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Dento-alveolar and maxillofacial injuries: a 5-year multi-center study. Part 1: General vs facial and dental trauma

Shaul Lin[1,2], Liran Levin[3], Sharon Goldman[4], Kobi Peleg[4]

[1]Endodontics and Dental Trauma Unit, Department of Dental Sciences, Rambam Medical Center, Haifa; [2]Department of Endodontology and [3]Department of Oral Rehabilitation, The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University, Tel Aviv; [4]The Israeli National Center for Trauma & Emergency Medicine Research, Tel-Aviv University Sackler Faculty of Medicine, Tel Hashomer, Israel

Correspondence to: Dr Shaul Lin, Endodontics and Dental Trauma Unit, Department of Oral and Dental Sciences, Rambam Medical Center, POB 9602 Haifa, Israel
Tel.: +972 4 8543387
Fax: +972 4 8341346
e-mail: linsh@post.tau.ac.il

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Abstract – Maxillofacial injuries are a significant cause of morbidity and demand meticulously planned treatment. The aim of this present multi-center study was to evaluate the occurrence of dento-alveolar and maxillofacial injuries over a 5-year period. A retrospective cohort study of data from the Israel Trauma Registry was conducted for the years 2000–2004. The registry includes all trauma patients admitted and hospitalized due to an injury. Of the 111 010 hospitalized trauma patients, 5886 (5.3%) were diagnosed with maxillofacial or dental injuries. The main causes of injuries for hospitalized trauma patients were falls (48.1%) and motor vehicle accidents (25.2%), while the major causes of facial and dental injuries were vehicle accidents (39.6%, 56.8%, respectively) and falls (32.1%, 26.7%, respectively). High-risk age groups for dental and facial trauma were 10–18 years and 19–28 years, respectively, while for other trauma, ages for the greatest risk ranged from 0 to 9 years and over 59 years. Males were injured two to three times more frequently than females. A better understanding of the etiology of maxillofacial and dental injuries and identifying the high-risk groups should lead to appropriate prevention programs and treatment methods.

Maxillofacial injuries are a significant cause of morbidity and demand meticulously planned treatment (1–4). Etiology, type, and site of these injuries differ depending on various factors. Geographic area and socio-economic status of populations may affect the results of different studies. However, recent studies show that maxillofacial injuries are most commonly caused by trauma, such as motor vehicle accidents, assault, and falls (5–8).

Risk factors for maxillofacial fractures include male gender, alcohol consumption, and interpersonal violence. Moreover, increased leisure time has become an important factor in the etiology of maxillofacial fractures (5, 9, 10).

National statistics regarding facial trauma reflect not only standards of living and culture but also the implementation and enforcement of laws. For example, the introduction of seat belt laws has contributed to a reduction in serious and fatal injuries, as well as changes in the types of injuries (11–14).

There appears to be an increase in the occurrence of oral maxillofacial injuries over the past few years. For example, presentation of patients with facial fractures at a Maxillofacial and Oral Surgery Unit in New Zealand almost doubled from 1989 to 2000 (9). Additionally, the number of maxillofacial fractures increased by 27.9% over a 16-year period in Finland, and 20% in the United Kingdom (15, 16).

The aim of the present multi-center study was to evaluate the occurrence of dento-alveolar and maxillofacial injuries over a 5-year period. Part 1 focuses on the incidence of general trauma injuries, as well as facial or dental trauma. Part 2 will focus on the severity and location of these injuries.

Materials and methods

This is a retrospective study of all trauma patients recorded in the Israel National Trauma Registry (ITR) from January 1, 2000 to December 31, 2004. The ITR records data on all injury-related hospitalizations, in-hospital deaths, and transfers to another trauma center in Israel. In this multi-center study, data were collected from all six level I and four regional level II trauma centers in Israel. Patients with maxillofacial injuries were defined with a diagnostic injury code and an abbreviated injury scale (AIS) between 243400.1–251800.2 and 243099.1. Data regarding the nature of the injury, treatment, and outcome were obtained from the registry and analyzed

according to age, gender, etiology, and year of the injury. A total of 111 010 trauma files were reviewed. Maxillofacial and dental injuries were separated and further analyzed according to the above parameters. The descriptive analysis was processed using SAS 8.12.

Results

During the study period, 5886 (5.3%) patients were hospitalized with maxillofacial or dental injuries (Fig. 1). While the main causes of all trauma-related hospitalizations were falls (48.1%) and motor vehicle accidents (25.2%), the primary causes of maxillofacial or dental injuries were vehicle accidents (39.6%, 56.8%, respectively), falls (32.1%, 26.7%, respectively), and intentional violent injuries (18.9%, 11.4%, respectively) (Table 1). Between 2000 and 2004 the distribution of facial and dental injuries remained constant (Table 2).

Multi-organ injuries involving the maxillofacial area were frequent. Head injuries were the most common organ accompanying facial and dental injuries (44% and 33.8%, respectively), followed by the upper extremities (19.1% and 20.9%, respectively), lower extremities (17.2% and 22.5%, respectively), and thorax (17.4% and 14.7%, respectively).

Table 3 shows trauma distribution according to age and gender. Children (10–18) and young adults (19–28) were at the greatest risk for facial and dental injuries, while children under age 10 and adults 60 and over are at the greatest risk for trauma injuries. Males were injured two to three times more frequently than females.

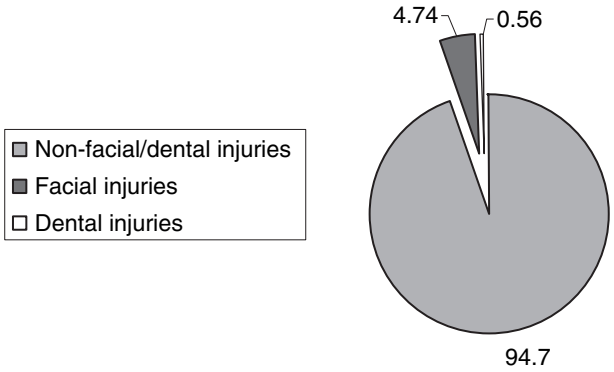

Fig. 1. Distribution of all trauma injury patients admitted and hospitalized in trauma centers in Israel during the years 2000–2004.

Table 2. Distribution according to general/facial/dental injuries

Year	Injuries: Non-facial/dental (%)	Facial (%)	Dental (%)	Total trauma files (%)
2000	17 264 (94.6)	869 (4.7)	115 (0.6)	18 248 (100)
2001	19 337 (94.5)	1021 (4.9)	111 (0.5)	20 469 (100)
2002	19 448 (94.5)	999 (4.8)	132 (0.6)	20 579 (100)
2003	24 168 (94.9)	1152 (4.5)	137 (0.5)	25 457 (100)
2004	24 907 (94.8)	1224 (4.6)	126 (0.5)	26 257 (100)
Total	105 124 (94.6)	5265 (4.7)	621 (0.6)	111 010 (100)

Table 3. Trauma distribution according to age and gender

	Injuries: Non-facial/dental (%)	Facial (%)	Dental (%)	Total trauma files (%)
Age				
Unknown	528 (0.5)	40 (0.8)	7 (1.1)	575 (0.5)
0–9	24 161 (23)	825 (15.7)	146 (23.5)	25 132 (22.6)
10–18	13 125 (12.5)	686 (13)	164 (26.4)	13 975 (12.6)
19–28	16 300 (15.5)	1300 (24.7)	150 (24.2)	17 750 (16)
29–38	10 639 (10.1)	728 (13.8)	77 (12.4)	11 444 (10.3)
39–48	8170 (7.8)	540 (10.3)	42 (6.8)	8752 (7.9)
49–58	6984 (6.6)	369 (7)	16 (2.6)	7369 (6.6)
>59	25 217 (24)	777 (14.8)	19 (3.1)	26 013 (23.4)
Gender				
Unknown	24 (0.02)	2 (0.04)	1 (0.2)	27 (0.02)
Female	39 170 (37.3)	1306 (24.8)	179 (28.8)	40 655 (36.6)
Male	65 930 (62.7)	3957 (75.2)	441 (71)	70 328 (63.4)
Total	105 124	5265	621	111 010 (100)

Discussion

Dental and maxillofacial injuries are an increasing public health-related problem (5, 9, 15, 16). A better understanding of the causes and risk indicators for these injuries is important for preventive programs and approaches. The present report found that during the years 2000–2004, 5.3% of trauma-related hospitalizations resulted in maxillofacial or dental injuries. This indicates that maxillofacial and dental trauma needs to be addressed.

Table 1. Causes of trauma among all patients admitted and hospitalized in trauma centers in Israel (2000–2004)

Cause of trauma	Injuries: Non-facial/dental (%)	Facial (%)	Dental (%)	Total trauma files (%)
Motor vehicle accidents	25 519 (24.3)	2084 (39.6)	353 (56.8)	27 956 (25.2)
Falls	51 512 (49)	1690 (32.1)	166 (26.7)	53 368 (48.1)
Burns	4562 (4.3)	3 (0.1)	1 (0.2)	4566 (4.1)
Other unintentional injuries	14 261 (13.6)	446 (8.5)	30 (4.8)	14 737 (13.3)
Intentional injuries	9007 (8.6)	933 (18.9)	71 (11.4)	10 011 (9)
Unknown	263 (0.3)	8 (0.2)	0 (0)	271 (0.2)
Total	105 124 (100)	5265 (100)	621 (100)	111 010 (100)

Not surprisingly, vehicle accidents, falls, and violence represented major causes of general and facial trauma, coinciding with the literature (5–8, 17). It should be noted that all three major causes of trauma are preventable.

Multi-organ injuries involving the maxillofacial area were frequent. These data can serve as an indication of the severity of these injuries. A patient with multi-organ trauma that includes maxillofacial injury requires special attention and knowledge from the medical hospital staff. Unfortunately, despite the high rate of experience with such events, the knowledge of physicians and emergency medical technicians regarding primary treatment of dental trauma is poor, especially diagnosis and treatment (18, 19).

It is clear that special emphasis should be given to provide primary caregivers with the relevant education needed to improve their knowledge and ability to deal with dental trauma.

Generally, the literature indicates that children are the most susceptible to trauma (20–22). However, the present study demonstrated a greater incidence in 10- to 28-year olds. This represents a trend of trauma occurrence in school-age children and young adults, possibly as a result of intense social activity (23).

Despite the prevalence and close relation between facial trauma and dental injuries, only a few studies have specifically analyzed this relationship (23, 24). Dental injuries may be overlooked by physicians treating trauma patients in hospital emergency rooms, resulting in misdiagnosis or improper dental evaluation. This problem was reported in the UK by Omovie and Shepherd (25), where 55% of facial injuries had been treated at emergency care facilities and only 21% of these were treated by maxillofacial surgeons. Given the high incidence of general and facial trauma in conjunction with dental trauma, as demonstrated in this study, it is clear that there is a need for further studies in this area.

Conclusions

This 5-year multi-center study demonstrated a relatively high occurrence of dental trauma in conjunction with general and facial trauma. Special public educational programs and publicity to promote knowledge regarding prevention of general, as well as maxillofacial and dental injuries are required.

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