

## ETIOLOGY AND PATTERNS OF FACIAL FRACTURES IN AL-AIN, UNITED ARAB EMIRATES

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أجري تحليل استعراضي لكافة الملفات السريرية والشعاعية لمائتي وتسعة وسبعون مريضاً ، أدخلوا المستشفى بكسور ووجهية ولمسدة تجاوزت السنة سنوات ، لتقدير شكل وكيفية ومسببات كسور الوجه في منطقة العين ، في الإمارات العربية المتحدة .  
أغلب كسور الوجه كانت قد وحدثت في الذكور بعمر ١٦ - ٢٠ عاماً .  
وكان منها ٦٠ % بسبب حوادث المرور في حين كان منه ٦ % بسبب الاعتداءات . وكانت أشد الإصابات بسبب حوادث المرور والمترافقة بعدم استعمال حزام الأمان أثناء قيادة السيارة .

A retrospective analysis of all clinical and radiological records of two hundred and seventy-nine (279) patients, admitted with facial fractures over a six year period, has been carried out to evaluate the trends in the etiology and patterns of facial fractures in Al-Ain, United Arab Emirates (U.A.E.).

The majority of facial fractures were found in 16 to 20 year old males. Road traffic accident (60%) was the most common cause, while assault accounted for 6% of the cases. In comparison with other studies, patients in the present study sustained more extensive facial fractures, as well as higher number of associated injuries. The severity of injuries observed is attributed to the predominance of road traffic accidents as the major cause and the absence of an obligatory seat belt law.

### introduction

Periodic epidemiological reviews are valuable in reaffirming previously established trends or identifying new patterns of disease frequency.<sup>1</sup> The incidence, etiology and pattern of the facial fractures vary in different countries. Studies have shown that assaults are the most common cause of maxillofacial fractures in many developed countries, whereas road accidents remain the most frequent cause of injury in many developing areas.<sup>2</sup> These variations are mainly due to social, cultural and environmental factors.<sup>2,35</sup> There are no published data on the epidemiology of facial fractures in the United Arab Emirates. The purpose of the present study was to determine the etiology and pattern of facial fractures in Al-Ain Medical District, United Arab Emirates as well as to highlight the factors that could be addressed in taking effective preventive measures in the region. The authors'

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results were compared with similar studies in the available literature.

### Materials and Methods

A retrospective study of the clinical and the radiological records of two hundred and seventy-nine (279) patients, admitted in the Al-Ain Medical District from January 1990 to December 1995, with facial fractures was carried out. There was no mandatory seat belt legislation during the period of this study. The patients with facial fractures excluding isolated nasal fractures were evaluated in greater detail.

The fractures were identified according to age and sex of patient, cause of injury, anatomic location and associated injuries. The causes of injuries were classified as road traffic accidents, assaults, sports related, falls, work related and miscellaneous. The anatomic locations of mandibular fractures were classified into the

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following categories: dentoalveolar, anterior (symphyseal and parasymphyseal), body, angle, ramus, coronoid and condylar fractures. The anatomic locations of midface fractures were classified into the following categories: dentoalveolar, sagittal palatal, Le Fort I, Le Fort II, Le Fort III, isolated zygomatic complex, blow out, nasal and naso-orbito-ethmoidal complex fractures. Many of the patients sustained multiple facial bone fractures and therefore were classified into more than one category. Associated injuries were grouped into the following categories: head injuries, loss of vision, orthopaedic and visceral injuries. Head injuries were classified into two subgroups of cerebral concussion only and major head injuries. The major head injuries included skull fractures, intra-cranial bleeding and pneumocele.

**Results**

Isolated nasal fractures

One hundred and nine (109) patients (39%) sustained nasal fractures without involvement of any other facial bone. The highest number of isolated nasal fractures were sustained by 11 to 20 year old patients (41%), followed by 21 to 30 year (30%), 31 to 40 year (13%), 0 to 10 year (9%) and 41 to 50 year old patients (6%). Falls (27%) and road traffic accidents (25%) were the most common causes followed by assaults (19%) and sports related injuries (18%).

Facial fractures excluding isolated nasal fractures

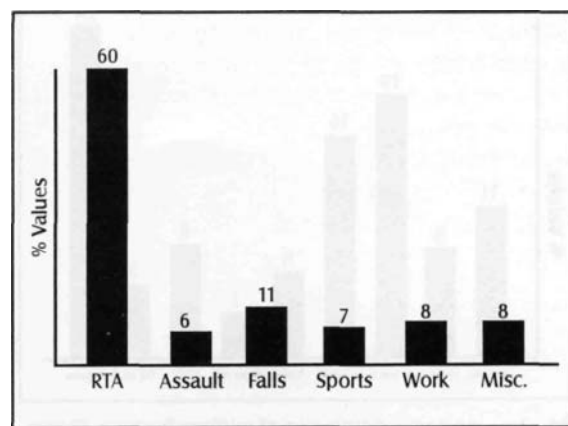
One hundred and seventy (170) patients sustained facial fractures excluding isolated nasal fractures. There was no definite trend of either an increase or a decrease in the numbers of facial fractures per year from 1990 to 1995. No evidence of seasonal variation was noted in the study (Table 1). There is a male preponderance with the male: female ratio being 6.6:1. Age incidence is shown in Table 2. Etiology of the facial fractures excluding isolated nasal fractures is shown in Fig. 1.

**Table 1.** Incidence of facial fractures.

Month/Year	1990	1991	1992	1993	1994	1995	Total
January	1	1	5	3	4	3	17
February	1	2	2	0	1	5	11
March	0	3	1	2	1	2	9
April	6	1	2	4	1	4	18
May	3	1	1	1	6	6	18
June	6	1	0	2	0	3	12
July	1	4	2	2	1	6	16
August	1	0	2	0	1	3	7
September	1	3	4	1	3	1	13
October	1	3	1	4	5	2	16
November	4	2	1	4	1	9	21
December	1	2	1	2	3	3	12
Total	26	23	22	25	27	47	170

**Table 2.** Age Incidence.

Age Group (Years)	No. of Patients
0-5	5
6-10	5
11-15	12
16-20	40
21-25	28
26-30	26
31-35	24
36-40	19
41-45	6
46-50	5



**Fig. 1.** Etiology of facial fractures.

Out of one hundred and seventy (170) patients, forty-five percent (45%) sustained mandibular fractures, thirty-six percent (36%) midface fractures and nineteen percent (19%) a combination of both fractures. 170 patients sustained three hundred and thirty-two (332) fractures (1.95 fractures per patient). These 332 fractures included fifty-three percent (53%) mandibular, thirty-five percent (35%) midface and twelve percent (12%) isolated zygomatic complex fractures. The anatomic distribution of the mandibular and midface fractures are shown in Figs. 2 and 3, respectively. The nasal fractures without involvement of any other facial bones have been discussed separately under the heading of isolated nasal fractures and are not included in Fig. 3.

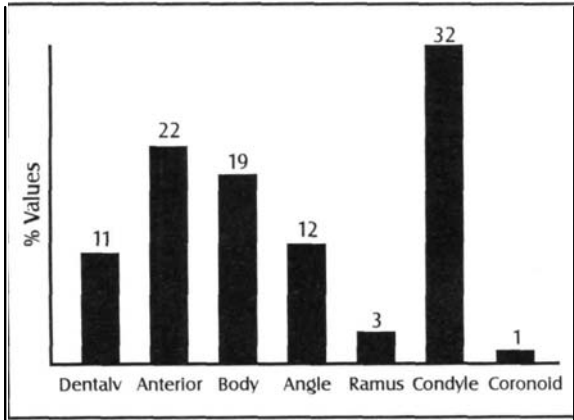


Fig. 2. Anatomic distribution of mandibular fractures.

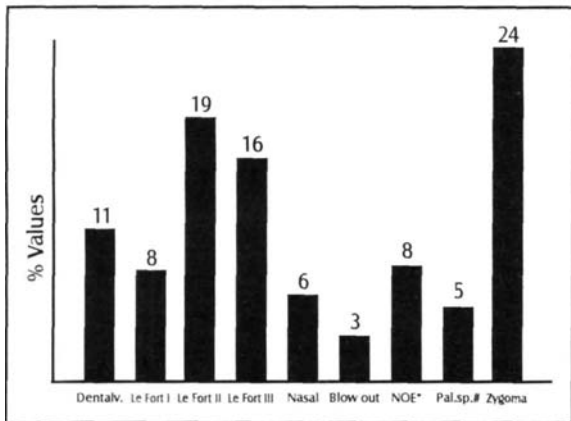


Fig. 3. Anatomic distribution of midface fractures (\*Naso-orbito-ethmoidal; # Palatal split; Isolated nasal fractures have not been included in this table).

Fifty percent (50%) of the patients sustained injuries in addition to the facial fractures (Fig. 4). Thirty-two percent (32%) sustained head injuries. Among the head injury patients, thirty-one percent (31%) sustained cerebral concussion only, whereas the rest of the patients (69%) sustained major head injuries. In addition to the facial fractures, eighty-seven percent (87%) of the patients sustained facial lacerations.

Sixty percent (60%) of the patients suffered facial fractures secondary to road traffic accidents, whereas all other causes were responsible for forty percent (40%) cases (Fig. 1). Twenty-eight percent (28%) of the road traffic accident patients were 16 to 20 year old as against seventeen percent (17%) of all other causes in the same age group. Road traffic accident patients sustained more severe and extensive injuries when compared with other patients (Table 3).

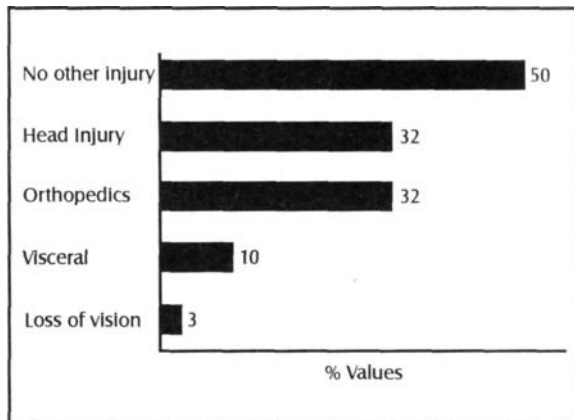


Fig. 4. Associated injuries.

Table 3. Road traffic accidents versus all other causes.

	Road Traffic Accident (103 patients) %	All Other Causes (67 patients) %
Incidence	60	40
Fractures per patient	2.3	1.5
Combination fractures	24	15
Associated injuries	66	21
Major head Injury	28	12

## Discussion

### Isolated nasal fractures

Isolated nasal fractures were the most common facial fractures in the present study. Nakamura and Gross<sup>6</sup> also reported nasal fractures to be the most common in their series.

### Facial fractures excluding isolated nasal fractures

Increases in the frequency of the facial fractures over a period of time and seasonal variation have been reported.<sup>7,8,9</sup> The present study does not show any such trend (Table 1). The sex ratio is higher in favour of males as compared to the studies conducted in the West.<sup>19</sup> It is similar however to findings from studies conducted in other Arab countries.<sup>2,4,10,11</sup> This can be attributed to the Islamic culture and the socio-economic factors. A majority of the patients were in the 16 to 20 year old age group (25%) followed by 21 to 25 year old (16%) and 26 to 30 year old (16%) patients (Table 2). Maximum number of patients in the 16 to 20 year old age group sustained the injuries due to road traffic accidents indicating an irresponsible driving attitude among the youngsters. Considering a ten-year age bracket (as used in most of the studies), the maximum number of the patients were in the 21 to 30 year old age group as shown in other studies.<sup>2,8,12</sup> In the present study, however, a higher percentage of patients were in the 11 to 20 year old age group than were found in previous studies.

One hundred and ten (110) patients sustained one hundred and eighty-five (185) separate mandibular fractures. The anatomic distribution of the fractures of the mandible (Fig. 2) showed fewer angle fractures and more anterior fractures in the present study compared with studies conducted in the West.<sup>12</sup> The anatomic distribution of midface fractures (Fig. 3) showed a much lower number of isolated zygomatic fractures and higher number of Le Fort II and Le Fort III pattern fractures in comparison with the incidence in Libya,<sup>4</sup> USA<sup>1</sup> and United Kingdom.<sup>3,12</sup> The anatomic locations and fracture distributions showed more extensive injuries in the present study. The fracture distri-

butions in Arab studies showed a higher incidence of midface and combination fractures in comparison with the studies conducted in the West.<sup>2,12</sup> The differences in distribution and anatomic location of facial fractures in various studies are mainly attributed to the etiologic factors.

A higher number of patients sustained associated injuries in the Arab studies when these are compared to the studies conducted in the West.<sup>12,4</sup> Road traffic accidents have been shown to cause the most associated injuries.<sup>1</sup> The patients involved in road traffic accidents sustained significantly higher number of associated injuries in the present study (Table 3).

Road traffic accident (60%) was the most common cause, whereas assaults accounted for only 6% of the patients (Fig. 1). Incidence of more extensive facial injuries and higher numbers of associated injuries can be attributed to higher incidence of road traffic accidents as the cause and absence of mandatory seat belt legislation at the time of the the present study. Road traffic accidents are the most common cause in the Arab and the developing countries,<sup>1,4,8,13</sup> whereas assault is the main etiologic factor in the studies conducted in the West.<sup>2,12</sup> High frequency of blindness associated with midfacial fractures in the region has been attributed to the predominance of road traffic accidents as the major cause in the absence of an obligatory seat belt law.<sup>14</sup> A significant reduction in the incidence of facial fractures has been noted in various studies comparing the periods before and after the introduction of compulsory use of the seat belt.<sup>10,15,16</sup> The force necessary to fracture the facial skeleton readily develops when the face or head of an unrestrained front seat occupant strikes any non-yielding vehicle component in the event of a road traffic accident.<sup>12</sup> Nelson<sup>17</sup> stated that the injuries suffered by restrained front seat occupants occurred less frequently, are less severe, less likely to prove fatal, and less likely to cause long stays in the hospital. The present and the past studies indicate that the restraint of front seat occupants by seat belts is expected to reduce the rate of road traffic accident related fatalities and injuries.

Clearly, compulsory use of seat belts and continuing education of motor vehicle drivers will reduce the number and extent of road traffic accident injuries significantly. Mandatory seat belt legislation for the front seat passengers was enacted in the United Arab Emirates on June 1, 1998. It would be useful to re-evaluate the etiology and pattern of the facial fractures to assess the impact of compulsory seat belt legislation after a few years. Assault is the major etiologic factor in the West. 1.2.6.12.15 Alcohol and unemployment are considered to be contributory factors in the assault as the cause of facial fractures.<sup>1218</sup> Low incidence of assault as a cause in the present study is most likely due to significantly lower rates of unemployment and alcohol consumption in the subjects studied.

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