

THE ETIOLOGY AND PATTERNS OF MAXILLOFACIAL FRACTURES IN CHILDREN IN KUWAIT, 1979 TO 1988 AND RECOMMENDATIONS FOR PREVENTION

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الرضوض الوجهية الفكية التي تصيب الأطفال، كانت نسبتها المثوية لمجموع الاصابات الوجهية الفكية هي أكبر بمرتين أو أكثر في الكويت من البلاد الأخرى التي درست مثل هذه الاصابات.

السببين الرئيسيين لمثل هذه الحوادث هما حوادث الطرق حيث يكون الأطفال فيها أما مسافرين ضمن مركبة أصيبت بحادث سير أو أصيبوا بحادث دهس. أو حوادث السقوط ضمن البيت أو خارجه. حوادث العنف لم تسجل كسبب هام.

إن نسبة كسور الفك السفلي كانت أكبر بكثير مما كتب عنه في دراسات مشابهة ويعتبر المؤلفون إن سبب ذلك يعود إلى المدنية السريعة وغير الكاملة للمجتمع الكويتي والذي يعتبر عامل مساعد لحدوث مثل هذه الإصابات.

وقد تم وضع توصيات بيئية وثقافية وسلوكية لتخفيض مخاطر مثل هذه الاصابات عند الأطفال تم جمع النتائج السريرية لهذا البحث من ١٢٨ مريضاً تم قبولهم في الوحدة الجراحية وتراوح أعمارهم بين ٠ - ١٢ سنة ومصابين برضوض وجهية فكية وكانت مدة الدراسة بين عام ١٩٧٩م وعام ١٩٨٨م وتم مشاهدة وفحص المرضى بشكل دوري لتقدير نجاح المعالجة. وتم استبعاد المرضى الذين لديهم اصابات سنوية وعددهم ٦٨ مريضاً من هذه الدراسة. وقد صممت استمارة جمع المعلومات لتسجيل أساء المرضى، عمرهم، جنسهم، وجنسياتهم. (كويتيين، عرب، غير كويتيين، وغير عرب) وصف، نوع، ومكان الكسر، وسبب الاصابة. تم وصفة كحوادث سقوط، أو حوادث مرور كمسافرين أو مشاة، النشاطات الرياضية أو اللعب، عنف، أو حوادث ذات أسباب أخرى، المدة المنفصلة بين الحادث وبدء المعالجة، أسلوب العلاج المتبع، المضاعفات بعد المعالجة مدة الشفاء بعد المعالجة، عدم التناظر الوجهي والتشوهات الناتجة عن الاصابة.

Maxillofacial trauma to children, as a percent of total maxillofacial injuries, is two times greater or more in Kuwait than in other countries reporting such injuries. The two major etiological factors identified are road accidents in which children are either vehicular passengers or run over by a vehicle, and falls in and around the home. Violence was not reported as a significant cause. The percentage of mandibular fractures is far greater than those reported in similar studies. The authors considered the rapid but incomplete urbanization of the Kuwait society as a possible contributing factor for these injuries. Specific behavioral, educational, and environmental recommendations are made to reduce the risk of such injuries to children.

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Introduction

The Ministry of Public Health had observed a continuous increase in the number of children treated for maxillofacial injuries in the 1980's, a period of rapid industrialization and urbanization in Kuwait. An earlier study of maxillofacial trauma cases at the Surgical Unit of the Specialist Dental Center, Ministry of Public Health in Kuwait reported that 15% (82/533) of the treated cases were children, aged 0-9.¹ In other countries where data have been published, the percentage ranged from 1.5% to 8%.²

In this study, clinical data of all maxillofacial trauma cases to children from the neonatal period to 12 years of age have been examined to analyze the patterns and etiology of these injuries.

Materials and Methods

The patient records of 128 injured victims, aged 0-12, from February 1979 to February 1988 were retrieved and relevant data was recorded and analyzed. Data collection and patient interviews were carried out by staff oral surgeons at the Surgical Unit. Since all maxillofacial injuries were admitted in this unit, the records represented the sum of maxillofacial injuries to children during the period were less fatal and those involving only the teeth. Follow-up interviews and examinations were devised to assess the treatment results. Patients with teeth injuries (68) alone were excluded from the study. A data collection sheet was designed to record patient's name, age, sex and nationality (Kuwaiti, non-Kuwaiti Arab, and non-Arab); description, type and location of the fracture; the reported aetiology of the injury described as falls, road traffic accidents either as a passenger or a pedestrian; sport or play activities; violence, and other description of the incident; time from date of injury to definitive treatment; type of treatment rendered, post operative complications, length of post operative recuperation; functional anomalies and facial asymmetries resulting from the injury.

The standard error of difference between the means and percentage were calculated to determine p values of which below 0.050 were accepted as significant.

Results

There was no significant difference in the number of patients admitted by age [Fig. 1]. Injured males exceeded the number of injured females, 61.9% vs. 38.3 ($z=3.92$, $p<0.001$) [Fig. 2]. Arab victims outnumbered the non-Arab victims, 93% vs 7% ($z=8.52$, $p<0.001$) [Fig. 3]. Of these, Kuwaitis represented 45.3% and 47.7% for the non-Kuwaiti Arabs. Majority of the fractures were in the mandible (122/128) [Fig. 4], of which 73/122 ($z=2.45$, $p<0.01$) were classified as simple mandibular fractures. The remaining fractures (6/128) were of the facial skeleton.

The primary cause of injury was road traffic accidents (63/128;49%) [Fig. 5]. Thirty-eight victims were passengers, while 25 were pedestrians hit by a vehicle. Of these 25, 18 were children of primary school age. Patient records did not indicate whether passenger victims were in the front or back seat of the vehicle, or whether seat belts and other restraining devices were used.

Forty-six percent (59/128) of the injuries were caused by falls in and around the home, of which 30 were Kuwaitis. Additionally, 3% of the injuries (4-128) was a result of sport activities of which 0.8% (1/128) was hit by a heavy object and another 0.8% (1/128) was not documented. There were no injuries attributed to violence or child abuse. Majority of patients (82%, 105/128) presented were treated within five days of the injury [Fig. 6].

The greatest number of accidents occurred in December (19/128) and the lowest was in August (5/128). The number of injuries that occurred in the winter quarter (from December to February) was significantly higher ($z=3.47$, $p<0.001$). Various splinting methods were used for treatment fixation [Figs. 6 and 7]. No post operative complications were recorded. Follow-up interviews involved only 14 patients and not enough information was gathered to comment on.

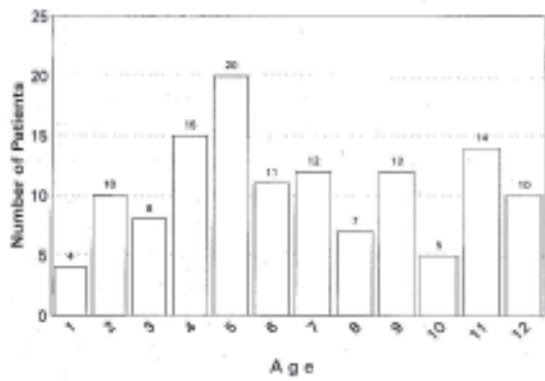


Figure 1. Bar graph showing maxillofacial fractures in children. A retrospective study of 128 cases from 1979 to 1988.

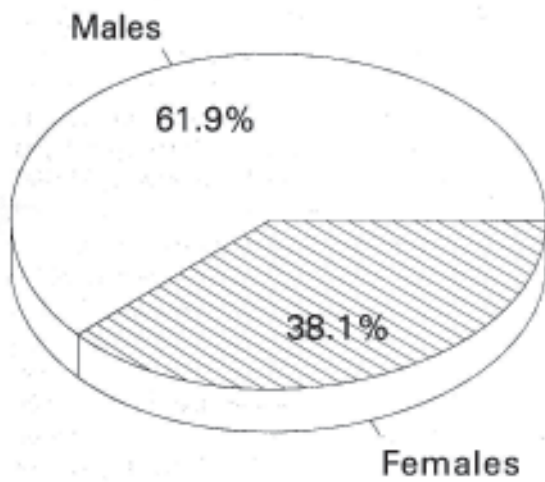


Figure 2. A pie chart showing maxillofacial fractures in children according to gender.

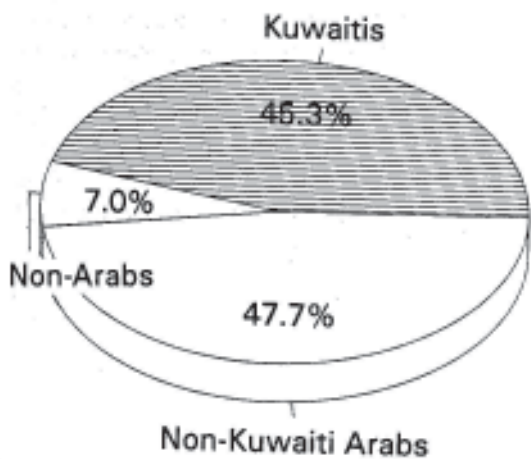


Figure 3. A pie chart showing the maxillofacial fractures in children.

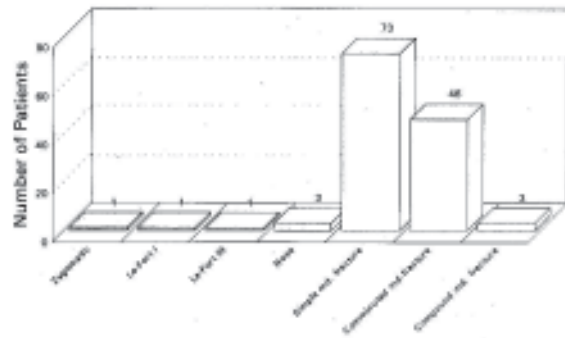


Figure 4. A bar graph showing the location of fractures.

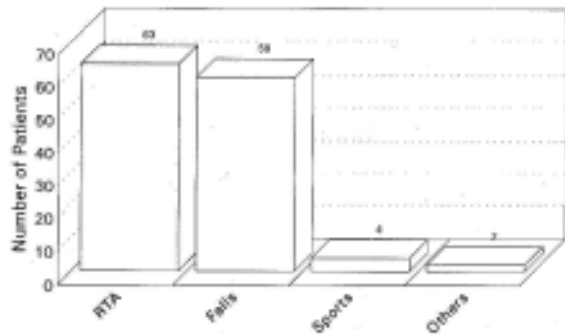


Figure 5. A bar graph showing the etiology fractures.

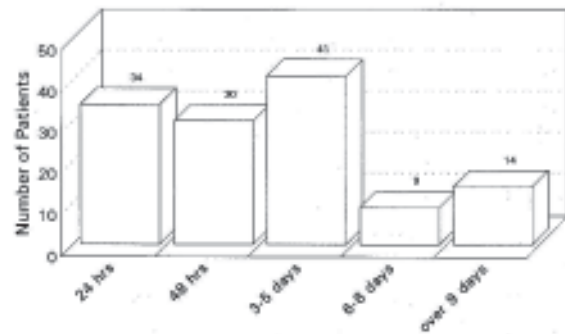


Figure 6. A bar graph indicating the time interval between injury, presentation and treatment.

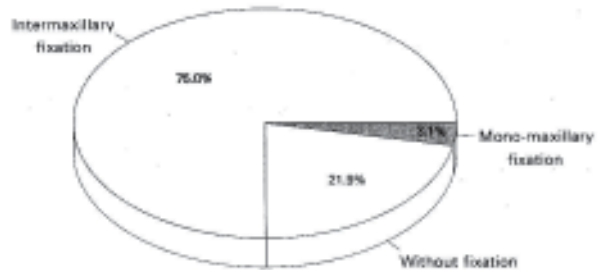


Figure 7. A pie chart showing the fixation percentage.

Discussion

Anatomically, children are less susceptible than adults to the effects of trauma to their facial structures.³ Their bones are more elastic, the sinuses are smaller, there is greater relative concentration of buccal adipose tissue, and the small facial skeleton is protected by a relatively large cranium. On the other hand, children have an immature mandible, especially around the developing canines, making this area susceptible to fractures.

In this study, the percentage of mandibular fractures is far greater than reported in similar studies, 95% vs. 32-53%.^{4,5} With all these fractures, there is the potential for later development of facial deformities and asymmetries.

In Kuwait, motor vehicles and the home and its environs were found to be the major etiologic factors in maxillofacial trauma to children. The World Health Organization reported that Kuwait ranks second in the world in the number of road traffic accidents per unit population. The primary cause of maxillofacial trauma to children is vehicular accident. A recent study in Australia demonstrated that falls were the main etiologic factor in facial injuries (43%) followed by play (22.7%) and road traffic accidents, a distant third (17.4%).⁶ Injuries to males exceeded those of females which was in consistent with the findings in the United States.⁷

The estimated yearly incidence rate of maxillofacial injuries in this period was 2.35/100,000 children aged 0-12. The incidence due to motor vehicle accidents was 1.16/100,000. Current estimates in the United States are 3.3/100,000 aged 0-14, of serious non-fatal injuries due to motor vehicle accidents.⁸ Two-thirds of all childhood injuries in the United States took place at home.⁹

In Kuwait, cultural factors seemed to play a role in these injuries to children which is due, perhaps, to its urbanization and industrialization in less than one generation. Its society was transformed from a rural desert-based existence to a highly technical urban-based lifestyle. Rapid development in industry, commerce, and public thoroughfares has brought significant changes in transportation, shelter, family structure, education, sport and leisure activities. However, the adaptation of the Kuwaiti society to such change is still incomplete.

Kuwaiti home, in the European sense, is an evolution for the Arab family. Data gathered

showed that children experienced serious injuries due to falls from stairs, off the ledges, or from the roof of a new home. This may, perhaps, be due to the fact that parents lack the cultural tradition or practical knowledge needed to inculcate a protective sense in the developing child. Maxillofacial injury rate for children, ages 0-12, from falls in Kuwait was estimated to be 1.1 /100,000/year during the study period. In 1984 in the United States, the estimated incidence rate for all injuries to children, ages 0-14, was 5.2/100,000/year.⁹

In Kuwait, no injuries were recorded as a result of violence. Assault or violence is a major cause of facial injuries in England.¹⁰ Fifty percent of the injury cases were treated within 48 hours in Kuwait as compared to 75.9% in UK, and 20% in Riyadh.¹¹ This time frame is an important factor which can effect future treatment needs.

Eighteen percent (23/128) were treated six days or more after the injury occurred. In these cases, life-threatening injuries were given priority over facial injuries, or that the patients had traveled from other Arab states.

Conclusions

The Ministry of Public Health in Kuwait had observed the continuous increase of maxillofacial trauma to young children since 1979. A review of the literature indicates that the percentage of these injuries to young children was totally of maxillofacial injuries admitted to hospitals which are two or more times greater than what had been reported in other countries. The major causes of these injuries are road traffic accidents and accidents around the home. Road accidents involved both children as passengers and pedestrians. Accidents at home generally involved falls from stairs and heights. Accidents from sports, play or violence were minimal. Injuries to Kuwaiti and non-Kuwaiti Arab children far outnumbered those to non-Arab children. The vast majority of these patients were treated within five days of injuries. Delays in treatment beyond five days were caused either by distant travel or emergency treatment for more lifethreatening conditions. Injuries were more likely to occur during the winter quarter.

The authors speculated that the rapid industrialization, resulting in significant changes in transportation, shelters and family structure, educational

and leisure activities have not been accompanied by a rapid growth of practical knowledge and cultural adjustment needed in parents and guardians to inculcate a protective sense in the child. Road safety regulations, when they exist, are poorly enforced while building safety codes infringements may be potential factors for injuries in and around the home.

Strategies to prevent pedestrian and passenger related accidents need to be identified, evaluated, and implemented. For example, overpasses which separate the child from traffic, fenced play areas, sidewalks and barriers, speed humps can reduce pedestrian injuries. Environmental curbs such as these offer greater potential than behavioral control of the child.¹¹

To reduce injuries at home, potential interventions should include (a) educating parents, caretakers and older siblings on how to reduce risk factors of falls; (b) supervision and safety measures to prevent falls; and (c) providing appropriate safety regulations in the national building codes.^{9,12}

The most promising method to reduce motor vehicle injuries is the mandatory legislation on the usage of lap-shoulder seat belts. Observance of such laws have increased which can be associated to the decrease of injuries and fatalities.⁹ Additionally, the mandatory use of both safety seat belts among children under four years of age has markedly decreased the injury among this group.^{11,13} Another potential intervention is the use of air bags, which have been designed to overcome the primary weakness of seat belts.¹⁴

In considering any of these changes, we must realize that the innate behavioral characteristics and sequence of child development cannot be changed. Hence efforts must be directed at educating the adults and modifying the environment.^{11,15}

Considering this reported high incidence of maxillofacial injuries involving children, additional studies are needed to assess the total annual incidence of injuries to children in Kuwait.

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