the fronto-zygomatic suture through the fronto-nasal suture and fronto-maxillary suture to similar structures on the opposite side, and inferiorly by the occlusal plane of the upper teeth or upper alveolar ridge if patient is edentulous.[1,2] Posteriorly, it extends as far as the frontal bone above and the body of the sphenoid and pterygoid plates below.[1-3]

Road traffic crash[4-8] is the single most common cause of middle third facial fractures in many developing countries in peace time and assault[9-12] is recognized as a significant cause in many developed countries. The incidence of middle third facial fractures due to traffic crashes has increased tremendously. In developed countries, there is a gradual decline in traffic crashes as a result of effective compliance with

road safety measures unlike in developing countries where the incidence is increasing due to non-compliance and ineffective enforcement of road safety laws.[4-8,13] The sudden economic prosperity from oil wealth, rapid urbanization, increased unregulated importation of motor vehicles[6] poor road infrasatructures[4,5] and low education level of drivers[7] have contributed immensely to the incidence of middle third facial fractures recorded in road traffic crashes in Nigeria. Over the years, improvement in road infrastructures has not kept up with the surge in the number of motor vehicle on our roads[4,5,7,14] this has resulted in increased preference for motorcycles by commuters[14-16]. Since this mode of transportation became operational, the incidence of unusual combination of middle third facial fractures from road with cranial extensions became common findings in many emergency rooms[10,16-18]. The aim of this paper was to present the influence of positioning on the incidence and severity of middle third facial fracture in vehicles and motor bike crashes in a Nigerian tertiary health facility.

MATERIALS AND METHODS

This is a cross-sectional descriptive study of the influence of position on the incidence of middle third facial fractures presenting at a tertiary institution. Data was collected prospectively over a 49- month period (October, 2006 to October, 2010) and included the age, sex, position in the vehicle or motor cycle, whether seat belt or helmet was worn or not. The collected data was analyzed and results are shown in tables and charts. Middle third facial fractures were categorized into dentoalveolar fracture, nasal complex fracture, orbital blowout fracture, zygomatic complex fracture, zygomatic arch fracture, LeFort I, II and III fractures, and palatal fracture.[1]

The study population was made up of 304 patients who had middle third facial fractures, that presented at the accident and emergency unit and the maxillofacial clinics primarily or were referred, who fulfilled the inclusion criteria below. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 17.0.

RESULTS

They represented 304 out of 781(38.92%) fractures treated with that period. The age range of patients in this study were between 5 and 69 years with a mean age of 23.2 ± 3.4 years. Majority were males 214 (70.4%) while the remaining 90 (29.6%) were females; a male to female ratio 2:4:1 was recorded (Table 3).

Patients position in vehicles and on motorcycles

In vehicular crashes front seat passengers had more fractures with 56 (14.5%) cases (Table 2). On motorcycles, pillion passengers had more fractures with 103 (26.7%) cases (Table 2). There was a strong association between patients position either in a vehicle (Pearson R Correlation = 0.628) or on a motorcycle (Pearson R Correlation = 0.722) and the risk of middle third facial fractures.

The major cause of middle third facial fractures in this study was road traffic crash which occurred in 231 (76%) patients. Other causes are shown in Figure 1.

Of the 130 cases who were involved in motorcycle crashes, the mechanism of injury showed that 81 (62.3%) cases were attributed to loss of balance and control, 43 (33.1%) cases had head –on- collision and 6 (4.6%) cases had rear collision. In 76 cases of vehicular crashes, burst front tyre and loss of control occurred in 39 (51.3%) cases, head-on-collision in 28 (36.8%) cases and burst back tyre and loss of control in 9 (11.9%) cases.

Table 1: Mode of transportation employed in conveying patients with middle third facial fractures to the health facility

S/N	Mode of transport	Frequency n (%)
1.	Ambulance	25 (8.2)
2.	Federal Road Safety pick –up van	40 (13.2)
3.	Nigerian Police Force pick-up van	50 (16.5)
4.	Commercial motor vehicles	100 (32.9)
5.	Commercial trucks/lorries	44 (14.5)
6.	Private motor vehicles	36 (11.8)
7.	Motorcycles	9 (2.9)
	Total	**304(100.0)**

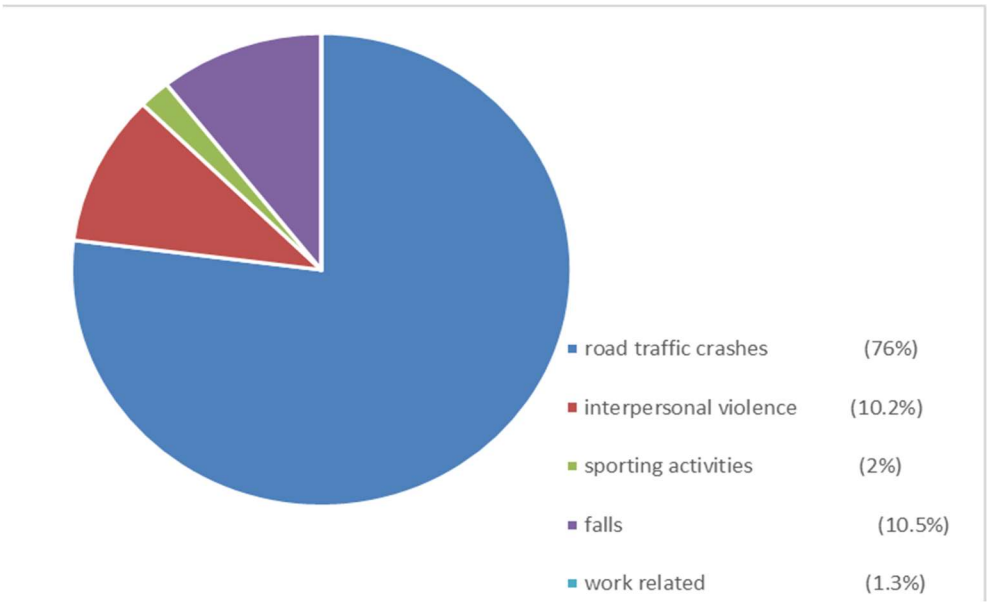

Figure 1: Major causes of middle third fractures

Table 2: Patients position as a risk factor of middle third facial fractures in a traffic crash

No	Anatomic site	Driver of vehicle	Front seat with driver	Middle seat behind driver	Back seat passenger	Motorcycle rider	Pillion passenger	Total no of fractures n (%)
1.	Zygomatic complex	2	10	6	-	25	55	98 (36.2)
2.	Zygomatic arch	-	-	-	-	4	-	4 (1.5)
3.	Palatal split	1	14	1	-	4	12	32 (11.8)
4.	Orbital blowout	2	8	2	-	5	1	18 (6.6)
5.	Dentoalveolar	-	10	-	2	20	28	60 (22.1)
6.	Isolated nasal bone	6	1	-	-	3	-	10 (3.7)
7.	Nasal complex	2	6	-	-	-	2	10 (3.7)
8.	Le Fort I	2	4	-	-	1	-	7 (2.6)
9.	Le Fort II	4	2	-	-	8	4	18 (6.6)
10.	Le Fort III	6	1	-	-	6	1	14(5.2)
	Total	25	56	9	2	76	103	271(100.0)

Table 3: Aetiology by age and sex distribution of middle third facial fracture

No.	Age range In years	Road traffic crashes M	F	Fall from height M	F	Inter personal violence M	F	Sports related injuries M	F	Work place injury M	F	Total n (%)
1.	0 – 9	6	2	2	-	-	-	-	-	-	-	10 (3.3)
2.	10 – 19	28	11	12	7	-	-	-	1	-	-	59 (19.4)
3.	20 – 29	69	41	4	-	13	1	3	-	-	-	131 (43.1)
4.	30 – 39	21	5	6	-	2	6	2	-	3	-	45 (14.8)
5.	40 – 49	20	3	1	-	1	8	-	-	1	-	34 (11.2)
6.	50 – 59	8	4	-	-	-	-	-	-	-	-	12 (3.9)
7.	60 – 69	11	2	-	-	-	-	-	-	-	-	13 (4.3)
Total		163	68	25	7	16	15	5	1	4	-	304 (100.0)

DISCUSSION

The prevalence of 38.9% in this study, is slightly higher than the findings in previous retrospective studies on maxillofacial fractures in Nigeria which have reported 33%[19], 33.8%[20] and 36.4%.[21,22] This is far higher than the 16.8% recorded by Abiose[4] and 21.3% documented by Fasola et al.[5] on isolated middle third facial fractures in Ibadan, Nigeria.

The prevalence of 38.9% in this study is by far lower than the reports of some authors who documented the prevalence of middle third facial fractures as 60%[23], 61.4%[24] and 71.5%.[25] The low prevalence in our study when compared with these authors[23,24,25], may not be unrelated to compliance with the wearing of crash helmet and seat belt among traffic crash victims which was a common feature in the study.

There is an increasing recognition that drivers in vehicles and pillion passengers on motorcycles had the highest risk of middle third facial fractures.[17,26,27] Decline of these fractures have been recorded by some researchers[28,29-31] where restraint devices such as seat belt and crash helmet were properly worn.

Saheeb and Etetafia[27] had 72.8% male and 27.2% females. This was similar to our findings where 70.4% were males and 29.6% females. This study had a mean of 23.2±3.4 which was lower than the 40 years recorded by Saheeb and Etetafia.[27] Their age ranged 1-80 years and our 5 to 69 years. It may be attributed to the fact that elderly people in this part of the country do not get much involve in activities that will warrant them to take commercial transport. They can easily trek to their farms. Of note was the age bracket 20-29 years (Table 3) which was the most affected. This was also observed by Udeabor et al.[32] They advanced as reason the fact that it is the age involved in high activity and job seeking and we cannot agree less as the same factors are applicable in the Northern Nigeria

About 32.9% of the victims arrive the hospital in commercial vehicles followed by the Federal Road Safety (FRSCN) vehicles (Table 1). This was contrary to finding by Fomete et al.[33] who found 62.5% of the victims being transported by police and FRSCN. This could be so because the victims in their study were from insurgency.

The role of road traffic crashes in middle third facial fractures are well recognized[9,26,31,34] and the finding in this study is in agreement with the literature.[12,26,31,34-37] Transportation by road was a major risk factor in this study (Figure 1) where road traffic crashes occurred in 231 (76%) of the patients accounting for 271 (70.2%) of middle third facial fractures (P-value = 0.002).

This study had more cases from motorcycles (130) followed by mini buses (35) which contrast report from Saheeb and Etetafia[27], where most common vehicle was mini bus, 34.3% followed by motorcycle 26.5%. But agrees with Udeabor et al.[32] where motorbike (45.5%) dominated. The possible explanation is that in this part of the country many use motorcycle as mean of transportation.

In this study, pillion passengers on motorcycles (Pearson R correlation = 0.722) and front seat occupants (Pearson R correlation = 0.682) had a stronger association with middle third facial fractures in vehicles. Therefore, such a position constituted a risk factor. According to Masahito[38], drivers constituted the risk.

More pillion passengers had middle third facial fractures than motorcycle riders which agreed with the findings in Benin[27,38] but contrast with that of Oginni et al.[15] where motorcycles riders had more middle third facial fractures. In this study, multiple pillion passengers were common for cost saving measures. Loss of balance and control was a major mechanism of injury, where the weight of passengers may have exceeded the engine capacity of the motorcycle. Secondly, most pillion passengers were taken by the element of surprise and were almost always thrown out of the motorcycle in a crash. The objects they impacted against in "off the road" collision brought about abrupt deceleration with increased risk of injuries to prominent facial bones.

In vehicular crashes, front seat occupants who also did not wear seat belt had the highest risk of middle third facial fractures. This finding contrast with that of Saheeb and Etetafia[27], where drivers of minibuses had more middle third facial fractures. This also contrast with Masashito[37], who found drivers more vulnerable. Front seat occupants in the study had the highest risk as many were thrown out through the windscreen, front door as the vehicle somersaulted following a burst tyre thus rendering the passengers as missiles during a crash. The commonest fracture they sustained was zygomatic complex fracture (Table 2). This agree with Saheeb and Etetafia[27], but contrast with Masahito[27], who found nasal complex fracture to be commonest.

CONCLUSION

There is a strong association between patients position either in a vehicle or on a motorcycle and the risk of middle third facial fractures. Front site passengers in vehicles and pillion passengers in motorcycle were the most at risk.

Source of Support
Nil.

Conflict of Interest
None declared.

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