# The Pattern of Middle Third Facial Fractures Presenting at a Nigerian Tertiary Health Care Facility

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**ABSTRACT**

**Objective:** The patterns of fractures of the individual bones that constitute the middle third of the facial skeleton are varied. The peculiarities of fractures in some anatomic sites are influenced by the prevailing aetiological risk factors in the study population. The objective of this study, was to address the draw-back and determine the pattern of middle third facial fractures presenting at a Nigerian tertiary healthcare centre.

**Methods:** This was a cross-sectional descriptive study of the pattern of middle third facial fractures, presenting at a Nigerian tertiary healthcare facility. Data was collected prospectively over a 49- month period (October, 2006 to October, 2010).

**Results:** During the forty-nine months of this study, 781 patients with maxillofacial fractures were seen Out of this number, 304 patients had middle third facial fractures which represented a prevalence of 38.9%. In this study, only 25 (8.2%) patients with middle third facial fractures were brought from accident scenes and referring peripheral hospitals in ambulances to the health facility.

**Conclusion:** Middle facial fractures occurred more in male than female and in younger age groups and road traffic crash was the major cause.

**Key words:** Pattern, middle third, facial fracture

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## INTRODUCTION

The middle third of the facial skeleton is made up of eight paired bones which consist of the maxillae, zygomatic bone, zygomatic arches, palatine bones, inferior conchae bones, nasal bones, lacrimal and sphenoid bones while the unpaired bones are the ethmoid and vomer.[1,2] These bones are comparatively fragile and are easily fractured.[3,4] There is an increase in the reported incidence of middle third facial fracture which is related to changing pattern in the causes of facial fractures.[3,4] The true incidence of middle third facial fractures may be difficult to determine because of variation in the study designs.[3,5] Due to the fact that many of the victims either died at the scene of a crash or en route to the hospital, earlier retrospective studies have purportedly showed that, middle third facial fractures from road traffic crashes were

uncommon.[5,6] However, the high frequency of fractures of the zygomatic bones and isolated nasal bones has been attributed to the recent reported increases.[2,3] Furthermore, the availability and utilization of advance diagnostic imaging facilities have also contributed to the early and accurate diagnosis of middle third facial fractures which have increased the incidence in reported studies.[3,7]

Generally, middle third facial fractures are more frequent in males than females with variable ratios of involvement[3] and this is influenced by the prevailing socioeconomic, cultural and environmental factors in the locality[3]. Road traffic crashes[3,4], interpersonal violence[7,8], falls[9] and different sporting activities[3] have accounted for majority of cases seen. Road traffic crash[5,6], is the single most common cause of middle third facial fractures in many developing countries in peace time and assault[7,10] is recognized as a significant cause in many developed countries.

Treatment of middle third facial fracture has improved over the years with the major objectives being the restoration of form, occlusion, function and aesthetics.[2,3] The modalities of treatment ranges from simple elevation[9], close reduction[5], non-rigid fixation supplemented with internal suspension, to complex rigid internal fixation with miniplate osteosynthesis.[2]

The objective of this study, was to address the draw-back and determine the pattern of middle third facial fractures presenting at a Nigerian tertiary health centre. This study will provide more information on the pattern of middle third facial fractures and the factors that may influence it in the environment.

## MATERIALS AND METHODS

The cases for this study were trauma patients seen at the accident and emergency centre and the general out-patient clinics, surgical out-patient clinics and maxillofacial clinic that were suspected with middle third facial fractures. This is a cross-sectional descriptive study of the pattern of middle third facial fractures, presenting at a Nigerian tertiary health facility. Data was collected prospectively over a 49-month period (October, 2006 to October, 2010). The collected data was analyzed and results were shown in tables and charts. The study population was made up of 304 patients who had middle third facial fractures. Data for this study was entered into a computer with Microsoft Excel 2007 and the Statistical Package for Social Sciences (SPSS) version 17.0 was employed in the data analysis.

## RESULTS

During the period of this study, 781 patients with maxillofacial fractures were seen, of which 304 patients had middle third facial fractures which represented a prevalence of 38.9%. The age range of patients in this study was between 5 and 69 years with a mean age of 23.2 ± 3.4 years. The peak age incidence of middle third facial fractures occurred in the third decade with 131 (43.1%) cases, followed by patients in the second decade 59 (19.4%) cases (Fig.1). Majority were males 214 (70.4%) while the remaining 90 (29.6%) were females; a male to female ratio 2:4:1 was recorded (P-value = 0.02). 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 2.

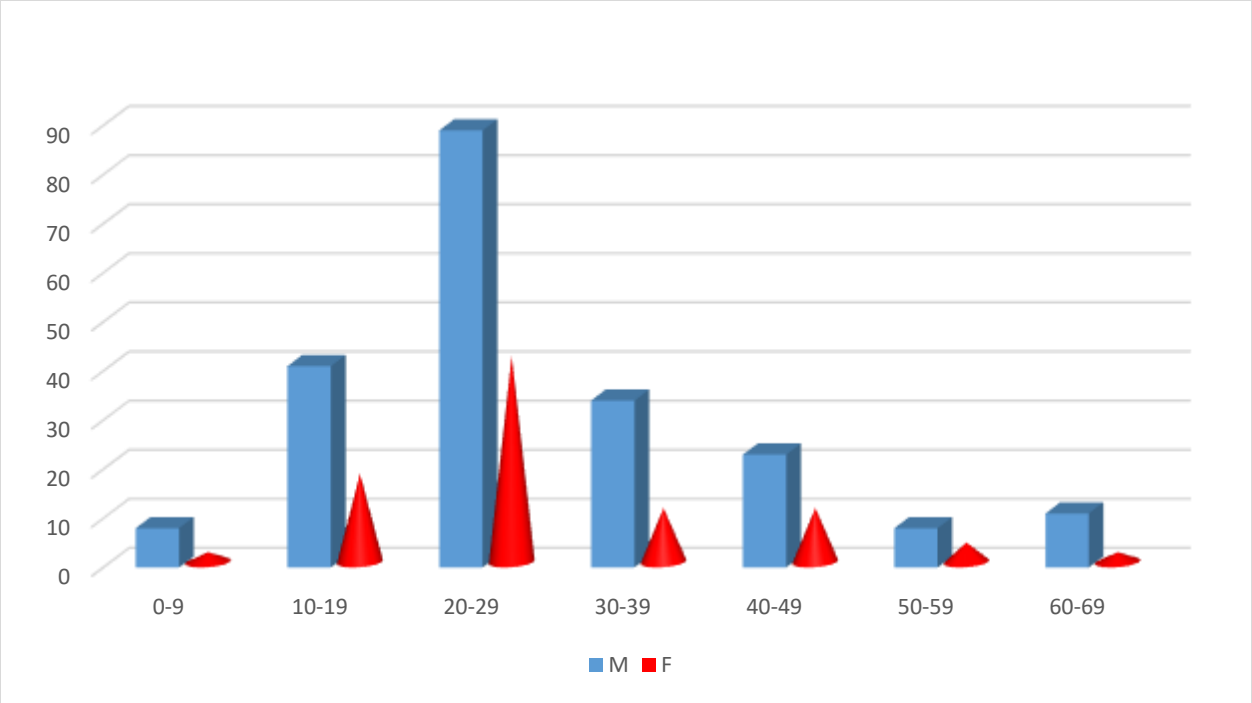


Figure 1: Age and Sex Distribution of Patients with middle third fractures

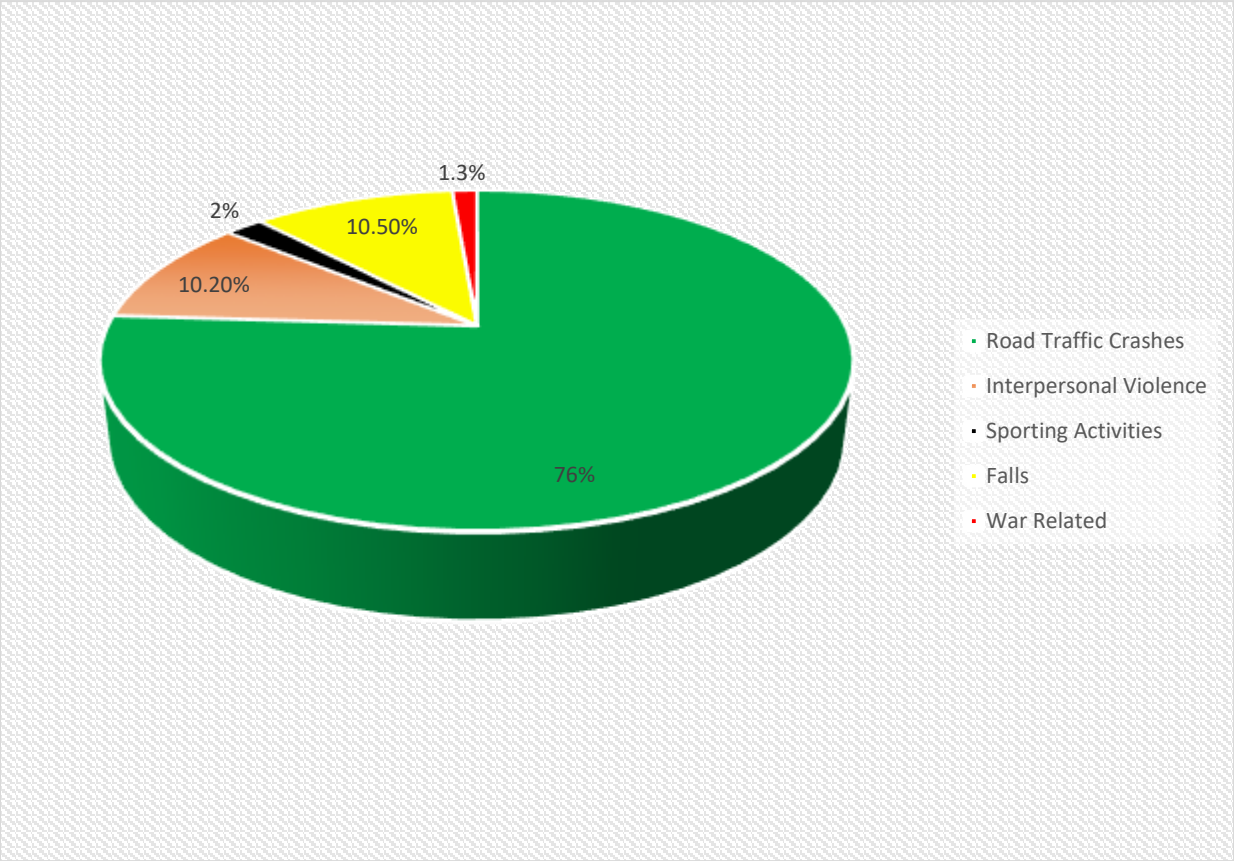


Figure 2: Major causes of middle third facial fractures

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.

Aetiology by age and sex distribution of middle third facial fractures in 304 patients showed that road traffic crashes occurred in all age groups. A statistically significant relationship existed between age, sex and the aetiology of middle third facial fractures in the study (P-Value= 0.02).

Table 1 is a presentation of the pattern of middle third facial fractures seen in the study. Zygomatic complex fractures had the highest frequency of occurrence with 102 (26.4%) fracture sites. This is followed by dentoalveolar fractures with 84 (21.8%) sites. Surgical procedures were performed in 245 (96.1%) of the total number of fracture cases treated while 10 (3.9%) cases were treated conservatively. Open reduction and direct wiring of fractures, through lateral eyebrow and infra orbital skin incisions, was the main method of treatment used in 52 (13.5%) cases of zygomatic complex fractures. Close reduction and stabilization with plaster- of-Paris splint was the only mode of treatment used in the 22 (5.7%) cases of isolated nasal bone and nasal complex fractures. Close reduction, with Erich metal arch bar type ligated to the teeth using soft stainless-steel wires and intermaxillary fixation in 35 (9.1%) cases for the treatment of dentoalveolar fractures. Reduction of fractures, exploration and repair of orbital floor defect with autogenous bone graft was the major treatment modality employed in 8(2.1%) cases of orbital blowout fractures. Le Fort I, II, III and palatal fractures were rarely isolated, they were treated by close reduction. Erich metal arch bar type was ligated to the teeth with soft stainless steel wire and fractures were stabilized by internal fronto-mandibular suspension in 42 (10.9%) cases and internal circum-zygomatic suspension in 35 (9.1%) cases with intermaxillary fixation.

During the period, 22 (5.7%) patients died in the course of hospitalization, before definitive treatment was carried out. Their deaths were attributed to the following reasons: cranio-cerebral injuries occurring in 15 (3.9%) cases, uncontrolled diabetes mellitus in three (0.8%) cases, hypovolaemic shock in three (0,8%) cases and tetanus in one (0.2%) case.

In the follow-review of 226 patients that were treated, 178 (78.7%) of the patients were seen two weeks post operatively while 64 (28.3%) patients reviewed one month post operatively. At the end of three months follow-up-review, only 17 (7.5%) patients were reviewed. During the review appointments, 38 complications were noted in the patients that were treated with post treatment infections being the most common complication record in 12(31.6%) cases (Table 3)

Table 1: Pattern of middle third facial fractures

| No | Anatomic sites | n (%) |
|---|---|---|
| 1. | Zygomatic complex | 102 (26.4) |
| 2. | Zygomatic arch | 24 (6.2) |
| 3. | Palatal split | 32 (8.3) |
| 4. | Orbital blowout | 24 (6.2) |
| 5. | Dentoalveolar | 84 (21.8) |
| 6. | Isolated nasal bone | 25 (6.5) |
| 7. | Nasal complex | 22 (5.7) |
| 8. | Le Fort I | 32 (8.3) |
| 9. | Le Fort II | 20 (5.2) |
| 10. | Le Fort III | 21 (5.4) |
| | Total | 386(100.0) |

Table 2: Treatment of middle third facial fractures

| No | Treatment modality | n (%) |
|---|---|---|
| 1. | Zygomatic complex and arch fractures | **126** |
| | * Conservative | 10 (2.6) |
| | * Close reduction with Gilles temporal lift | 10 (2.6) |
| | * Coronoidectomy | 6 (1.5) |
| | * Open reduction with transosseous wire fixation | 52 (13.5) |
| | *No treatment | 48 (12.4) |
| 2. | Isolated nasal bone and nasal complex fractures | **47** |
| | * Close reduction + plaster-of-Paris splint | 22 (5.7) |
| | * No treatment | 25 (6.4) |
| 3. | Dentoalveolar fractures | **84** |
| | * Splint with arch + 0.35mm wire | 35 (9.1) |
| | * Splint with arch bar + Intermaxillary fixation | 28 (7.2) |
| | * No treatment | 21 (5.4) |
| 4. | Orbital blowout fractures | **24** |
| | * Exploration, reduction + autogenous bone graft | 8 (2.1) |
| | * Exploration, reduction + medipore graft | 1 (0.3) |
| | * No treatment | 15 (3.9) |
| 5. | Le Fort and palatal fractures | **105** |
| | * Close reduction + arch bar + fronto-mandibular suspension | 42 (10.9) |
| | * Close reduction + arch bar + circum-zygomatic Suspension | 35(9.1) |
| | * Open reduction + arch bar + fronto-maxillary Suspension (Asthmatic) | 1(0.3) |
| | * Open reduction + Le Fort I osteotomy + Circum –zygomatic suspension | 1(0.3) |
| | * Open reduction + Le fort II osteotomy + arch bar + fronto-mandibular suspension | 4 (1.0) |
| | * No treatment | 22(5.7) |
| Total | | 386 (100.0) |

Table 3: Complications noted in the cases that were treated

| No | Types | Frequency n (%) |
|---|---|---|
| 1. | Malocclusion | 6 (15.8) |
| 2. | Neurological | |
| | * Optic nerve neuropathy | 2 (5.3) |
| | * Facial nerve palsy | 3 (7.9) |
| | * Post traumatic distress syndrome | 1 (2.6) |
| | * Post trauma epilepsy | 1 (2.6) |
| 3. | Ophthalmic | |
| | * Blind eye | 1 (2.6) |
| | * Monocular diplopia | 1 (2.6) |
| 4. | Aesthetic | |
| | * Enophthalmos | 2 (5.3) |
| | * Traumatic telecanthus | 2 (5.3) |
| | * Dish face deformity | 1 (2.6) |
| | * Hypertrophic scar | 6 (15.8) |
| 5. | Infections | 12(31.6) |
| | Total | 38(100.0) |

## DISCUSSION

The prevalence of 38.9% in this study, was slightly higher than the findings in previous studies in Nigeria which reported 33.8%[11] and 36.4% [12,13]. This was however far lower than other reports 60%[14], 61.4%[15], and 71.5%[16]. The high prevalence of middle third

fractures in this study, may be attributed to increased road traffic crashes.
It has been recognized earlier that deaths from traffic crashes in Nigeria are often associated with poor pre-hospital care at the scene of a crash, during rescue effort and en-route to the hospital[17,18]. It may be possible that in this study, many patients who had middle third facial fractures that would have been include in the study may not have survived the journey from the accident scenes and referring peripheral hospitals. This may have apparently reduced the true prevalence of middle third facial fractures in this study.

In this study youths in the third decade (20-29 years) were affected more than any other age groups which is in agreement with the literature.[19,20] A probable explanation offered for the dominance of this age group in this study is that, the age group (20-29 years) coincides with the period many youths in northern Nigeria are either in secondary schools or in tertiary institutions. Due to inexperience, youths have a tendency to underestimate risk and may overestimate their own abilities to overcome challenges.

A male to female ratio of 2.4:1 in this study was higher than the 2.2:1 that was reported in Maiduguri[13]. But lower than 3.16:1 by Septa et al.[20]; 7.6:1 by Fasola et al.[5] In this study, more females had middle third facial fractures when compared with previous studies.[11,17] The findings in this study may be attributed to a changing workforce in northern Nigeria, where, more women are involved in several outdoor socio-economic activities to earn more money for the family.

Road traffic accident was the most common cause of middle third facial fracture with 76% followed by far by fall and interpersonal violence with 10.5 and 10.2% respectively. This was lower than the 91.1% by Udeabor et al.[19] but higher than the 48.1% by Haider et al.[21] Fall in this study was the second cause of midface fracture with 10.5% which was lower than the 21.2% recorded by Haider et al.[21] who also found fall to be the second cause of midfacial fracture.
We observed that zygomatic complex fracture had the highest frequency of occurrence with 26.4% followed by dentoalveolar fracture with 21.6%. This was in agreement with Udeabor et al[19], Septa et al[20] and Haider et al[21] who had 46%,62.5% and 65.4% respectively. While dentoalveolar fracture was the second most common in this study, Septa et al.[20] found Lefort II with 23% to be second most common. Simple and cheap methods of treatment were used in this study (Table 3) with satisfactory results. Udeabor et al[19] used conservative treatment and closed reduction with intermaxillary fixation. In this study, 3.9% were treated conservatively while 96% had various forms of surgical treatment depending on the type of fracture ranging from close reduction with intermaxillary fixation, close reduction with stabilization using plaster of Paris and open reduction with direct wiring (15.1%) (Table2). Udeabor et al[19] carried out open reduction and internal fixation with trans-osseous wiring in 5.4% which was lower than the finding in this study. Open reduction and rigid internal fixation has become the "gold standard of care".[22] The outcome of these treatment methods produced satisfactory results that are consistent with previous Nigerian studies[5,17].
It is nearly impossible in Nigeria to continue prolonged post treatment follow-up on trauma patients[23] due to ignorance, socioeconomic reasons and logistics on the part of patients[23]. Therefore, the incidence and pattern of late complication of trauma patients may be difficult to be fully investigated[23,24].
In this study, many of the patients were lost to follow-up review soon after discharge or following the release of mandibulo-maxillary fixation and suspension wires. Only 7.5% were reviewed at the end of 3 months post surgery. In this study, post treatment wound infection was the most common complication noted in 12 (31.6%) cases followed by malocclusion and hypertrophic scar with 15.8% each (Table 3)

## CONCLUSION

During the analysis of 781 consecutive patients with maxillofacial fractures over a 49 month period with a 38.9% prevalence of middle third facial fractures was recorded. Youths in the third decade were frequently affected with male more than female. Road traffic crashes, fall from heights and interpersonal violence were the major aetiological factors of middle third facial fractures in our environment.

**Source of Support**
Nil.

**Conflict of Interest**
None declared

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