Analysis of the crown fractures and crownroot fractures due to dental trauma assisted by the Integrated Clinic from 1992 to 2002

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Abstract – The purpose of this study was to analyze crown fractures and crown-root fractures due to dentoalveolar trauma, treated in the Integrated Clinic comprehensive dental care at Araçatuba School of Dentistry (UNESP), from January 1992 to July 2002. The data were obtained from files of trauma cases. On the analysis period, 293 patients had crown fractures or crown-root fractures, in 605 teeth. Sixty-nine percent were males and 31% were females. Adolescents between 11 and 18 years old were the most prevalent group (41.6%) and the maxillary arch was the most commonly traumatized (83%). The most commonly affected tooth was the maxillary central incisor (58.3%). The most frequent causes were falls from bicycles (30.8%). It was concluded that the reality of the local service is similar to the published data.

Traumatic injuries to teeth and their supporting structures occur most commonly in young patients, and vary in severity from enamel fractures to avulsions. The magnitude of these problems is confirmed by statistical data on the prevalence of dental trauma during childhood and adolescence (1). However, the knowledge in this subject is still insufficient and fragmentary.

Crown fractures and crown-root fractures deserve special attention, due to their prevalence, variety of causative factors, and the diversity of clinical solutions proposed for the treatment of these fractures.

It has been reported that during childhood the main causes of traumatic dental injuries are falls (2-4). Among adolescents, the trauma is mainly due to accidents related to sports (5). At the end of adolescence and beginning of adulthood car accidents is the most prevalent cause (6, 7). Trauma related to violence have also been reported (8).

The majority of dental trauma occurs in the maxillary central incisors (9). A thorough examination is critical to reach a correct diagnosis and treatment plan (10). Dental trauma remains one of

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the most challenging clinical situations for dentists because they present sporadically and require multidisciplinary diagnosis and treatment (11).

Dental trauma can be classified according to several factors such as anatomy, pathology and therapy, as it can be observed by several classifications proposed in the literature (12–17). The classification of traumatic dental injuries proposed by Andreasen (2) is based on a system accepted by the World Health Organization (WHO) (18), which was adopted in this study.

The purpose of the present study was to analyze cases of crown fractures and crown-root fractures as a result of dentoalveolar trauma, assisted by the Integrated Clinic Comprehensive Dental Care at Araçatuba School of Dentistry (UNESP), from January 1992 to July 2002.

Material and methods

The material consisted of 771 patient files, registered in the Integrated Clinic from January 1992 to July 2002. As a basic requirement to be included in the study, patients with a trauma history were selected that included crown fractures and crownroot fractures and whose files were complete.

The data collection was carried out by a questionnaire designed for this study and comprising the following items: identification, medical history, history of previous dental trauma, current dental trauma, extraoral and intraoral examination, radiographic examination and diagnosis (Appendix 1). The findings were tabulated according to the sequence of the patients file and were recorded in forms created for this purpose. The authors reviewed each patient evaluation. There was no disagreement between examiners. These patients received an emergency assistance and treated as needed until the completion of the case and further clinical and radiographic control.

Results

Figure 1 shows the relationship between the total number of patients that presented with trauma in relation to those that are presented in crown and crown-root fractures for each year of the study.

From the 293 assisted patients, 69% were males and 31% were females. Adolescents (122 individuals) between 11 and 18 years were the most prevalent group. Only 16 patients belonging to the age range from 8 to 10 years were attended by the Integrated Clinic discipline. Despite the importance of a systemic approach, which begins with an adequate medical and dental history, the most reported alterations were allergy to some kind of drug (10), heart disease (three), seizures (three), syncope (three), hepatitis (one), leprosy (one), HIV seropositivity (one), depression (one). A great number of them (268) have not reported any systemic disturbance.

Forty-seven (16%) of the 293 patients related history of previous dental injuries. In these 47 subjects, 68 teeth received some kind of trauma and recurrence occurred in 35 teeth.

Two hundred and ninety-three patients with 605 teeth suffered crown fractures or crown-root fractures (Fig. 2) accounting for 90.3% of the occurrences caused by direct trauma, as against 9.7% caused by indirect trauma.

Higher incidence of crown fractures and crownroot fractures were found in the maxillary arch (505 teeth), and 100 teeth in the mandibular arch. The maxillary central incisors were the teeth most involved (58.3%), followed by the maxillary lateral incisors (28.4%) (Fig. 3).

According to the proposed classification, from the 505 maxillary teeth, the following results were obtained: 15.8% of teeth with enamel fracture, 39.9% of teeth with enamel–dentin fracture, 25.7% of teeth with enamel–dentin fracture involving the pulp (complicated crown fracture), 16.8% of teeth with enamel–dentin–cementum fracture (uncompli-





Fig. 1. Yearly relation between the total of attendances to patients who suffered dentoalveolar trauma and number of patients with crown fracture or crown-root fracture.

Fig. 2. Yearly relation between the total of attended patients and teeth with crown fracture or crown-root fracture.



Fig. 3. The distribution of crown fractures and crown-root fractures in the maxillary arch according to tooth affected.

regarding the etiology of trauma.

Fig. 4. The distribution of the crown

fractures and crown-root fractures

cated crown-root fracture), and 1.8% of teeth with enamel-dentin-cementum fracture involving the pulp (complicated crown-root fracture).

Etiology of the crown fractures and crown-root fractures are shown in Fig. 4. In 23 files (7.9%) this information was not given (Fig. 4).

The first aid locals subsequent to trauma were Araçatuba School of Dentistry (169), emergency medical services (47), 'Santa Casa de Misericórdia' hospital (46), and private dental clinics (31).

From the emergency treatments carried out or reported by the patients, intraoral and extraoral sutures of soft tissues accounted for 57, restorations of fractured elements (56), stabilization of the mobile teeth (35), pulpotomy (22), direct pulp capping (13), coverage of the exposed supragingival dentin with glass-ionomer cement (five), temporary prosthesis (two), and surgical cement dressing (two). One hundred and twenty-five patients could not report the procedures received at the first appointment.

The information about the associated drugs administration on the first aid is presented as follows: antibiotics prophylaxis (92), anti-inflammatory agents (47), tetanus booster (34) and analgesic prescription (30). One hundred and eighty-three patients did not receive a drug prescription.

Data taken from extraoral examination found 50.2% lesions classified as laceration, abrasion and/ or contusion. The soft tissue structure most victimized by lacerations was the lip, representing 55.8%of total. In 34.2% of cases abrasions were observed in the face, 30.2% on the lip, 21% on the mentum, 13.1% on the nose, and 1.5% in other regions. The contusions were more frequently found on the lip, corresponding to 55.4%. As to the intraoral examination, soft tissue lesions were found in 31.2% of patients, the laceration being found in only seven reports against 45 reports of contusion.

During the intraoral examination, 227 of the 605 teeth examined presented a positive response to the sensibility tests. The number of patients presenting with acute clinical symptoms, such as pain, was 129. Pain responses were distributed as pain to percussion (53.9%), heated gutta-percha (10.2%), ice (29.9%), and premature contact (6%).

As to the radiographic examination, the findings were the following: periapical radiolucency (45), widened and diffusely outline periodontal space (45), bone fracture (four), endodontic treatment (four), new developing immature root (two), dental crown structure loss (123), jaw fractured (16), root resorption (17), radiopaque area inside the upper lip (one), vertical bone resorption (two), horizontal bone resorption (one). In 135 files, no finding was reported.

Discussion

It was observed that 38% of the cases were crown fractures and crown-root fractures over a 10-year period. Males were more prevalent than females in an approximated proportion of 2:1, supported by the majority of previous studies (9, 19–24). In addition, it was observed that adolescents were the group most affected (9). The lifestyle and the general tendency of taking great risks and the ignorance of preventive measures can explain the high incidence for this group. The prevalence of deciduous, mixed and permanent dentures in school children under 12 years old is not in agreement with other studies.

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Most of the studies report a higher prevalence in older patients (25).

A short medical history is essential to provide an adequate treatment. In the present study, the majority of patients (268) reported to have no systemic disturbance, as expected for a population of young patients, which constitute the higher number of individuals assisted by the Integrated Clinic Comprehensive Dental Care.

The observation that 605 teeth suffered crown fractures or crown-root fractures most commonly in the maxillary arch is in agreement with published (9, 17, 19, 20, 22, 24, 26–28).

The finding that 83% of the crown fractures and crown-root fractures were the maxillary arch and the highest prevalence in the central incisors (58.3%), was similar to those found by Petti and Tarsitani (26) (62.9%) and Caliscan and Turkun (20) (66%).

Bicycle falls were the most common cause of crown fractures and crown-root fractures (30.8%). Araçatuba is located on a plane region, which favors the use of bicycles, thus explaining the reason they may be the major cause of accidents. Other factors were: general falls (22.5%), car accidents (25.9%), work accidents (4.1%), aggression (3.8%), personal collision (1.3%), and epilepsy only 0.3%.

Identifying the etiologic factors makes it possible to establish preventive measures aimed at avoiding future injuries. For example, mouth protectors and helmets may be suggested for the practice of impact sports, cycling, motorcycling, and other activities related to skates (29, 30).

Systemic drugs are not usually necessary with crown and crown-root fractures as periodontal destruction is minimal and thus pain slight. In our study, the majority (183 patients) did not receive systemic drugs. However, in some patients with concomitant luxation, root fracture or avulsion, the drug therapy is indicated (31–33) and was also used with our patients.

The lip was the structure most affected by contusions and lacerations (55.6%). It is common that soft tissue injuries will occur when a crown or crown-root fracture injury is sustained. We found extraoral (50.2%) and intraoral (31.2%) soft tissue injuries.

Contrary to most reported literature that enamel fractures occur with the highest frequency (8,23,27,34–37), we observed that enamel–dentin fractures were the most frequent.

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Appendix 1

Questionnaire elaborated for the data organization



Integrated Clinic Comprehensive Dental Care Araçatuba School of Dentistry (UNESP)

I. Identification

Gender	Female	Male
Age		
Civil State		
Race		
City		

II. Medical history:

III. Main complaint:

 History of previous dental trauma: Yes Involved teeth: Date: Month and year

No

Treatment performed	
First aid local	

2. Current dental trauma:

Date – Month and year												
Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Month												
Time	Time											
First aid local												
Trauma type Direct					Indi	rect						

3. Etiology:

4. First aid locals:

Araçatuba School of Dentistry (UNESP)
'Santa Casa de Misericórdia' Hospital
Emergency Medical Services
Private dental clinics

5. Treatment performed:

Suture	Pulpotomy		
Stabilization of the mobility teeth	Surgical cement dressing		
Direct pulp capping Fractured teeth restorations			
Coverage of the exposed supragingival dentin with glass-ionomer cement			

6. Drugs administration:

Antibiotic	Analgesics
Anti-inflammatory	Tetanus booster

IV. Extraoral examination:

1. Laceration					
Face	Lip	Mentum	Nose	Other	
2. Abrasion					
Face	Lip	Mentum	Nose	Other	
3. Contusion					
Face	Lip	Mentum	Nose	Other	

V. Intraoral examination:

1. Soft tissues

1. Laceration				
Alveolar mucosa Gingiva		Tongue	Buccal mucosa	Oral mucosa
2. Abrasion				
Alveolar mucosa Gingiva		Tongue	Buccal mucosa	Oral mucosa
3. Contusion				
Alveolar mucosa	Gingiva	Tongue	Buccal mucosa	Oral mucosa

2. Hard dental tissues and the pulp

Percussion	Ice
Heated gutta-percha	Occlusal contact

VI. Radiographic examination:

VII. Diagnosis:



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