

A profile of facial bone fractures in an Oral and Maxillofacial Unit in Trinidad and Tobago

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ABSTRACT

Objective: Investigate the patterns of facial fractures presenting to an oral and maxillofacial service at a teaching hospital in Trinidad.

Methods: A retrospective study was conducted to obtain information on traumatic maxillofacial and mandibular fractures from the Oral and Maxillofacial Unit at the Eric Williams Medical Complex, Trinidad. Data was collected from February 2019 to February 2020 from 174 patients. For each patient the month of presenting injury, age, sex, ethnicity, mechanism of injury and fracture type was recorded.

Results: In the (174) patients that reported fractures, 72% were male and 28% were female patients with a mean age of 34.9 years and mainly from the ethnicity of Afro-Caribbean (63.2%) followed by East Indian (30.5%). Two hundred and thirty-one (231) fractures were reported in this study with the highest number of fractures occurring in the 20-29 years age group (22%) and the most common fracture type was orbital floor fractures (31.6%). The predominant cause of traumatic fracture was physical assault (37.9%) followed by accidental injury (25.9%).

Conclusion: The main cause of traumatic maxillofacial injury was physical assault and generally in young adult males. Orbital floor fractures comprised the most common fracture type in this study.

INTRODUCTION

Maxillofacial injuries such as oral and facial bone fractures are a common presentation in priority care facilities, whether isolated or with associated injuries in a patient. Emergency medical treatment facilities in São Paulo, Brazil found that facial bone fractures accounted for 7.4–8.7% of their cases.¹ Patients presenting with maxillofacial trauma may also present with neurological injuries requiring intervention in 8.1% of cases, based on a retrospective analysis of cases in Amsterdam.² Another study in the United Kingdom noted that 2.2% of patients with maxillofacial injuries also had cervical spine injuries such as cord contusion and disc herniation.³ The lack of treatment of oral and facial bone fractures can have a significant impact on the individual's daily life or longer term disability.⁴

Oral and facial bone fractures vary among populations with respect to the incidence, location of the injury, mechanism of injury, socioeconomic status, culture, and lifestyle. Other factors, such as laws/legislation involving seat belt use, helmets, speed limits and legal blood alcohol levels, also impact the incidence of such injuries.⁵ Several studies have evaluated the epidemiology of facial trauma.^{1,5,9-23}

Modes of transport can impact the patterns of fractures in patients, with motor vehicle accidents remaining the most common cause of maxillofacial trauma worldwide⁵. Nevertheless, there is a progressively decreasing trend, particularly in North America, Brazil and Europe and this was mostly due to increased road awareness and the frequent use of seatbelts.⁵ This study aims to determine the aetiology and patterns of facial trauma in Trinidad.

METHODS

Study design and setting

A one-year retrospective chart review was conducted. The study was carried out at the Eric Williams Medical Sciences Complex, North Central Regional Health Authority (NCRHA) in Trinidad from February 2019 to February 2020. The estimated catchment population of the NCRHA is 351,137(CSO 2011).

Inclusion and exclusion criteria

Participants were included if they were:

- adult and paediatric patients
- suffering from facial trauma
- referred to or treated at the Eric Williams Medical Sciences Complex

Patients were excluded if:

- They were diagnosed with any of the following fractures: pathologic fractures, a congenital facial disorder resulting in fracture, nasal/nasoethmoidal and other skull fractures (treated by E.N.T. and Neurosurgery respectively).
- They were not referred to or treated at the Eric Williams Medical Sciences Complex

Ethical approval was obtained from the University of the West Indies campus research ethics committee and the North Central Regional Health Authority Research and Ethics committee.

Outcome measures

Aetiology was grouped as follows: Physical assault which includes any physical altercation or interpersonal violence, motor vehicle accident (MVA) involving automobiles and motorcycles (including drivers and passengers), gunshot injury, occupational / industrial, accidents which includes falls and slips due to playing or systemic causes, sports and road traffic accidents (RTA) included pedestrians being hit by cars.

Data collection

The patient's medical records and clinical logbooks of attending dentists within the OMFS clinic were reviewed to confirm patient demographics and diagnosis. Radiographs and computed tomography (CT) scan images were also reviewed by two oral surgeons. No patient identifiable data was recorded. Variables collected included the month of presentation and demographic characteristics of patients (age at the time of injury, sex, ethnicity). The mechanism of injury, type and anatomical location of facial bone fracture was recorded onto a spreadsheet.

Data analysis

The prevalence of injury within various age groups also the aetiology, anatomical site of fracture was analysed. Data analysis was carried out using the Statistical Package for Social Sciences (SPSS) (version 22.0, IBM, Chicago, USA).

RESULTS

Demographics

A total of 174 presentations were identified. Regarding gender stratification, there were 126 males (72.4%) and 48 females (27.6%) in the patient groups. The patient cohort was stratified based on ethnicity as follows: Afro-

Caribbean (63.2%), followed by East Indians (30.5%), mixed (5.2%), Asian descent (0.6%) and Caucasians (0.6%) (Table 1).

Patient ages ranged from 2 – 98 years, with the mean patient age being 34.9 years, 34.8 for females and 34.9 for males. There were 21.8% of facial bone fractures in patients aged 20 – 29, 19% in patients aged 40 – 49 years (19%). The smallest age group was 90 – 99 years (0.6%). The monthly distribution of cases per year in terms of the highest number of cases was in March (12.6%), followed by November (11.5%).

Table 1: Description of patient demographics

Patient Characteristics		Percent N (%)
Sex	Male	126 (72)
	Female	48 (28)
Ethnicity	Afro-Caribbean	110 (63)
	East Indian	53 (30)
	Mixed	9 (5)
	Asian	1 (1)
	Caucasian	1 (1)
Age	<10	18 (10.3)
	10-19	21 (12.1)
	20-29	38 (21.8)
	30-39	26 (14.9)
	40-49	33 (19)
	50-59	17 (9.8)
	60-69	12 (6.9)
	70-79	5 (2.9)
	80-89	3 (1.7)
	90-99	1 (0.6)

Presentations of maxillofacial fractures

The 174 patients accounted for 231 maxillofacial fractures. Of these there were 145 fractures of the maxilla, 61 fractures of the mandible and 25 dentoalveolar fractures. The most observed fractures were fractures of the orbit, accounting for 45% of the total number of cases. Mandibular fractures accounted for 24% of cases, followed by zygomatic complex and arch (12.5%), dentoalveolar (teeth-bearing regions) (10.8%), Le Fort II (2.2%), Le Fort I (2.7%) and Le Fort III (0.4%) fractures (Table 2). As for the mandibular fractures, 11% were classed as bilateral fractures, and the most common site was the angle (24.6%), followed by the body (21.3%), parasymphysis (16.4%), ramus (14.8%), symphysis (8.2%), condyle (8.2%) and coronoid (6.6%) as shown in Table 2.

Table 2: Presentation of maxillofacial fractures

Fracture site	Frequency N (%)
Maxilla (n=145)	
Orbital	104 (45)
Zygomatic complex	13 (5.6)
Zygomatic arch (isolated)	16 (6.9)
Le Fort I	6 (2.7)
Le Fort II	5 (2.2)
Le Fort III	1 (0.4)
Mandible (n=61)	
Angle	15 (24.6)
Body	13 (21.3)
Parasymphysis	10 (16.4)
Ramus	9 (14.8)
Condyle	5 (8.2)
Symphysis	5 (8.2)
Coronoid	4 (6.6)
Dentoalveolar (n=25)	

Mechanisms of injury

The most common aetiology of facial bone fractures was physical assault/interpersonal violence accounting for 37.9% of cases (Table 3). Accidental (falls/slips) accounted for 25.9% of facial trauma cases, and MVA accounted for 16.1% of cases (Table 3). Other aetiologies reported were RTA (pedestrian hit by a car) (6.9%), gunshots (6.9%), sports-related (3.4%), occupational (1.7%) and suicide attempt (1.1%).

Table 3: Aetiology of the maxillofacial injuries

Mechanism of injury	Number of patients (%)
Physical assault	66 (37.9)
Accidental	45 (25.9)
Motor vehicle accident	28 (16.1)
Road traffic accident	12 (6.9)
Gunshot injury	12 (6.9)
Sports	6 (3.4)
Occupational	3 (1.7)
Suicide attempt	2 (1.1)

DISCUSSION

The determination of trends within maxillofacial trauma can contribute to our understanding of which persons are being injured and any associated behaviours that may be attributed to said causation of the injury.⁸ Multiple studies have shown higher frequencies of males to females involved in maxillofacial trauma which is consistent with

our findings of more males presenting with facial fractures.^{1, 5, 9-23} Numerous studies have also shown that men are more likely to be involved in social activities that may lead to physical assault, sport, work related or MVA.²⁴⁻²⁸

Patients between 20-49 years old accounted for more than half of our age group which is also a common finding in other similar studies.^{1, 8, 9, 13-15, 20, 21, 23, 29} The mean age of 34.9 years in our study, whereby facial bone fractures were most recorded, was similar to European¹⁰ and U.S. populations.¹³

Our three main aetiologies (physical assaults, accidental injuries and MVAs) were also consistent with studies worldwide.^{1, 4, 5, 8-18, 20, 22, 23, 28, 29} Physical assaults were reported to be the leading cause of facial bone fractures in studies from Europe (38.5%)¹⁰, Brazil (27.9%)¹ and (81.8%)²², California (44.3%)¹³ and Australia (29.9%)¹⁶ which is similar to our cases of 37.9%. In a European population, it was observed that assaults were the most frequent cause behind injuries of men approximately 80% and provided further evidence for the link between men and assaults leading to oral and facial fractures.¹⁰

Motor vehicle accidents were the main cause in many studies^{5, 8, 9, 15, 17, 18, 21, 23, 29} with values as high as 70%^{21, 23}, 75%⁸ and 83.1%¹⁵ but in our study, this was lower at 16.1%. A systematic review in 2014 found that MVAs remains the leading cause of maxillofacial trauma worldwide⁵. However, reported vehicular accidents in Trinidad and Tobago whereby persons have been injured has declined from 2010-2016⁶ which could explain why our findings are not consistent with other global trends.

Fractures of the orbit were found to be the most frequently fractured facial bone in studies from Malaysia (51.2%)¹⁵, Australia (36.6%)¹⁶ and Austria (27%)²⁰ similar to our study (45%). This contrasts with other studies where the mandible was the most frequently fractured facial bone.^{1, 8-13, 17, 18, 21, 23} Fractures of the zygomaticomaxillary complex, including the zygomatic arch, account for 12.5% of facial fractures in our population in contrast with a study in Northern Brazil where fractures of the zygomaticomaxillary complex was the most frequent finding of facial fractures.²⁹ The zygoma was still observed to be one of the more common fractures of the facial bones in studies from Europe (24%)¹⁰, Nigeria (18.5%)¹⁸, Austria (23.8%)²⁰ and India (17.4%)²¹. Studies have shown the condyle as the most fractured site in the mandible^{8, 10-12, 16, 17} in contrast to our mandibular fracture data. Rashid et al. 2013¹⁴, in a 5-year study on mandibular fractures, showed angle

fractures as the most common site similar to our findings with a strong association between physical assault and angle fractures being suggested.

Facial bone fractures due to assault/interpersonal violence outnumbered those due to motor vehicle accidents which could be associated with a decline in vehicular accidents because of reinforcement of Road Traffic laws in Trinidad.³¹ There has been steady increase from 1975 to 2020 in wounding and shootings in Trinidad and Tobago based on serious crime reports to the police⁷ and this is keeping with our findings that most fractures occurred due to physical assault. Expanding this study to include additional hospital sites within Trinidad and Tobago would give more insights on the prevalence of facial bones fractures.

CONCLUSION

This study has revealed that the leading cause of maxillofacial injury in our patients is physical assault. Young males aged 20-29 were most likely to sustain facial bone fractures. Fractures of the orbit were the most common fracture seen in this study. The findings of this study show that the trends of facial bone fractures in Trinidad is similar to many other parts of the world. The prevalence of facial bone fractures in our local population would assist in targeted public education by the development of policies and guidelines to prevent these traumatic injuries.

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