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Dento-alveolar and maxillofacial injuries: a 5-year multi-center study. Part 2: Severity and location

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Abstract – Maxillofacial and dental injuries are not uncommon. These injuries may cause morbidity and demand meticulously planned treatment. Part 1 of this study focused on the incidence of general trauma injuries, as well as facial or dental trauma. The aim of part 2 is to evaluate the severity and location of the dento-alveolar and maxillofacial injuries over 5 years. A retrospective cohort study was conducted based on data from the Israel National Trauma Registry. Patients admitted and hospitalized due to trauma injuries during the years 2000–2004, totaled 111 010 in which 5886 (5.3%) were maxillofacial or dental injuries. Most of these injuries were traffic-related (54.5%), followed by events at home (18.7%). Facial injuries combined with injuries to other organs involved occurred in 3721 (63.2%) of the patients. Most minor injuries were noted when no other organs were involved, while severe injuries were more common when multiple organs were involved. More than 25% of facial injuries required surgery. Meticulous epidemiologic studies are needed to support the leading role, extent, and severity of maxillofacial trauma.

Dental trauma is a common event during childhood and adolescence (1–4). Prompt and appropriate management is necessary to improve significantly the prognosis for many dento-alveolar injuries. Treatment of a traumatized tooth requires fastidious diagnosis and coordination between all treating dental professionals from the moment of injury. Unfortunately, much of this trauma remains untreated, mistreated, or over-treated, leading to more complicated treatment in the future (5–7).

It is possible to establish preventive measures aimed to avoid future injuries when the etiologic factors are identified. Management of maxillofacial trauma includes treatment of facial bone fractures, dento-alveolar trauma, and soft tissue injuries, as well as associated injuries, mainly of the head and neck (8). Maxillofacial injuries affect a significant proportion of trauma patients, which can occur in isolation, or in combination with other serious injuries, including cranial, spinal, and upper and lower body injuries (9). The epidemiology of maxillofacial trauma varies in type, severity, and cause depending on the population studied (10, 11). Differences between populations regarding the causes of maxillofacial trauma may be the result of risk factors and cultural differences between countries.

An understanding of the cause, severity, and distribution of maxillofacial trauma can help establish clinical and research priorities for effective treatment and prevention of these injuries. Continuous long-term data collection related to maxillofacial injuries is important because it allows the development and evaluation of preventative measures (12). Prospective and retrospective data collection enables accurate detailed recording and regular data analysis.

The aim of the present multi-center study was to evaluate the severity and location of dento-alveolar and maxillofacial injuries during a 5-year period. Part 1 focused on the incidence of general trauma injuries compared with facial or dental trauma (13).

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 other acute care hospitals at 10 of 27 medical centers in Israel. In this multi-center study, data refer to all six level I and four

regional level II trauma centers in Israel. A diagnostic injury code and an abbreviated injury scale (AIS) between 243400.1–251800.2 and 243099.1 were assigned to all patients with maxillofacial injuries. Data were analyzed according to the severity of trauma using the Injury Severity Score (ISS), trauma location, and duration of hospital stay. The ISS is an anatomic scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an AIS score and is allocated to one of six body regions (head, face, chest, abdomen, extremities including pelvis, and external). Only the highest AIS score in each body region is used. The score of the three most severely injured body regions is squared and added together to produce the ISS score (values from 0 to 75; Table 1). For example, an AIS of 6 (fatal injury) is automatically assigned an ISS of 75. The ISS is virtually the only anatomic scoring system in use and correlates linearly with mortality, morbidity, hospital stay, and other measures of severity (14).

During the years 2000–2004, a total of 111 010 trauma files were reviewed. Files included patients admitted and hospitalized in the trauma centers due to any kind of trauma. Maxillofacial and dental injuries were separated and further analyzed according to the above parameters. The descriptive analysis was processed using SAS 8.12.

Results

Maxillofacial or dental injuries were found in 5886 (5.3%) of the patients. Table 1 shows that most of the injuries occurred on the roads and streets (54.5%), followed by events at home (18.7%). The prevalence of both facial injuries and injuries to other organs was reported among 3721 (63.2%) of the patients.

More than one-quarter of the facial and dental injuries required surgery (Table 2). Table 3 shows the distribution of facial and dental injuries according to the area of surgical intervention. Injuries to the facial bones were the most common cause of surgery among patients with maxillofacial injuries, 23% of hospitalized patients with facial bone injuries needed surgery compared with less than 3% for injuries to other facial organs.

As expected, injury severity increased among patients with multi-organ injuries. Minor injuries (ISS 1–8) were reported among 97% of the patients with single facial injuries, while 37% of patients with multi-organ injuries were diagnosed with minor injuries. ISS of 25+ was reported among 20% of patients with multi-organ injuries, while almost all patients with only facial injuries had either minor (ISS 1–8) or moderate (ISS 9–14) injuries (Table 4).

Likewise, the length of hospital stay increased for multi-organ injuries. The majority (87%) of facial injuries required a hospital stay of up to 6 days, while 41% of persons with multi-organ injuries were hospitalized for less than a week (Table 5).

Table 1. Distribution of facial and dental injuries by place of event, 2000–2004 (n = 5886)

Place of injury	Facial/dental injuries (%)
Road/street	54.5
Home	18.7
Public building	5.7
Industry	4.0
Playgrounds/outside trips/sports center	3.3
School	1.6
Institutional living	1.1
Military base	1.0
Mall/commercial center	1.0
Unknown	6.7
Other	2.4
Total	100

Table 2. Distribution of facial and dental injuries according to surgical intervention, 2000–2004 (n = 5886)

	Injuries		
Surgical intervention	Facial (%)	Dental (%)	Total (%)
No	3844 (73)	451 (72.6)	4295 (73)
Yes	1421 (27)	170 (27.4)	1591 (27)
Total	5265 (89.4)	621 (10.7)	5886 (100)

Table 3. Distribution of facial and dental injuries, by area of surgical intervention, 2000–2004 (n = 5886)

	Surgical intervention	
Area of intervention	Yes (%)	No (%)
Facial bones	1343 (22.8)	4543 (77.2)
Tongue	134 (2.3)	5752 (97.7)
Mouth	148 (2.5)	5738 (97.5)
Teeth/gums/alveoli	40 (0.7)	5846 (99.3)
Teeth	83 (1.4)	5803 (98.6)

Table 4. Distribution of Injury Severity Score (ISS) for facial injuries, by single and multiple organ injuries, 2000–2004 (n = 5886)

	Facial injuries		
ISS	Alone (%)	With other organs (%)	Total (%)
1–8 (minor)	2098 (96.9)	1362 (36.6)	3460 (58.8)
9–14 (moderate)	63 (2.9)	848 (22.7)	911 (15.5)
16–24 (severe)	4 (0.2)	784 (21.1)	788 (13.4)
25–75 (critical)	0 (0)	727 (19.5)	727 (19.5)
Total	2165 (100)	3721 (100)	5886 (100)

Table 5. Duration of hospital stay for facial injuries, by single and multiple organ injuries, 2000–2004 (n = 5886)

	Facial injuries		
Duration of hospital stay (days)	Alone (%)	Combined with other organs (%)	Total (%)
Unknown	11 (0.5)	25 (0.7)	36 (0.6)
0	35 (1.6)	114 (3.1)	149 (2.5)
1	508 (23.5)	459 (12.3)	967 (16.4)
2	398 (18.4)	429 (11.5)	827 (14.1)
3	346 (16)	375 (10.1)	721 (12.3)
4–6	574 (26.5)	783 (21)	1357 (23.1)
7–13	245 (11.3)	776 (20.9)	1021 (17.3)
14–27	39 (1.8)	466 (12.5)	505 (8.6)
28–89	9 (0.4)	285 (7.7)	294 (5)
90+	0 (0)	9 (0.2)	9 (0.2)
Total	2165 (36.8)	3721 (63.2)	5886 (100)

Discussion

The leading cause of death in the first 40 years of life is trauma. Furthermore, traumatic injury has been identified as the leading cause of lost productivity, causing more loss of working years than heart disease and cancer combined. Fractures and injuries of the facial skeleton are a common component of multiple trauma resulting from motor vehicle and industrial accidents, as well as from sports and intentional injuries (10, 13, 15). A direct relationship has been found between the severity of facial injury and patients reporting work disabilities (10, 15). As injury severity increases, the percentage of persons reporting long-term injury-related disability increases. These include visual problems, alterations in smell, difficulty with mastication, breathing and epiphora, which contribute to unemployment. Meticulous epidemiologic studies are needed to determine the extent and severity of maxillofacial trauma.

The incidence of facial injuries that occur in conjunction with major trauma has been shown to range from 34% of 87 174 trauma patients in a North American Database on Trauma (16) to 15% of 1088 trauma patients in Liverpool (17), and 24.5% of 802 trauma patients in London (18). As the present findings showed a much higher percentage of multi-organ involvement, the management of combined maxillofacial and general trauma is a challenge. An interdisciplinary approach by several specialists is required to optimize patient care and outcome. General and emergency room physicians could play a pivotal role in the provision of primary care following such trauma. The authors support the view that there is a real need to involve non-dental primary healthcare professionals in providing primary diagnosis and treatment for dental trauma (19, 20).

As described above, over 25% of facial and dental injuries required surgical intervention, contributing to the severity of the injuries. Minor injuries (ISS 1–8) were most common when facial injuries were the primary injury and other organs were not involved. However, when other organs were involved, the ISS increased. This further emphasizes the need for oral and maxillofacial health education and training for physicians and non-dental primary healthcare professionals.

Conclusions

This 5-year multi-center study demonstrated that oral and maxillofacial injuries are common. There is a need for meticulous epidemiologic studies to support the leading role, extent, and severity of maxillofacial trauma. The incidence of facial injuries that occur in conjunction with major trauma is high. Special emphasis should be given to provide primary caregivers with the relevant education to improve their knowledge and ability of dealing with diagnosis and treatment of oral and maxillofacial trauma.

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