Maxillofacial fractures among patients attended at Muhimbili National hospital, Dar es Salaam

BM Kalyanyama, FM Shubi, ENM Simon

Abstract

Background: Fractures of the facial region often result in with functional and psychological and psychological consequedisturbannces, that includethe magnitude of which determines the morbidity and risk to life.

Objective: To determine the pattern of occurrence, types, and treatment and prognosis of patients with maxillofacial fractures at the dental school of the Muhimbili University College of Health SciencesNational Hospital, Dar es Salaam, Tanzania.

Methodology: All patients with maxillofacial fractures who presented from January 2003 to June 2004 were included in this prospective e study. Using a questionnaire and specially designed patients' record form,s data on age, gender, education, site and, causes of fracture and treatment offered of fracture were recorded. Statistical testing was done where a p-value of 0.05 was considered to be significant.

Majority of mandibular fractures were treated by closed reduction and immobilisation by maxillomandibular fixation. Few fractures were treated by open reduction. as outpatientsLe Fort I and II fractures were treated by zygomatico-maxillary suspension while Le Fort III fractures were treated by frontomaxillary or craniomaxillary suspension with supplementary maxillomandibular fixation (MMF). Patients were followed up at three and six months post treatment. Majority of the patients healed uneventfully. Few had permanent deformities with functional and psychological effects.

Results: One hundred and eighteen patients with maxillofacial fractures were seen and treated (M:F ratio = 3.7:1). Peak incidence was in the 21-30 years age group who that accounted for 53 (46.3 %) of the cases, followed by the 11 to 20 years age group which comprised of 25 (accounting for 21.3%) of the cases (p<0.001). Majority, 110 (85.9%) fractures, were occurred in the mandible, while 16 (13.6%) occurred in the maxilla and 2 (1.6%) in the zygoma. The most frequent cause was violence (social altercation, domestic violence and assaults), which accounted for 64 (54.2%) of all fracturescauses, followed by motor traffic accidents with 41 (34.7%).

Conclusion: The mandible was the most commonly fractured bone. Violence was the major cause of maxillofacial fractures with most of the patients belonging to the younger age groups of the low social economic class. Treatment was mainly closed reduction and immobilization. Most fractures healed with minimal complications and the prognosis was generally good.

Key words: Maxillofacial fractures, epidemiology, treatment and prognosis, Muhimbili National Hospital

Introduction

Injuries Fractures of the facial region cause great suffering and worry to patients and often pose serious challenges to the maxillofacial surgical team because of the potential danger of damage to vital structures. They may result in with functional and psychological and psychological consequedisturbances that includesuch as difficulties with feeding, . Important functions that may be interferednce with respiration, vision, smell, neurological disturbances as well as facial expression and appearanceaesthetics. The magnitude of the injuries determines the risk to life and often may result in permanent morbidity or death [1-3]. There is quite abundant literature from different countries on the pattern of occurrence of facial bones fractures *(Mwaniki & Guthua 1990, Adebayo et al. 2003, Ugboko et al. 1998, Villarreal et al. 2004, Gassner et al. 2004, Quadah et al. 2002, Ida et al. 2001, Kleser et al. 2002, Abiose 1986, Nair & Paul 1986)*

Maxillofacial injuries are associated with social economic, cultural and environmental factors [2-9]. Of recent there has been a rReportesd show an increase in the number of maxillofacial fractures in many developing countries, most of which are attributable to progressive change of ways of life as a result of social and economic changes[6,7,10]. However, the causes and pattern of occurrence and causes of maxillofacial fractures have shown considerable variations among countries with some studies sightngling out motor traffic accidents (MTA) as the major cause [1,2,11,12]. while oOthers, however, have reported violence as the principal cause of such injuries [6,7,9,10,13,14].

Despite the burden placed on the already strained maxillofacial surgical services in Tanzania and the resulting patient's morbidity, little information exists regarding demographic data, causes, types, management and prognosis ofn maxillofacial skeleton injuriesfractures. exists with relation to demography, causes, types, management and prognosis. The only recent retrospective study on maxillofacial fractures [15] shed some light, but because it was a retrospective one but missedwas deficient of important and accurate information regarding treatment procedures and prognosis. Such information is necessary in planning, developing and implementing educational programmes suited to the appropriate key players in the management and prevention of maxillofacial fractures.

The aim of this study therefore was to determine the pattern of occurrence, of maxillofacial fractures, tmanagement and and prognosis ofof maxillofacial fractures in patients attended at the dental school of the Muhimbili University College of Health SciencesNational Hospital, Dar es Salaam, Tanzania.

Materials and Methods

Participants and setting

A prospective study involving all patients with maxillofacial fractures who attending attended at the Oral Surgery Department of Muhimbili National Hospital (MNH) was carried out from January 2004 to June 2005.

Data collection

Using a questionnaire and a specially designed patients' record forms data on age, gender, education, causes of fracture, site, type of fracture and and, treatment offered and complications after treatment of fracture were recorded. Causes of fractures were categorised, similar to other studies[2,3,7], into motor traffic accidents (MTA), violence, sports, falls and bone pathology. The patients were followed at three and six months after completion of the initial treatment and the prognosis was recorded.

Correspondence to: Elison NM Simon, Muhimbili University College of Health Sciences, P. O. Box 65014, Dar es Salaam, Tanzania

Department of Oral Surgery and Oral Pathology, School of Dentistry

Patient examination

Physical examination of the general condition of the patient included extra and intra oral conditions.which included and dentition Routine and specific investigations were done. Depending on the nature of the injury, the following x- ray views of the skull were ordered to confirm or rule out presence of fractures: posteroanterior, occipital-mental, lateral, and submental vertex. The orthopantomograph was used in mandibular fractures and Towne's view in condylar neck fractures. Where necessary a supplementary periapical view was doneused.

Treatment

Management of the patient included resuscitation in form of that included maintenance of airway, controlling bleeding and replacement therapy where necessary. For patients who se were in serious condition, was serious and unstable patientsunstable, definitive treatment was deferred until their general condition allowed manipulation. Majority of the mandibular fractures were treated by closed reduction and immobilisation by maxillomandibular fixation (MMF) under local anaesthesia after achieving optimal occlusion as outpatients. In mandibular fractures, teeth in lines of fractures were not extracted except where they were found to be mobile or fractured. The MMF was maintained for a minimum of 6 weeks during which period patientsperiod patients had to survive on liquids and soft diet. However, for fractures where this method was not feasible, under general anaesthesia, open reduction and fixation using stainless steel plates, titanium plates or interosseous stainless steel wires was applieddone under general anaesthesia. Fractures of the condyles were treated conservatively except for one where open reduction was necessary. Le Fort I and II fractures were treated by zygomatico -maxillary suspension while Le Fort III fractures were treated by frontomaxillary or craniomaxillary suspension with supplementary MMF to maintain occlusion. For all mid-face fractures (Le Fort I, II and III) the MMF was maintained for 4 weeks only. Zygomatic bone fractures were treated by directly lifting up the depressed bone using a special hook or through Caldwell Luc approach. For injured soft tissues wound debridment and cleansing was done followed by suturing using vicryl 2.0. All patients in this study were covered with broad-spectrum antibiotics for duration of about 5 to 10 days. All mandibular fractures except 5 were treated by closed reduction and immobilized by MMF. Two patients with mandibular angle fractures who developed submasseteric abscesses had incision and drainage done before fixation of the fractures.

One 11 years old adolescent underwent open reduction and immobilization with titanium plates for fracture of the angle of the mandible. Another patient had to be treated by open reduction because he was partially edentulous and had two fracture lines onat the angle and symphysis of the mandible. The third patient had open reduction and fixation using titanium mini plates for fracture of the condylar neck that had gross displacement. Two patients who were injured by gunshots and two others with pathological fractures due to malignancy and osteomyelitis were also treated by open method.

Data analysis

Statistical tests were done to compare the differences in the occurrence of fractures between the different age groups. Chi-square was used to test significance, where $p \leq 0.05$ was considered to be statistically significant. Occurrence of failures was compared between the different age groups.

Ethical matters

All patients were given a clear explanation on the study and its purposes. Participation was voluntary after the patients gave consent. Non-participation could not affect the ultimate management of the patient. Research and Publications Committee of the Muhimbili University of Health and Allied Sciences issued ethical clearancegiven. Certified competent maxillofacial surgeons, with the assistance from residents, carried out clinical examination and treatment with the assistance of from the intern doctors.

Results

Altogether 118 patients, 93 males and 25 females with maxillofacial fractures were seen and treated (M:F ratio = 3.7:1). Their age ranged from 13 to 63 years with a mean age of 28.8 years. The inter-examiner reliability for diagnosis of fractures was 98% butand for resultant complications it was 95.2%.

Peak incidence of maxillofacial fractures was in the 21 - 30 years age group who that accounted for 50 (46.3 %) cases, followed by the 11 to -20 years age group, which comprised of accounting for 23 (21.3%) cases. Males were more affected than females at a male to female ratio of 3.7 to 1. Majority 94 (87%) of the patients were aged between 11 and 40 years. There was a sudden decline in occurrence of fractures beyond 40 years of age (Table I). The difference in the occurrence of fractures between the 11-20 years old group and the 21-30 years old group was statistically significant ($p < 0.001$). Likewise, the difference between the 21-30 years old group and the 31-40 years old group was statistically significant ($p < 0.001$).
cases
Out of the total 128 fractures, about 1110 (85.9%) were occurred in the mandible, 16 (13.6%) in the maxilla and 2 (1.6%) in the zygoma (Table 2).

Within the mandible tThe most commonly involved fractured site on the mandible was the body that accounted for 66 (60%) of mandibular fractures followed by the symphysis 19 (17.2%), alveolar bone and angle each with 10 (9.1%) fractures (Table 2).

The most frequently encountered mid-facial fracture was Le Fort I, which accounted for 10 (55.6%) of all mid facial fractures followed by Le fort III 4 (22.2%) of fractures, Le Fort II and zygoma with 2 (11.1%) fractures each (Table 2).

In 81 (64.6%) patients, intra oral soft tissues were simultaneously injured. Fifty-one (62.9%) of these had lacerations, 12 (14.8%) had both lacerations and cut wounds, 16 (19.6%) had cut wounds only and 2 (2.5%)

had avulsed tissues. Seventy-four (91.3%) cases had certain degree of bone displacement.

The most frequent cause of maxillofacial fractures in both sexes was violence (social altercation, domestic violence and assaults) 64 (54.2%) patients, followed by motor traffic accidents 41 (34.8%) and sports/games 7 (5.9%) patients. No female was involved in in sports injuries (Table 3). The majority, 80 (67.6%) of the patients with The majoritymaxillofacial fractures had a maximum of primary school education and the incidence decreased with increasing level of education(Table 4).

Two patients who had fractures at the angle developed submasseteric abscess.

Eighty-seven (73.7%) patients reported for the 3 months follow up, however only 71 (60.2%) presented at 6 months post treatment. At 3 months follow up 11 patients with mandibular fractures complained of some mild pain on wide opening of the mouth, facial deformity and inability to chew. Three of these complained of some paraesthesia of the lower lip. Two patients had malocclusion due to premature contact in the molar region. One patient with fracture of the zygoma complained of paraesthesia of the upper lip. However, at six months follow up, all patients except six were free of complaints. One had persistent malocclusion due to wrongly healed fracture of the angle of mandible and another one had paraesthesia in the lower lip. The two patients with avulsed tissues due to bullets and the other two with pathological fractures ended up with permanent facial defects.

Almost all the treated fractures in this study healed uneventfully except the three that developed infection. However, after infection control these also healed successfully.

Table 1. Distribution of patients with maxillofacial fractures by age and sex

Age group	Males n (%)	Females n (%)	Total n (%)
11-20	21 (17.9)	4 (3.4)	25 (21.3%)
21-30	44 (37.2)	9 (7.6)	53 (446.38%)
31-40	17 (14.4)	6 (5.1)	23 (19.45%)
41-50	7 (5.9)	4 (3.4)	11 (9.3)
51-60	3 (2.5)	1 (0.84)	4 (23.84%)
61-70	1 (0.84)	1 (0.84)	2 (1.70.9%)
Total	93 (798..6%)	25 (2021.4 4%)	118 (100%)

Table 2. Distribution of causes of fractures by gender

Causes of fracture	Males n (%)	Females n (%)	Total n (%)
Violence:			
a. Social altercation	25 (21.2)	5 (4.3)	30 (25.4)
b. Domestic violence	12 (10.2)	5 (4.3)	17 (14.4)
c. Assault	13 (11.0)	4 (3.4)	17 (14.4)
MTA	32 (27)	9 (7.6)	41 (34.8)
Sports/games	7 (5.9)	- -	7 (5.9)
Bullets	2 (1.7)	- -	2 (1.7)
Falls	2 (1.7)	- -	2 (1.7)
Pathological fracture	- -	2 (1.7)	2 (1.7)
Total	93 (78.8)	25 (21.2)	118 (100)

Table 3. Distribution of causes of maxillofacial fractures by in relation to education level

Causes	Primary education n (%)	Secondary education n (%)	College education n (%)	Total n (%)
Violence				
a. Social altercations	19 (16)	7 (5.9)	4 (3.4)	30 (25.3)
b. Domestic violence	14 (11.9)	1 (0.8)	2 (1.7)	17 (14.4)
c. Assault	11 (9.3)	4 (3.4)	2 (1.7)	17 (14.4)
MTA	27 (23)	10 (8.4)	4 (3.4)	41 (34.8)
Sports/ games	5 (4.3)	2 (1.7)	- -	7 (6.0)
Bullets	2 (1.7)	- -	- -	2 (1.7)
Falls	- -	2 (1.7)	- -	2 (1.7)
Pathological conditions	2 (1.7)	- -	- -	2 (1.7)
Total	80 (67.60)	26 (22)	12 (10.2)	118 (100)

Table 4. Patients with maxillofacial fractures who were involved in MTA

Person involved in MTA	n	(%)
1. Driver of private vehicle	2	(4.9)
2. Bus driver	1	(2.4)
3. Passenger in a bus	18	(43.9)
4. Passenger in a private vehicle	2	(4.9)
5. Passenger in lorry	3	(7.3)
6. Motorcyclist	4	(9.8)
7. Cyclist	2	(4.9)
8. Pedestrian	9	(21.9)
Total	**41**	**(100)**

Table 5. Pattern Distribution of occurrence of fractures in the maxillofacial bones

Mandibular fractures			Mid-face fractures		
Site	n	(%)	Type	n	(%)
Body	66	(60)	Le fort I	10	(55.6)
Symphysis	19	(17.3)	Le fort II	2	(11.1)
Alveolar bone	10	(9.1)	Le forte III	4	(22.2)
Angle	10	(9.1)	Zygoma	2	(11.1)
Condylar neck	5	(4.5)			
	110	(100)		18	(100)

** Some patients presented with more than one fracture.

Discussion

The This study showed that males had a significantly higher tendency of sustaining maxillofacial fractures compared to females. with a male to female ratio of 3.7:1 (Table 1)This male preponderance seen in this study is in agreement with findings of a retrospective study that was previously carried out in from the same centre [15]. However, this figure is less than those reported from Kenya, France, Nigeria, Zimbabwe and India[6,7,9,12,16,17]. In the Tanzanian social system males are involved in activities and occupations that predispose them to physical injuries more often than females do them physical. Driving, pushing carts, cycling, building at construction sites or cutting trees are mainly done by men generally exposing them to serious injuries compared to females. It is also noteworthy that in most Tanzanian tribes social activities like drinking alcohol, which often lead to social altercations are predominantly done by men only.

The age group that most frequently suffered maxillofacial fractures was the third decade (21 – 30 years) (Table 1). There was a statistically significant difference when the 11– 20 year age group was compared to the 21-30 year-old group ($p<0.001$). Similarly, w but wNevertheless, when combined, these two groups suffered more fractures than the rest. The vsvariations in sex and age of patients who suffered maxillofacial fractures seen in this study have also been observed by others[9,18,19]. Taking into consideration the common causes of maxillofacial fractures as seen in this study, the younger age groups seem to be the most vulnerable. Apparently people belonging to this group are active, adventurous, less educated and jobless therefore are forced by circumstances to engage in varieties of activities that might often predispose to oral and maxillofacial injuries.

The major cause of maxillofacial fractures in this study was violence with alleged social altercation being the most prominent (Table 2). It was evident that the majority (64.4%) of the patients who suffered maxillofacial injuries had low education, with eventualmost of whom also belonged to low social economic statusclass (Table 3). This coincides withis in agreement with reports from Kenya, Zimbabwe and South Africa [6,7,10]. Apparently people belonging to the low social economic group are forced to engage in activities as mentioned above that are more likely to predispose them maxillofacial fractures.

MTA was the second most common cause of maxillofacial fractures. Lawlessness, especially by drivers of commercial vehicles (taxis and city commuter buses) and laxity on the part of the law enforcers could be cited as among main reasons for the accidents that resulted in these maxillofacial injuries. Additionally, drunken drivers, driving without applying seat belts, over-speeding, driving vehicles that are not roadworthy, ignorance of traffic rules by both the drivers and the public at large, inadequacy of road signs and poor infrastructure wereinfrastructure were most likely responsible for the accidents. Some of the patients sustained fractures as a result of accidents involving lorries in which they were travelling as passengers (Table 4). Often people are compelled to seek dangerous alternatives such as riding on lorries full of cargo in poorly serviced roads because of transport problems especially in rural roads, influenced by poor economic status of the country.

The mandible was by far the most (93.2%) commonly fractured bone (Table 5). The fractures of the mandible involved the body, followed by the symphysis and the alveolar process. Other regions of the mandible that were fractured albeit at a lower frequency included the angle and condylar neck. This is in agreement with studies done elsewhere [2,9,10,20]. However, in those studies where the most common cause of maxillofacial fractures was MTA a relatively higher percentage of mid-facial fractures was seen [2]. Reasons given for this difference included the prominence and shape of the mandible and presence of several anatomical weak points. The presence of the third molar and thinner cross sectional area are considered to be some of the predisposing factors to fractures in this region of the mandible. Ellis (1999) reported that where the major cause of maxillofacial fractures was altercations the angle represented the largest percentage of mandibular fractures [21]. To the contrary however, although in this study the main cause of fractures was social altercations, majority of the mandibular fractures occurred in the body.

Robbers or bandits attacked the individuals who suffered bullet injuries that resulted in fractures of the jaws. Avulsion of both bone and soft tissues as a result of gunshots is one of the greatest challenges that were encountered during the treatment of these cases. Furthermore, iIntense heat from the bullets burnt some of the surrounding tissues. Considerable amount of soft tissue and bone were lost. During treatment it was necessary to remove all the shattered fragments of bone and non-vital soft tissues, a process which left behind big defects. In Tanzania the use of biomaterials that can be used to replace lost tissues is near to impossible because of cost. It follows therefore that iIn the patients who had suffered avulsion of tissues, advancement flaps from neighbouring tissues were used to close the gaps. However, iIt was impossible however, to adequately replace lost bone in the upper or lower jaws. This left such patients with permanent deformities, which resulted in both functional and psychological dissatisfaction. Intra oral wounds were managed by suturing using vicryl 2.0 before the MMF was applied.

In this study majority of the patients had a successful treatment outcome regardless of the choice of the method of treatment. It is noteworthy that despite delay in reporting to hospital by some of the patients and low levels of oral hygiene in most of the patients, there were very few infections. Routine use of broad-spectrum antibiotics might have been the reason for the low infection rate. Rigid internal fixation has several advantages over MMF, which include; decreased discomfort to the patient, better oral hygiene and better nutrition [22]. Nevertheless, in the Tanzanian circumstancesn, like in many of theother developing countries with inherent acute shortages of both human and material resources, closed reduction and MMF take precedence over the other methods. For condylar fractures, the level of fracture and the magnitude of displacement were the variables that essentially determined the management approach[23]. One of the two pathological fractures was due to a malignant process and the other was a result of delayed treatment of osteomyelitis of the mandible. Both patients presented in late stages of their conditions, which is a common feature in our population. The relatively low turn out for follow up despite efforts made by the clinicians is an inherent problem in Tanzanian whoour country where where ppeople usually go to hospital only when they have incapacitating problems. All the patients who did not show up for follow up disappeared after removal of the wires.

Conclusion

Violence was the most important cause of maxillofacial fractures with young males of low social economic class being the most affected group. The mandible was the most commonly fractured bone. Majority of the fractures were compound with minimal displacement. The commonly used management; reduction and immobilisation by MMF complemented by the use of antibiotics resulted in adequate healing with only minimal complications. There is a need for the government to improve the social-economic standards of the people in

order to cut down onreduce violence in the country. Consistent enforcement of traffic rules, provision of road signs and improvement of the infrastructure are necessary measures. In spite of the fact that the number of sports related maxillofacial fractures as seen in this study is relatively low, more precautions should be put in place specifically in sports and games in which physical contact is expected. Stringent control of firearms is another necessary measure in order to curb injuries due to gunfire (bullets).

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