

# Pattern of Midface Trauma with Associated Concomitant Injuries in a Nigerian Referral Centre

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## ABSTRACT

**Aim:** The aim of this study was to determine the pattern of midface trauma with associated concomitant injuries seen in our environment. **Methodology:** This was a prospective analysis of trauma patients with midfacial injuries presenting at a referral center in South West Nigeria. In addition to socio-demographic data, the following information was also obtained: Mechanism of injuries, type of midfacial injuries, concomitant/associated injuries and treatment. **Results:** A total of 101 patients with midfacial injuries were involved. They were made up of 85 males and 16 females. The 20-29 year age group was mostly affected (44.6%) and the most common cause of midface injuries was road traffic accident (91.1%). The zygoma was fractured more than any other midfacial bone (46.0%). A total of 144 associated injuries were recorded among these patients, head and ocular injuries accounted for 49 (34%) and 35 (24.3%) respectively. The patients were mostly treated conservatively or by closed reduction. **Conclusion:** The rate of head and ocular injuries among patients with midfacial injury was high. Knowledge of these associated injuries provides useful strategies for patient care and prevention of further complications. A multidisciplinary approach is important for optimum management of these patients.

**KEYWORDS:** Concomitant injuries, midface trauma, multidisciplinary care

## INTRODUCTION

The midface comprises the medial portion of the face including the upper maxillary region and the zygomatico-orbito-maxillary complex.<sup>[1]</sup> Facial bones, especially of the middle-third of the face, readily fracture more than bones in other parts of the body because they are composed of a network of fragile bones held together across sutures, which easily give way to minimal trauma.<sup>[2]</sup>

Maxillofacial injuries in general can occur in isolation, but most of the time when these injuries are as a result of high energy traumatic forces, patients often have other concomitant injuries. These injuries can be very severe and life-threatening often requiring multidisciplinary management.<sup>[3]</sup> An attempt is made in this present study to determine the pattern of injuries associated with trauma to the midface in an effort to emphasize

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the multidisciplinary nature of the care needed by many of these patients.

## METHODOLOGY

This was a prospective descriptive analysis of patients with midfacial injuries seen at our center over a period of 1 year. The study was approved by the Health Research Ethics Committee. We defined the midface as the area that lies between the lateral canthus of the eye superiorly and the angle of the mouth inferiorly, which on the facial skeleton extends downwards from the frontal bone to the level of the upper teeth or, if the patient is edentulous, the upper alveolus. Midfacial injuries were categorized into soft and hard tissue injuries after clinical and radiographic examinations. For each of the 101 patients seen, the following data were collected: Age, gender, mechanism of trauma, type of midfacial injuries and concomitant/associated injuries. Concomitant injuries were categorized into fractures other than those of the midface, head/neurological, orbital, thoracic and abdominal injuries.

## RESULTS

Out of the 150 patients that presented to our center with maxillofacial injuries during the period of this study, 101 had midfacial injuries. Eighty five (84.2%) were males and 16 (15.8%) were females. The 20-29 year age group were mostly affected (44.6%), followed by the 30-39 years group (19.8%) [Figure 1] and the most common cause of midface injuries was road traffic accident (RTA) (92 patients, 91.1%) [Figure 2].

Abrasion was the most common midfacial soft-tissue injury seen; accounting for 81 (40.1%) out of a total of 202 soft tissue injuries [Table 1], whereas zygomatic complex fracture was the most common hard tissue injury, accounting for 46 (46.0%) fractures among the 100 fractures of the middle-third facial region recorded [Table 2].

A total of 144 concomitant injuries were recorded among the patients. Out of these, head injury was highest (49; 34%) followed by ocular injuries (35; 24.3%) [Table 3].

The main stay of treatment for midfacial fractures from the above study was conservative management and closed reduction with maxillomandibular fixation.

## DISCUSSION

The zygomatico-maxillary complex, due to its prominent position in the face bears the impact of trauma in majority of the cases and has been shown to have the highest incidence of fractures in the maxillofacial region.<sup>[2]</sup> Trauma in general terms is regarded as the disease of men and the youth. This assertion is further corroborated by the present study in which most of the patients here were men within the 20-29 year age bracket. The main reason among others is the fact that motorbikes are mostly ridden by young men for commercial purpose in our environment and motorbike-related accidents accounted for 45.5% of all the

midface injuries in this series. This pattern is in keeping with similar studies both in the developed and the developing world.<sup>[4-10]</sup>

The 20-29 years age group from this study was more involved with middle-third facial injuries than any other age group. This is also in keeping with reports from other studies from around the world.<sup>[6,7,11-15]</sup> The reason is not far-fetched as this age group shows high activity in assaults, sports, industry and high speed transportation.<sup>[5,6]</sup>

Midfacial injuries from the present study were mainly caused by various forms of RTAs. This accounted for the injuries in 92 (91.1%) out of the 101 patients seen. The remaining 8.9% was accounted for by other causes such as assaults, falls, sports injuries and industrial accidents. Although this is in consonance with previous Nigerian studies and indeed studies from other developing countries,<sup>[6-8,16,17]</sup> it contrasts reports from the developed countries where assaults and interpersonal violence has replaced RTA as the major cause of maxillofacial injuries<sup>[17,18-20]</sup> The reason for this is attributable to the poor state of most Nigerian roads, traffic rules are disobeyed and road signs are non-existent. They are often neglected where they exist and most drivers/riders are not properly licensed.<sup>[7,8,17]</sup>

The prominence of the zygomatic complex as well as its multiple articulations with other bones of the facial skeleton renders it exceptionally vulnerable to fracture when injuries affect the maxillofacial region. This was our finding from the present study in which zygomatic complex fracture accounted for 46% of all the midface fractures, making it the commonest occurring midface fracture as in some other earlier reports.<sup>[6,21,22]</sup>

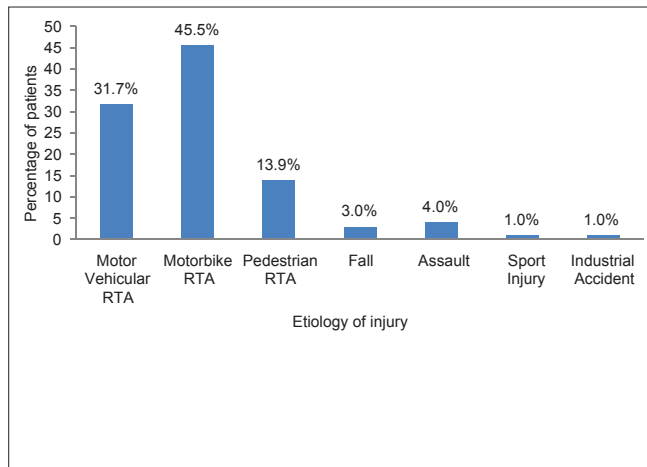


Figure 1: Age incidence of patients presenting with midface injuries

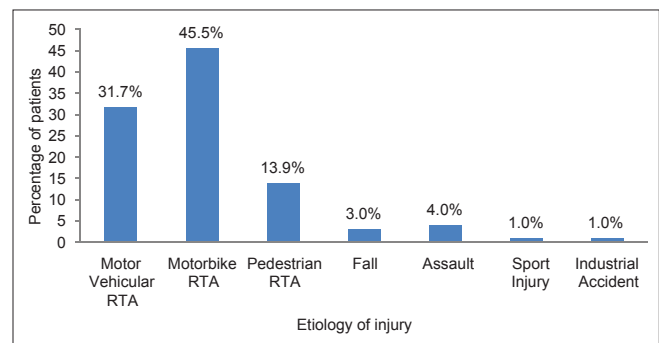


Figure 2: Mechanism of injury/etiology

Table 1: Midfacial soft tissue injuries

Maxillofacial site	Type of soft tissue injuries in midface					Total (%)
	Contusion (%)	Abrasion (%)	Laceration (%)	Avulsion (%)	Penetrating (%)	
Infraorbital	6 (3.0)	1 (0.5)	4 (2.0)	1 (0.5)	1 (0.5)	13 (6.4)
Lateral orbital	-	2 (1.0)	3 (1.5)	1 (0.5)	-	6 (3.0)
Zygoma	35 (17.3)	42 (20.8)	8 (4.0)	2 (1.0)	-	87 (43.1)
Cheek	11 (5.4)	20 (10.0)	8 (4.0)	3 (1.5)	-	42 (20.8)
Upper lip	16 (7.9)	7 (3.5)	18 (8.9)	1 (0.5)	-	42 (20.8)
Nose	-	9 (4.5)	3 (1.5)	-	-	12 (5.9)
Total	68 (33.7)	81 (40.1)	44 (21.8)	8 (4.0)	1 (0.5)	202 (100.0)

**Table 2: Midfacial hard tissue injuries**

Hard tissue involved	Type of fracture	Frequency	Percentage
Maxillary	Le Forte I	7	7.0
	Le Forte II	18	18.0
	Le Forte III	3	3.0
Zygomatic complex	Undisplaced	12	12.0
	Displaced	20	20.0
	Orbital	6	6.0
	Comminuted	6	6.0
	Zygomatic arch	2	2.0
Nasal bone	-	9	9.0
Nasoethmoidal complex	-	9	9.0
Orbital	Blow out	1	1.0
	Blow in	1	1.0
Dentoalveolar	-	6	6.0
Total		100	100

**Table 3: Concomitant injuries**

Location of injury	Type of injury	Frequency	Percentage
Orbital	Ocular injuries	35	24.3
Neurological	Head injury	49	34.0
	C-spine injury	5	3.5
Skull	Fractures	14	9.7
Orthopaedic	Tibiofibular fracture	7	4.8
	Femoral fractures	3	2.1
	Radicular fractures	6	4.2
	Humeral fractures	1	0.7
	Clavicular fractures	1	0.7
Mandibular	Mandibular fractures	17	11.8
Thorax	Rib fracture/ heamothorax	3	2.1
Abdomen	Blunt injuries	3	2.1
Total		144	100

Moreover, it has also been documented by Lee *et al.*<sup>[23]</sup> in a study on patterns of facial laceration from blunt injury that as the zygoma would fracture more readily than the frontal bone, the soft-tissue overlying the zygoma would therefore suffer a smaller magnitude of force resulting in contusions rather than open wounds. This could possibly explain the results obtained from the present study in which the soft-tissue overlying the zygoma was more affected by contusions and abrasions instead of lacerations [Table 1]. Upper lip on the other hand was the most common site for open wounds or lacerations as has been previously documented.<sup>[24,25]</sup> This is due to the fact that the upper incisors act as sharp objects

in cases of injuries to the face, sometimes giving a through and through laceration of the upper lip.

Maxillofacial injuries in general may occur in isolation or can be associated with other injuries<sup>[25]</sup> and the same is the case for midfacial injuries. Fasola *et al.*<sup>[6]</sup> reported 79.6% of associated injuries in their study population and the authors argued that such a high figure was expected because of RTA being the major etiological factor. Though there is ambiguity about the definition of injuries associated with maxillofacial fractures, the rate of injuries associated with maxillofacial trauma is thought to be quite high,<sup>[8,26,27]</sup> the present study also recorded a rate as high as 83.2% of associated injuries. These associated injuries are reportedly more common when maxillofacial fractures occur from road crashes and high velocity gunshot injuries resulting in multiple organs and systems involvement.<sup>[6,8]</sup> In fact, Haug *et al.*<sup>[26]</sup> was able to show from their series that motorcycle accidents were associated with the most severe head injury. However, this present study concentrated on concomitant injuries associated with midface injuries.

Neurological injuries were the commonest occurring concomitant injuries in this study accounting for 47.2% followed by ocular injuries with 24.3%, [Table 3]. The proximity of the midface to the eyes and the content of the cranium could as well have accounted for this. Hogg *et al.*<sup>[28]</sup> also reported head injuries to have accounted for 87% of the associated injuries in their study in Ontario, Canada, whereas Obuekwe and Etetafia<sup>[27]</sup> reported 55.8% of head injuries in Benin City, Nigeria. This wide range is probably due to different selection criteria and methods of detecting brain injury. Recognizing concomitant injuries in patients with facial fracture is important for rapid assessment and further management of these patients.

These results support the use of head computed tomography scan and cervical spine radiographs in most general trauma work-ups, but specifically validates their use in patients with suspected facial fracture.<sup>[3]</sup>

Despite the obvious advantages of open reduction and rigid internal fixation of facial fractures, it has not become popular in most developing countries (including Nigeria) mainly because of the cost.<sup>[8]</sup> Only four patients representing 5.6% had open reduction and internal fixation with trans-osseous wires while the rest had closed reductions [Table 4]. Nevertheless, previous Nigerian reports have attested to the satisfactory results obtained using simple methods of closed reduction and mandibulo-maxillary fixation.<sup>[4,6]</sup>

## CONCLUSION

Our study found that cerebral and orbital injuries are often associated with midfacial fractures. Knowledge of injuries associated with maxillofacial fractures and coordination of trauma teams, is vital for the early stabilization and treatment of these patients. Irrespective of the severity of injury, patients who sustained maxillofacial injury were more likely to be discharged earlier than those with concomitant injuries. The presence of

**Table 4: Treatment modalities for midfacial injuries**

Type of injury and treatment	Frequency	Percentage
Soft tissue		
Debridement and dressing	40	51.9
Suturing	37	48.1
Total	77	100
Hard tissue		
Conservative treatment (non-surgical)	34	47.9
Gilles lift for zygomatic complex fracture	10	14.1
Circumzygomatic suspension with maxillomandibular fixation for Le forte fractures	8	11.3
Frontomandibular suspension with maxillomandibular fixation for Le forte fractures	6	8.5
Closed reduction of nasal complex fracture	1	1.4
Open reduction and internal fixation	4	5.6
Others		
Fixation of dentoalveolar fracture	6	8.5
Extraction of subluxed and fractured teeth	2	2.8
Total	71	100

moderate to severe head injury, chest injury and orthopedic injury significantly prolong hospital stay. The usage of protective elements by road users especially motorcycle riders and their passengers should be enforced to reduce the rate of head injury and indeed other associated injuries among trauma patients in general.

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