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Occurrence of tooth injuries in patients treated in hospital environment in the region of Araçatuba, Brazil during a 6-year period

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Abstract – Dental trauma has been considered as a public health problem that affects mainly children and youngsters and due to its impact on the patient's quality of life. This study presents the results of a 6-year survey of the occurrence and characteristics of dental trauma in patients admitted to the Service of Surgery and Oral and Maxillofacial Traumatology of the School of Dentistry of Araçatuba (UNESP, Brazil) after emergency care in hospital facilities in the region of Araçatuba, SP, Brazil. For such purpose, the clinical files of patients treated at the Service between 1999 and 2005 were reviewed. Information regarding gender, age, number of traumatized teeth, etiology and diagnosis of the trauma was collected from the files of patients with tooth injuries and recorded in case report forms specifically designed for this purpose. The results showed that from a total of 4112 patients admitted to the Service within the surveyed period, 266 (6.5%) had tooth injuries (172 males – 64.7%; 94 females – 35.3%). The total number of traumatized teeth was 496. Most patients belonged to the 16–20 year-old age group (20.3%) and the most frequent causes of tooth injuries were bicycle accidents (28.6%), motorcycle accidents (19.2%) and falls (18.8%). Injuries to the periodontal tissues were the most frequent type of tooth injuries (408 teeth; 82.26%), occurring in 118 primary and 290 permanent teeth. Among the injuries to the periodontal tissues, avulsion was the most common (32.86%) (29.41% for primary and 34.0% for permanent teeth), followed by extrusive luxation (19.15%) (25.21% for primary and 17.24% for permanent teeth). In conclusion, in the surveyed population, cases of tooth injuries were more frequent in males aged 16–20 years old due to cyclist accidents with predominance of injuries to the periodontal tissues, in particular, avulsions.

Tooth injuries have been considered as an increasing public health problem (1–4) unlike dental caries that has been on decline over the last decades (5). Tooth injuries are of interest for health professionals not only because of its high prevalence, but mainly might interfere with the patient's life, as severe traumas may cause physical and psychological impairment and interfere with the social relations (6).

Tooth injuries most frequently occurs in children and adolescents (7–11) and its main causes are falls, collisions with other people and objects, sports activities, traffic accidents and physical aggressions (2, 3, 12–14). Therefore, tooth injuries may occur either isolated or associated with other types of trauma, especially facial traumas (11, 15).

The occurrence of tooth injuries is high (5) and in many situations it is not the top priority in the emergency management of polytraumatized patients. However, the treatment success is directly related to how fast and effective is the first-aid care of these patients. Several studies have reported the management of tooth injuries in hospital environment (15–17). In several cases, the urgency/emergency treatment may be performed without the presence of a dentist. Studies that investigate the prevalence of tooth injuries in clinical settings other than dental offices, such as hospitals and emergency rooms, are important to provide information about the most prevalent types of trauma and the characteristics of the treated population (8). This should be of help to improve the treatment, prevention and prognosis for trauma cases, and minimize the damage, in addition to underscoring the importance of including a dentist in the emergency clinical staff.

This study presents the results of a 6-year survey of the occurrence and characteristics of tooth injuries in patients admitted to the Service of Surgery and Oral and Maxillofacial Traumatology of the School of Dentistry of Araçatuba (UNESP, Brazil) after emergency care in hospital facilities.

Materials and methods

The research protocol was submitted to review by the Ethics in Human Research Committee of the School of

Dentistry of Araçatuba, UNESP (Brazil) and the study design was approved (Process No. 32/2006).

The charts of trauma patients admitted to the Service of Surgery and Oral and Maxillofacial Traumatology of the School of Dentistry of Araçatuba (UNESP, Brazil) between 1999 and 2005 were reviewed. Information regarding gender, age, number of traumatized teeth, etiology and diagnosis of the trauma was collected from the files of patients with tooth injuries and recorded in case report forms specifically designed for this purpose.

The study population comprised all patients who referred to our Service by four hospitals in the city of Araçatuba and two hospitals in the city of Birigui. All of the located hospitals in the service area were included in the research. These cities are located in the northwest of São Paulo state and had a total population of 290 000 habitants in 2005, according to the Brazilian Institute of Geography and Statistics (18), which is the agency responsible for statistical, geographic, cartographic, geodetic and environmental information in Brazil. Two post graduations in Dentistry of the institution were selected for the collection of the data in the charts, which received specific training for the standardization of the information. Members of the clinical staff were instructed and calibrated by the investigators for collection of the information used in the study. The types of dental trauma were classified according to the criteria proposed by Andreasen & Andreasen (5): periodontal injuries (concussion, subluxation, lateral luxation, extrusive luxation, intrusive luxation and avulsion), crown fractures (enamel, enamel/dentine and enamel/dentine/pulp), crown–root fractures (may or may not expose the pulp) and root fractures.

Data analysis included descriptive statistics (frequency distribution). Statistical significance for the association between the occurrence of tooth injuries and variables (gender, age, number of traumatized teeth, etiology and diagnosis) was determined using chi-squared test. The level of significance was set at 5%.

Results

Between 1999 and 2005, 4112 trauma patients were referred for treatment at the Service of Surgery and Oral and Maxillofacial Traumatology of the School of Dentistry of Araçatuba, UNESP (Brazil). From this total, 266 patients (6.5%) presented tooth injuries, being 172 (64.7%) male and 94 (35.3%) female. Most patients belonged to the 16- to 20-year-old age group (20.3%), followed by the 0- to 5-year-old age group (18.8%) (Table 1).

The most frequent causes of dentoalveolar trauma were bicycle accidents (28.6%), motorcycle accidents (19.2%) and falls (18.8%) (Table 2).

The total number of traumatized teeth was 496. In 45.5% of the patients, only one tooth was affected, 32.7% of the patients presented two traumatized teeth, 11.6% had three and 10.2% had four or more traumatized teeth (Table 3).

Injuries to the periodontal tissues were the most frequent type of dentoalveolar injury, occurring in a total of 408 teeth (82.3%), being 118 primary and 290 permanent teeth. Avulsion was the most common type of injury to the periodontal tissues, affecting 32.9% of the teeth (29.4% in the primary dentition and 34.0% in the permanent dentition), followed by extrusive luxation (19.2%) (25.2% of primary and 17.3% of permanent teeth). Among the injuries to hard dental tissues and the pulp, crown fractures affected 1% of the primary teeth and 21% of the permanent teeth (total of 16.3%), while crown–root fractures (1.1%) and root fractures (0.8%) occurred only in permanent teeth. The maxillary incisors were the most commonly affected teeth in the primary (65.6%) and permanent (49.1%) dentitions (Tables 4 and 5).

The relationship between dental injuries and characteristics did not reveal statistical significant differences.

Table 1. Distribution of tooth injuries according to the patients' gender and age group

	Patients				Teeth			
Age	Males	Females	Total	%	Males	Females	Total	%
0–5	27	23	50	18.8	42	46	88	17.7
6–10	27	19	46	17.3	52	36	88	17.7
11–15	19	13	32	12.0	31	20	51	10.3
16–20	36	18	54	20.3	67	37	104	21.0
21–25	31	6	37	13.9	64	11	75	15.2
26–30	11	6	17	6.4	19	10	29	5.8
31–35	11	5	16	6.0	13	16	29	5.8
36+	10	4	14	5.3	19	13	32	6.5
Total	172	94	26	100.0	307	189	496	100.0
%	64.7	35.3			61.9	38.1		

Table 2. Distribution of etiological factors and gender of tooth injuries

	Gender			
Etiological factors	Males	Females	Total	%
Traffic accidents				
Automobile	15	10	25	9.4
Motorcycle	37	14	51	19.2
Bicycle	37	39	76	28.6
Sports	9	1	10	3.7
Falls	32	18	50	18.8
Violence	15	2	17	6.4
Work-related	6	–	6	2.3
Animal	3	2	5	1.8
Other	6	–	6	2.3
Unspecified accidents	12	8	20	7.5
Total	172	94	266	100.0

Table 3. Number and percentage of traumatized teeth *per* patient and gender

Number of patients	1	2	3	4 or more
Female	43	29	12	8
Male	78	58	19	19
Total	121	87	31	27
%	45.5	32.7	11.6	10.2

Table 4. Distribution of traumatized teeth according to the type of trauma in the primary dentition

	Primary dentition													
	Superiors					Inferiors								
Diagnosis	53	52	51	61	62	63	73	72	71	81	82	83	Total	%
Periodontal injuries														
Concussion	–	–	1	–	–	–	–	–	–	–	–	–	1	0.8
Subluxation	–	3	1	6	6	–	–	–	–	–	–	–	16	13.5
Luxation														
Lateral	–	2	4	6	2	–	–	–	1	1	–	–	16	13.5
Extrusion	–	1	14	14	1	–	–	–	–	–	–	–	30	25.2
Intrusion	–	4	8	6	2	–	–	–	–	–	–	–	20	16.8
Avulsion														
Avulsion	3	4	9	8	6	1	–	–	2	2	–	–	35	29.4
Fractures														
Crown enamel/dentin	–	–	–	1	–	–	–	–	–	–	–	–	1	0.8
Total	3	14	37	41	17	1	–	–	3	3	–	–	119	100.0
%	2.5	11.8	31.1	34.5	14.3	0.8	–	–	2.5	2.5	–	–		

Table 5. Distribution of traumatized teeth according to the type of trauma in the permanent dentition

	Permanent dentition													
	Superiors						Inferiors							
Diagnosis	13	12	11	21	22	23	43	42	41	31	32	33	Total	%
Fractures														
Enamel	1	3	3	6	4	–	–	–	–	1	2	–	20	5.3
Enamel/dentin	–	4	10	12	8	1	–	1	2	3	2	–	43	11.1
Enamel/dentin/pulp	2	6	3	5	1	–	–	–		–	–	–	17	4.8
Crown/root/pulp	–	1	–	2	–	–	–	1	1	–	–	–	4	1.1
Root fracture	–	–	–	1	1	–	–	1	–	–	–		3	0.8
Concussion	1	–	–	2	–	–	–	–	–	–	–	–	3	0.8
Subluxation	2	6	11	10	4	–	–	1	4	3	–	1	42	11.1
Luxation														
Extrusion	2	8	15	14	6	2	1	2	8	4	3	–	65	17.2
Lateral	–	2	8	8	2	–	–	–	–	1	1	–	22	5.8
Intrusion	1	4	8	8	5	1	–	–	1	2	–	–	30	8.0
Avulsion	5	16	28	31	8	1	2	10	9	9	7	2	128	34.0
Total	14	49	86	99	39	5	3	16	25	23	15	3	377	100.0
%	3.8	13.0	22.8	26.3	10.3	1.3	0.8	4.2	6.6	6.1	4.0	0.8		

Discussion

The outcomes of the present study corroborate previously reported data regarding the prevalence of tooth injuries. The data collected in this survey confirmed that tooth injuries most commonly occurs in the male population, with a 1.8:1 male-to-female ratio (7, 9, 16, 19, 20) and most frequently affects the maxillary anterior teeth (9, 16), especially the maxillary central incisors (19). In the present study, the maxillary incisors were involved in most cases of tooth injuries in both dentitions, corresponding to a occurrence of 91.7% and 72.4% for the permanent and primary dentitions, respectively. This prevalence is similar to that reported by Gálea (21) (52.3%) but lower than that reported by Zerman & Cavalleri (7) (80%), who evaluated only permanent incisors. Probably, this casuistry difference exists among the works due to the differences of the etiological factors in the occurrence of the tooth injuries. Provavelmente, existe esta diferença de casuística entre os trabalhos devido às diferenças dos fatores etiológicos na ocorrência dos traumatismos dento-alveolares.

Bicycle accident was the most predominant etiological factor for both genders. The causes of tooth injuries may change depending on the age range and socioeconomic profile of the study population. However, the findings of the present study showed that traditionally mentioned causes actually present little variation from one emergency study to another (2, 3, 9, 12, 13). It is noteworthy that the cities from which the patients were referred for treatment in the School of Dentistry of Araçatuba present cultural, economical, topographic and climatic characteristics that are propitious to the use of bicycles as transportation and leisure means.

Motorcycle accident was the second most prevalent etiological factor for the male population. Victims of motorcycle accidents usually present multiple injuries, including trauma to several teeth, bone fractures and soft tissue lesions (21). Although in a large number of

patients (45.5%) only one tooth was affected, most patients presented more than one traumatized tooth (32.7% had two teeth, 11.6% three teeth and 10.2% four or more teeth). These findings are similar to those of a previous study (21).

In this survey, most cases of tooth injuries occurred in the 16–20 year-old age group, which may be attributed to the fact that adolescents and young adults usually have a more intense social interaction and are more frequently involved in traffic accidents (14). Such accidents are strongly influenced by high alcohol consumption due to unemployment and economical recession in developing countries (22). Nevertheless, several studies have reported that children usually are at higher risk to sustain tooth injuries (20, 21, 23, 24).

Avulsion was the most frequent type of injury to the periodontal tissues for primary and permanent teeth. This disagrees with the findings of previous studies, which reported crown fracture as the most prevalent injury in the permanent dentition (9), but agrees with reports of prevalence of luxations in primary teeth (25, 26). In the primary dentition, the elasticity of the bone tissue and the etiological factor are mainly responsible for that difference in the prevailing injury type (21).

A possible explanation for the outcomes of the present study may be attributed to the patient's profile as well as to the characteristics of our Service of Surgery and Oral and Maxillofacial Traumatology, which admits patients with oral and maxillofacial traumas in general, not limited to tooth injuries. Most Brazilian patients with tooth injuries alone are usually referred to dental offices rather than hospitals or emergency rooms. Therefore, the data collected in the present study were relative to more severe cases with association or suspicion of other traumas. This means that the results of the present study do not reflect the actual epidemiology of tooth injuries in the studied locations because the collected data are relative to patients treaded in hospital environment. However, it should be emphasized that emergency management of trauma patients by professionals with knowledge of tooth injuries is of paramount importance (27). The findings of the present study suggested that the existence of a qualified service for emergency management of tooth injuries cases was necessary to prevent the loss of sound teeth, which could not be preserved otherwise.

In the São Paulo state, the emergency management of tooth injuries trauma patients is undertaken by professionals with different specializations, including firefighters with special paramedic training who work on the mobile emergency care service and are in charge of providing first-aid care to victims of accidents on the street and might have to deal with cases of tooth injuries. In the city of the Araçatuba, patients with oral and maxillofacial trauma are referred for emergency care at the Service of Surgery and Oral and Maxillofacial Traumatology of the School of Dentistry and subsequently undergo the required endodontic, restorative and prosthodontic treatments.

Zerman & Cavalleri (7) affirmed that it is not easy to compare the distribution of the types of trauma reported in different studies because the tooth injuries receive distinct classifications. Nevertheless, in the present study, most patients were young and under their twenties, which is in agreement with the findings of other studies. The sequelae of such traumas may cause physical and psychological damage that may lead to clinical complications and social implications that could be avoided by the increase of prevention campaigns.

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