



Facial fractures presenting to a tertiary referral centre in Malaysia: A 9- year study

Muhammad H¹, Khairuddin NA¹, Zakaria AR¹, Yunus NNN², Wan Mustafa WM¹

¹ Department of Oral Surgery, Hospital Kuala Lumpur

² Department of Dental Paediatrics, Hospital Kuala Lumpur

ABSTRACT

Aim. To describe pattern and identify indicators for maxillofacial fractures presenting to a tertiary referral centre in Malaysia. *Materials and Methods.* Clinical records of facial fracture cases, from 2001 to 2009, including demographic, aetiology, fracture sites and treatment were reviewed. *Result.* In total, 1753 facial fracture cases were documented, the majority aged 20 - 29 years. Most cases were male, Malay ethnic group were the majority involved. The main cause was road traffic accidents, among those, 78.28% were motorcyclists. The mandible was the most commonly involved bone. The majority of cases were treated conservatively. *Conclusion.* Indicators for facial fractures were male, motorcyclist related RTA, age 20-29 years. There is need for health promotion measures in high risk groups to reduce road traffic accident related facial fractures.

Key Words: Not available

Please cite this article as: Muhammad H, Khairuddin NA, Zakaria AR, et al. Facial fractures presenting to a tertiary referral centre in Malaysia: A 9-year study. Malaysian Dental Journal 2012; 34(2): 10-15.

INTRODUCTION

Injuries resulting from road traffic accidents, assaults, work place accident, falls or sports are important causes of mortality and morbidity. Facial injuries occur in a significant proportion of trauma patients requiring prompt diagnosis of fractures and soft tissue injuries, with possible emergency interventions.

An understanding of the cause, severity and temporal distribution of facial trauma can aid in establishing clinical and research priorities for effective treatment and prevention of these injuries. Continuous long-term collection of data regarding the epidemiology of facial fractures is important because it provides information necessary for the development and evaluation of preventive measures that might help reduce the incidence of facial injuries.¹

Hospital Kuala Lumpur is a 2502 bedded tertiary referral centre catering for seriously injured trauma patients within the central region of Peninsular Malaysia.

Its size, location, available expertise and facilities, makes the hospital an important centre for the management of facial fractures. Despite this,

earlier studies on facial fractures presenting to this hospital has not been documented.

Within the hospital, the Department of Oral Surgery, HKL is the main unit dealing with facial fractures in adolescents and adults whereas the Dental Paediatrics Department manages facial fractures in children.

The purpose of this study is to identify and document the incidence, pattern and risk factors of maxillofacial injuries in children, adolescents and adults treated in the Oral Surgery and Dental Paediatric Departments, Hospital Kuala Lumpur. The findings were compared with published data from earlier studies.

MATERIALS AND METHODS

Clinical records of patients attending the Oral Surgery and Pediatric Dental Department, Hospital Kuala Lumpur for the management of maxillofacial fractures from 2001 to 2009 were cross-sectionally analyzed.

The data were subjected to descriptive analysis to determine the pattern of maxillofacial injuries including patient's age, gender, ethnicity, aetiology, anatomic location of facial fractures and

the treatment employed. Patients sustaining soft tissue injuries and dental trauma were excluded.

Data were analyzed using SPSS Version 14.00.

Table 1. Treatment employed

Type of Treatment	Number of Cases	Percentage (%)
Conservative	623	35.53
ORIF	395	22.53
Closed reduction	532	30.35
Refused	85	4.85
Inadequate information	21	1.20
Death	19	1.08
Refer/Transfer	78	4.45
Total	1753	100.00

RESULTS

A total of 1753 cases presented for treatment during this study period.

Number of cases by year

The number of cases presenting to the hospital varied from 129 to 261 cases during the study period. The average number of cases per year was 195. Prevalence of facial fractures by age, gender and ethnicity.

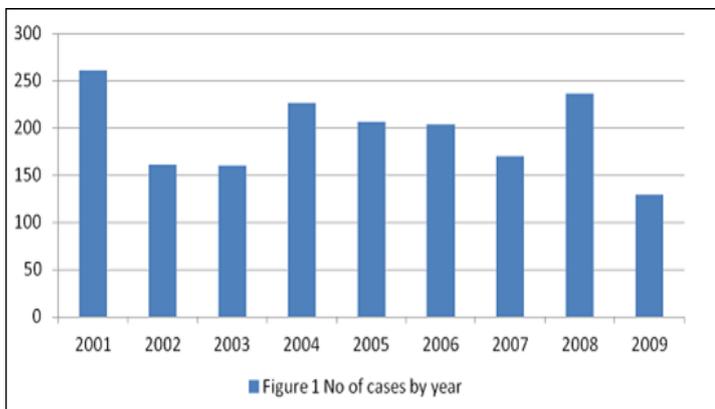


Figure 1. Number of cases by year.

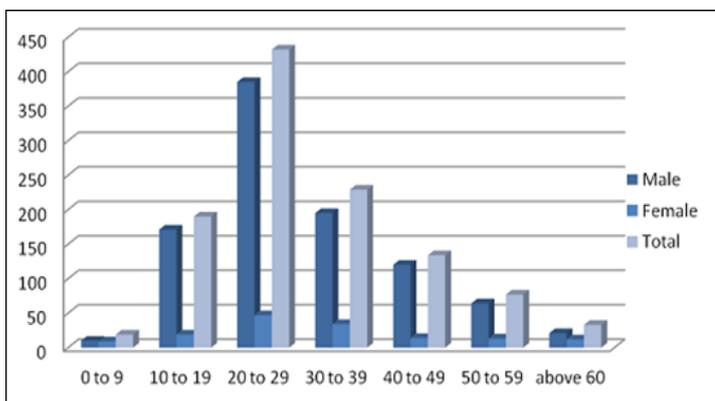


Figure 2. Distribution of facial fractures by age and gender.

The majority of cases were aged 20 to 29 years (680 cases, 38.8%)(Figure 2), followed by the 30-39 age group (335 cases, 19.11%). There were few fractures among those aged below 10 years (19 cases, 1.08%), and among the elderly aged 60 and above (69 cases, 3.42%).

For all age groups, males (1539 cases, 87.79%) were more commonly affected than females (214 cases, 12.21%) giving a male to female ratio of 7:1. Most facial fractures occurred in Malays (922cases, 52.60%), followed by Indians (385cases, 22.0%), Chinese (218cases, 12.44%) and foreigners (201cases, 11.47%) and other indigenous groups (27cases,1.54%).

Aetiology

Road traffic accidents (RTA) accounted for almost 69.08% of all cases (1211 cases). This was followed by assaults (261 cases, 14.89%), falls (185 cases, 10.55%), occupational injuries (45 cases, 2.57%), sports injuries (23 cases, 1.31%), and gunshot injury (3 cases, 0.17%). However, there were 25 cases (1.43 %) designated 'unknown' as the aetiology could not be ascertained (Figure 3).

Role of the injured person

Motorcyclists were affected on 948 occasions (78.28%), followed by motorcar occupants (181 cases, 14.95%). Bicyclists (11 cases, 0.91%) and pedestrians (59 cases, 4.87%) were next most commonly affected (Figure 4). 12 cases were designated unknown due to inadequate information.

Sites of fracture

Of the 2189 fractures (Figure 6), mandibular fractures accounted for 935 cases (42.71%). This

was followed by the zygoma (520 cases, 23.76%), maxilla (303 cases, 13.84%), dentoalveolar (244 cases, 11.15%), isolated orbital (103 cases, 4.71%), nasoethmoidal (36 cases, 1.64%) and frontal bone fractures (24 cases, 1.10%). 24 cases accounted as unknown due to inadequate information. Within the mandible, the body (298 cases, 25.17%) was the commonest site involved, followed by the angle (211 cases, 17.82%), parasymphysis (210 cases, 17.74%), condyle (228 cases, 19.26%), symphysis (153 cases, 12.92%), ramus (21 cases, 1.77%), coronoid (17 cases, 1.44%) and 46 cases (3.89%) accounted as unknown.

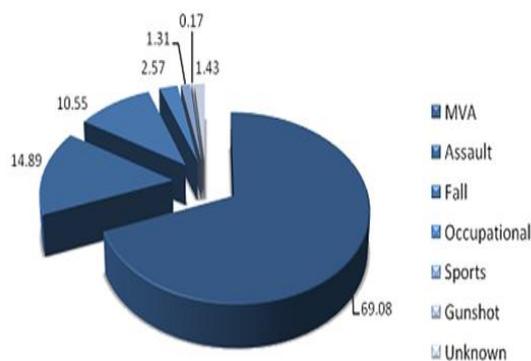


Figure 3. Aetiology of facial fractures.

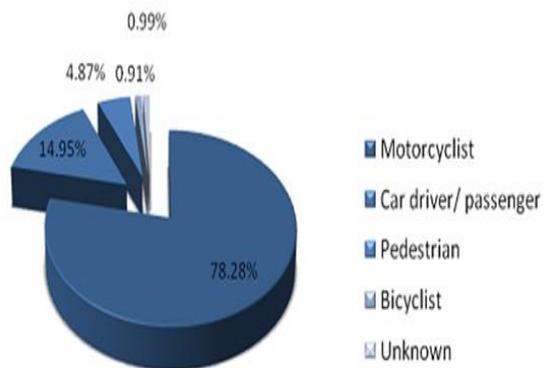


Figure 4. Role of the injured person.

Treatment employed

Most facial fractures were managed conservatively; without active intervention (623 cases, 35.53%). This was followed by closed reduction (532 cases, 30.35%) ; without surgical exposure of fractured site, open reduction and internal fixation (ORIF) (395 cases, 22.53%). 78 cases (4.45%), were either referred or transferred out, 19 cases (1.08 %) passed away, 85 cases (4.85 %) refused treatment,

whilst the treatment of 21 cases (1.20%) could not be ascertained due to inadequate information (Table 1).

DISCUSSION

The continuous communication of data associated with facial trauma epidemiology is extremely important in order to provide the necessary information for the development and evaluation of preventive action aiming at reducing the incidence of facial injuries. Studies such as this repeated at intervals provide such an information. In this 9 year cross-sectional study, a total of 1753 facial fracture patients were seen and managed in the Oral Surgery and Dental Paediatric Departments, Hospital Kuala Lumpur. The number of cases per year ranged from 129 to 261 cases, showing a decrease in number of cases towards the end of the study period (Figure 1). An average of 195 cases is seen yearly.

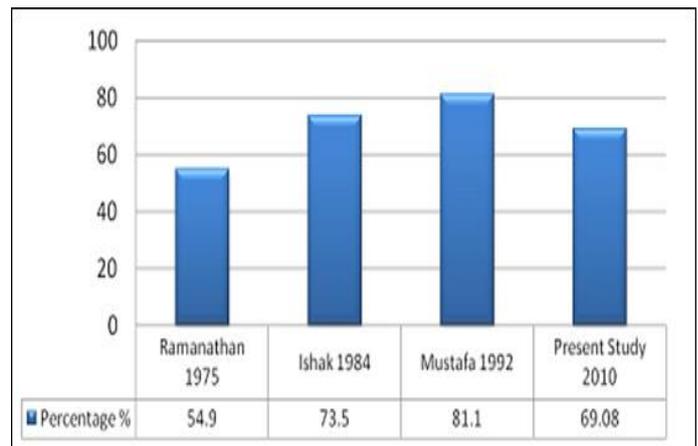


Figure 5. Percentage due to RTA.

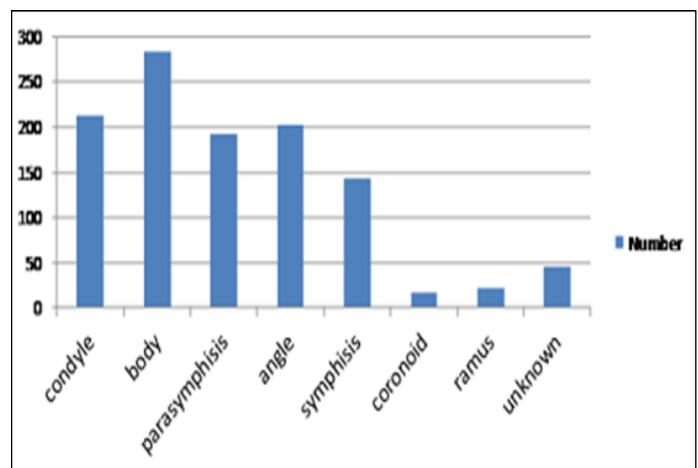


Figure 6. Site of mandibular fracture.

Generally, our findings are similar to several Malaysian studies,²⁻¹⁰ in terms of aetiology, gender ratio, peak age incidence, sites of facial fracture and the types of treatment employed. However, in terms of ethnic distribution, our results is in keeping with Mustafa et al^{2,3} Hashim and Iqbal⁷ and Ramli et al⁸ whereby the Malays were the majority ethnic group involved, but differs from studies by Ramanathan⁶ and Razak et al⁴ where the Chinese were the most frequently affected group.

The extremes of age ranged from 1 to 77 years old (Mean age 38.5). The number of patients below 10 years is low. The age group most commonly affected was the 20-29 age group. This finding is in keeping with other published data^{2,4-8,10,12,14} and corresponds generally to findings of other authors supporting the fact that facial trauma is associated with the young. Of these, males predominate,²⁻²¹ reflecting a world wide trend of males being more likely to sustain facial fractures. Causes of facial trauma vary but road traffic accidents (RTA), assault, fall, occupational, sports, gunshot are the common ones while others are rare.²⁻¹⁹ RTA was found to be the main cause of facial trauma, in which, the majority involves motorcyclists (78.28%) and car occupant (15.0%).

The percentage of RTA (69.08%) associated facial fractures differs from previous studies by Ramanathan⁶, Razak et al,⁴ Mustafa WM et al² whereby lower percentages were noted in our study (Figure 5). However, RTA remains the main cause of facial fractures. This is probably due to rapid development in Malaysia, with marked increase in the number of vehicles on the roads, its population structure and lack of strict implementation and enforcement of traffic rules.

Certain limitations in our local public transportation system (e.g. lack of access) results in its underutilization as a means of transportation and preference for motorcycles and motorcars as means of conveyance. Local factor such as inadequate motorcycle lanes²⁶ contributes to high rate of accidents and incidence of facial fractures among motorcyclists.

By contrast, in Western Countries^{11,14-16,18} a changing trend from RTA to assault as the main cause of facial trauma. Several factors have been suggested for the importance of assaults as a cause of trauma in the western population,¹¹ firstly, a decrease in RTA as a cause of trauma due to

improvements in vehicle design. Secondly, there is strict legislation in terms of compulsory seatbelts for all passengers. In addition to this penalties for drink driving and enforcement of speed limits contributing to the reduction in RTA related facial fractures but an increase in alcohol abuse provides a major contributing factor in interpersonal violence resulting in an increase in assault related facial fractures.

Assault or interpersonal violence was the second main cause of facial fracture in our study, accounting for 14.89% of cases. This finding is consistent with a Greek²² and previous Malaysian²⁻⁸ studies. In our local setting assault was found to be an important cause for facial fractures in Malaysian Indians and foreigners.

Falls has been reported as a common cause of facial injuries in many previous studies.²⁻²¹ In our study it was the third main cause of facial trauma, accounting for 185 cases or 10.55%. Of these, only 6 cases (5.2%) involved patients above 60 years. However, with a nationwide trend of ageing population, the proportion of facial injuries due to falls may be expected to increase especially in the Malaysian elderly.⁹

The incidence of work-related maxillofacial injuries has been reported to vary from 1% to 12%²³. In this study, a total of 45 cases (2.57%) of facial injuries were due to occupational accidents which is within range of previously reported studies. This suggests good implementation and enforcement of occupational safety and health policies. Sports have been reported as an important cause of accidental maxillofacial injuries.²⁴ In this study, sports related maxillofacial injuries were not common. Only 23 cases (1.31%) were recorded. In only 3 cases (0.17%) facial fracture were caused by gun shot in this study, reflecting Malaysia's strict regulations regarding firearms ownership.

The bone most commonly fractured was the mandible (935 fractures, 42.71%). The prominent position the mandible occupies in the face and areas of weaknesses²⁵ within the generally strong mandible, attributes to this finding which is similar to findings of many previous studies.²⁻²¹ The body of the mandible (298 fractures, 25.17%) was found to be the most commonly affected site. The zygomatic bone (520 fractures, 23.76%) was the second most commonly affected bone. This finding is consistent with many previous

studies.^{6,5,2} The zygomatic bone also occupies a prominent position in the face, making this bone vulnerable to injury. This finding however differs from studies by other authors,^{19,21} whereby maxillary fractures or mandibular fractures²⁷ were reported as second most frequent facial fracture and maybe a reflection the referral pattern at these places.

Conservative treatment was found to be the most common mode of treatment (35.53%), which suggests relation to factors such as, undisplaced fractures, particularly for zygomatic and condylar fractures, surgeon's high threshold for open reduction and unavailability of adequate OT (operation) time. Closed reduction (30.35%) was the next most common treatment employed. This is consistent with findings of studies from other developing countries.²¹ ORIF (22.53%) is the third most common mode of treatment employed.

CONCLUSION

Generally, in terms of age group, gender, aetiology, sites of facial fracture and treatment, the findings were similar to that of previous studies. The risk factors for facial fractures are the male gender, RTA and motorcyclists.

However, the pattern was different in terms of ethnicity and fracture site within the mandible. While RTA is the main cause of facial fractures it represents a lower percentage compared to previous studies (Figure 5). Among the RTA cases, motorcyclist were mainly involved. A previously unreported finding is the importance of assault as a cause of facial fractures in Malaysian Indians and foreigners.

Current prevention strategies which has produced some decrease in RTA related facial fractures has been relatively ineffective in reducing the incidence of facial fractures. There is need for continuing efforts such as health promotion in high risk groups, to reduce road traffic accident related facial fractures.

REFERENCE

1. Hogg NJ, Stewart TC, et al. Epidemiology of maxillofacial injuries at trauma hospitals in Ontario, Canada, between 1992 and 1997. *J Trauma* 2000;49:425-32.

2. Mustafa WM, Rabindranath S, et al. Fractures of the facial skeleton at Kota Bharu Kelantan: A retrospective study. *Dent J Malays* 1994;15:9-12.
3. Ferdinand J K: A four year retrospective study of facial fractures in Hospital Taiping. *Mal. J. Oral Maxillofac. Surg.* 2007;5:10-13.
4. Razak IA, Razak AA, Boon LC. An analysis of fractures of the facial skeleton. *Dent J Malay.*1984;6:25-7.
5. Foo G C. Maxillofacial fractures- A retrospective analysis of 285 cases. *Med J Malaysia* 1983;38:178-81.
6. Ramanathan K. Traumatic injuries to the facial skeleton. *M Dent J.* 1975;13-6.
7. Hashim H, Iqbal S. Motorcycle accident is the main cause of maxillofacial injuries in the Penang Mainland, Malaysia. *Dent Traumatol.* 2011 Feb;27(1):19-22. doi: 10.1111/j.1600-9657.2010.00958.x.
8. Ramli R, Rahman NA, et al. A retrospective study of oral and maxillofacial injuries in Seremban Hospital, Malaysia. *Dent Traumatol.* 2011 Apr;27(2):122-6. doi: 10.1111/j.1600-9657.2010.00968.x. Epub 2011 Feb 1.
9. Royan SJ, Hamid AL, et al. A prospective study on elderly patients with facial fractures in a developing country. *Gerodontology.* 2008;25(2):124-8.
10. Mustafa W M, Jalil N A, et al. Prevalence of Facial Fractures in Women Presenting to Ministry of Health Hospitals Malaysia: a 1-year Prospective Study. *Asian J Oral Maxillofac Surg.* 2006;18:268-71.
11. Tanaka N, Tomiksuma K, et al. Aetiology of maxillofacial fracture. *Br J Oral Maxfac Surg* 1994;32:19-23.
12. Buchanan J, Colquhoun A, et al. Maxillofacial fractures at Waikato Hospital, New Zealand: 1989 to 2000. *N Z Med J.*2005 24;118(1217):U1534.
13. Rabi A G, Khateery S M. Maxillofacial Trauma in Al Madina Region of Saudi Arabia: A 5-Year Retrospective Study. *Asian J Oral Maxillofac Surg.* 2002;14:10-14.
14. Ugboko V I, Odusanya S A, Fagade O O: Maxillofacial fractures in a semi-urban Nigerian teaching hospital. A review of 442 cases. *Int. J. Oral Maxillofac. Surg.* 1998;27:286-9.

15. Torgesen S, Tornes K: Maxillofacial fractures in a Norwegian district. *Int. J. Oral Maxillofac. Surg.* 1992;21:335-8.
16. Vetter J D, Topazian R G, et al. Facial fractures occurring in a medium-sized metropolitan area: recent trends. *Int. J. Oral Maxillofac. Surg.* 1991;20:214-6.
17. Koorey A J, Marshall S W, et al. Incidence of facial fractures resulting in hospitalization in New Zealand from 1979 to 1988. *Int. J. Oral Maxillofac. Surg.* 1992;21:77-9.
18. Motamedi MH. An assessment of maxillofacial fractures : a 5 year study of 237 patients. *Oral Maxillofac Surg.* 2003;61(1):61-4.
19. Telfer MR, Jones GM, Shepherd JP. Trends in the aetiology of maxillofacial fractures in the United Kingdom (1977-1987). *Br J Oral Maxillofac Surg.* 1991 Aug;29(4):250-5.
20. Zide MF, Kent JN. Indications for open reduction of mandibular condyle fractures. *J Oral Maxillofac Surg.* 1983;41(2):89-98.
21. Bataineh AB. Etiology and incidence of maxillofacial fractures in the north of Jordan. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;86(1):31-5.
22. Zachariades N, Papavassilou D. The pattern and aetiology of maxillofacial injuries in Greece. A retrospective study of 25 years and a comparison with other countries. *J Craniomaxillofac Surg.* 1990;18:251-4.
23. Eggensperger NM, Danz J, et al. Occupational maxillofacial fractures: a 3-year survey in central Switzerland. *J Oral Maxillofac Surg.* 2006 Feb;64(2):270-6.
24. Exadaktylos AK, Eggensperger NM, et al. Sports related maxillofacial injuries: the first maxillofacial trauma database Switzerland. *Br J Sports Med.* 2004 Dec;38(6):750-3.
25. Halazonetis JA. The weak regions of the mandible. *Br J Oral Surg* 1968;6:37-48.
26. Radin Umar RS. Motorcycle Safety programmes in Malaysia: how effective are they? *Int J Inj Contr Saf Promot.* 2006 Jun;13(2):71-9.
27. Hwang K, You SH. Analysis of facial bone fractures: An 11-year study of 2,094 patients. *Indian J Plast Surg* 2010;43:42-8.

Corresponding Author:

Dato' Dr. Wan Mahadzir Wan Mustafa
Department of Oral & Maxillofacial Surgery
Hospital Kuala Lumpur
50586 Jalan Pahang
Kuala Lumpur, Malaysia
Email: wanmaha54@yahoo.com