

Traumas on dentition during childhood and their consequences

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Abstract

Aim: The aim of this study was to estimate the prevalence of dental traumas and their consequences among the patients at a dental clinic in Albania, and assess some of the consequences that traumas can cause on the primary dentition, also determining the overjet higher than 3 mm as a risk factor for dental traumas.

Methods: The material for this study was collected from 307 subjects aged 2-15 years who presented at the dental clinic "Matis" in Tirana during 2013-2015. Out of these 307 subjects, 71 individuals with complete records had experienced trauma to the dental system and were considered to represent the "trauma group". The data of "trauma group" were compared to the data of the "no-trauma group" which consists of the remaining 236 subjects. The variables were the age at the moment of examination, gender and dental protrusion (overjet higher than 3 mm).

Results: The prevalence of dental traumas was 23%. The ratio male/female resulted 1.2:1. The age in which dental traumas were most frequent was 3.5-6 years old. It was found a statistically significant difference between the two groups for the variable of overjet higher than 3 mm ($p < 0.01$).

Conclusion: Dental traumas are a common problem among the pediatric patients. Dental injuries to primary dentition occur during early childhood, in the age of 3-5 years old, but can also affect the further development of dentition causing different consequences on permanent dental system.

Keywords: childhood, dental trauma, overjet.

Introduction

Dental trauma are an important issue and of great interest in terms of oral pathologies. Based on statistical data of different authors, it can be said that dental trauma are an important cause of tooth loss in modern times. Anterior teeth dental trauma in preschool children is a very unfortunate situation, but often ignored (1).

Children with dental injuries and their parents represent a challenge to the dentist. Loss or damage of to the teeth, especially the anteriors, in children represents not just a dental problem, but they have a huge psychological impact on the child and his parents, especially if the injury causes significant loss of tooth structure (2).

Dental traumas can happen at different ages, during different periods of the development of the dentition, and in different regions of the mouth, giving the respective consequences.

Although it may be difficult to predict an exact prognosis for permanent teeth, the doctor and parents should be prepared for the consequences. One of the major problems associated with dental trauma, is the fact that many times the consequences are not immediate and the real will show years later. Different studies show that in up to 25% of cases children have different problems in the development of permanent teeth (3).

Dental trauma can lead to a malocclusion through

three ways: i) Indirectly damaging the permanent germ through the trauma of the primary tooth; ii) Causing the displacement of the permanent germ through the early loss of primary tooth, and; Direct damage to the permanent tooth (4).

The consequences on the dentition depend on: i) The direction and displacement of the apex of the primary tooth; ii) The direction and intensity of the traumatic factor, the type of injury suffered and the presence of alveolar bone fracture, and; iii) The age of the child at the time of traumatic injury (follicles are particularly sensitive in the early steps of their development, which occurs in the age between 4 months and 4 years old), the stage of formation and development of the permanent tooth germ (2,5-7).

Some of the consequences of the trauma on the primary dentition are: i) Pulp necrosis of the primary tooth: this can happen in cases of tooth intrusion, lateral luxation, tooth fractures involving the pulp and alveolar bone fractures. Clinically the tooth presents a grey, red or blue discoloring. The pulp necrosis if not treated, leads to periapical inflammation with loss of periapical bone; ii) Loss of the primary tooth without damaging the successive germ: there are two possible ways a traumatic avulsion of the primary incisor can affect the permanent dentition: delayed eruption, or early eruption of the permanent tooth.

Figure 1. Traumatized primary central and lateral incisor in a 4-year old child



The consequences that dental traumas on primary teeth cause on permanent dentition

The consequences of dental trauma depend on their severity, the age of the child and the stage of the formation and development of permanent germs. They can affect the process of histogenesis, morphogenesis or can cause the displacement of the germ. They can affect the coronar region, the radicular region or the whole permanent germ (8).

- Some of these consequences can be found in the coronar region:

- White or yellow-brown discoloration of enamel;

- Yellow-brown discoloration of enamel, and circular hypoplasia, which represent the border between the hard tissue formed before and after the

injury (9);

- Crown dilaceration, which is described as an acute deviation of the long axe of the crown, that has its origin due to an acute non-axial displacement of the formed hard tissue against the not calcified tissue (crown dilacerations can be as a result of the intrusion of the primary tooth at the age of 2 years, when almost half of the crown of the permanent tooth is formed) (5,6).

Consequences in the radicular region:

- *Root dilaceration*, these lesions present a curvature in radicular region and can be caused by the intrusion of the primary incisive after the complete formation of the crown of the permanent tooth, between the age of 2 and 5 years;

Figure 2. Radicular dilaceration



- Partial or total interruption of root formation, which is a rare complication of traumas on primary incisives between the ages of 4 and 7 years (5,6);

- Root duplication.

In cases when the whole germ is involved, there can be alterations in the erupting of permanent tooth:

- Delayed eruption may occur, as a result of early loss of the primary tooth and the formation of a thick fibrous gingival tissue;

- Early eruption, when the loss of the primary incisive happens after the age of 5, especially if it is accompanied with bone resorption

due to the inflammatory reaction to the dental trauma; (8)

- Ectopic eruption, in cases when there has been an inflammatory process with fistula forming, the permanent tooth tends to erupt in a position higher than normal (10);

- Malformation of the permanent germ;
- Impaction of the permanent tooth;
- Odontoma-like malformations;
- A rare consequence may be the sequester of the permanent germ.

The aim of this study was estimate the prevalence of dental traumas and their consequences among the patients at a dental clinic in Albania, and assess

some of the consequences that traumas can cause on the primary dentition, also determining the overjet higher than 3 mm as a risk factor for dental traumas.

Methods

The material for this study was collected from 307 subjects of age 2-15 years who presented at the dental clinic "Matis" in Tirana during 2013-2015. Out of these 307 subjects, 71 individuals with complete records had experienced trauma in the dental system and were considered to represent the "trauma group". Their dental records included complete anamnesis, objective examination and

other needed records, radiographs, cephalometric analysis. The diagnosis of previous dental trauma was determined from dental records and from the detailed anamnesis.

The data of "trauma group" (n=71) were compared to the data of the "no-trauma group" which consisted of the remaining 236 subjects (n=236). The variables were the age at the moment of examination, sex and dental protrusion (overjet higher than 3 mm).

Results

Table 1 presents selected characteristics of the patients by study group.

Table 1. Characteristics of the patients by study group

Variables	The trauma group n=71 (%)	No-trauma group n=236 (%)	P-value
Males	39 (54.9)	126 (53.4)	0.236*
Age at the time of examination (years)	9.9±3.47	7.8±4.20	0.107†
Age at the time of trauma	4.2±1.63	-	-
Overjet>3 mm	28 (39.4)	44 (18.6)	<0.01*

* Hi – square test.

† Student's test for two independent samples.

Using the chi-square test, it was found a statistically significant difference ($p<0.01$) concerning the presence of an overjet higher than 3 mm between the two groups (39.4% of the subjects in the "trauma group" vs. 18.6% of the subjects in the

"no trauma group").

Conversely, no statistically significant difference was found concerning gender ($p=0.236$).

As shown in Table 2, most of dental traumas had occurred in the age group 3-6 years.

Table 2. Age at the moment of dental trauma

Age group	No. of subjects	Percentage
0-3 years	7	9.6
3-6 years	39	54.8
>6 years	25	35.6

There was a statistically significant correlation between the overjet > 3 mm and the presence of a dental trauma (Kendall's rank correlation coefficient $\tau=0.41$, $p=0.013$)

The dental problems verified from the examination, which resulted from previous trauma on the primary dentition are listed in Table 3.

Table 3. Dental problems verified during the examination procedure

Dental problems	No. of subjects
Delayed eruption	8
Anomalies of tooth shape	6
Dilaceration	4
Ectopic eruption	8
Hypoplasia of enamel	7
Impaction	2
Necrosis	5
Transposition	1
<i>Total</i>	<i>41</i>

The remaining 30 subjects presented traumas on permanent dentition, different types of fractures of permanent teeth.

Discussion

Large discrepancies exist in reports on the prevalence of dental trauma. Reported prevalence ranges from less than 6% to nearly 40%.

In our study, there were examined 307 patients of age 2-15 years and 71 of them resulted to have dental trauma experience. This group consists of 23% of the total number of the examined patients.

The variation in the given prevalence may be as a result of factors such as: the classification of dental traumas, the dentition studied, geographical and behavioral differences between study locations and countries.

In our study, the patients with dental trauma records were subjects who had traumatized teeth at the time of examination, and those subjects who presented in the permanent dentition consequences of previous dental traumas of the primary dentition.

According to different studies, the differences between males and females with dental trauma experience are not significant in the age 2-5 years, both girls and boys are equally exposed to dental traumas at this age.

Males experience more dental traumas than females with the eruption of permanent teeth in most of international studies. The male/ female ratio varies from 1.3-2.3 : 1.4 (11-15).

In our study the male/female ratio in the “trauma group” resulted 1.2:1 (39 males and 32 females), while in the “no trauma group” this ratio was 1.1:1 (126 males and 110 females). No significant difference between males and females was found. Other authors too have found no significant differences between both genders. Bijella et al. observed an insignificant difference between males and females 1.3:1 (16), whereas Onetto et al. reported that the male/female ratio was 0.9:1.0 in children younger than seven years (17).

It has been shown that if a child or a teenager experiences a dental trauma, it is more important the type of trauma and its treatment than the gender as a risk factor.

In our study, the age when the trauma experience was most frequent resulted 3-6 years. This result is similar to results of other studies of different authors. The reason is the specific characteristics of this age concerning the motoric and psychological development. During this age, the conscience and muscular coordination are not yet fully developed. The children of this age have a lower psychomotor development and motoric capabilities, and this can lead to injuries from accidents. Andreassen reports another peak at the age of four years, age in which the physical activity of the child increases (18,19). Many authors have reported the presence of an overjet higher than 3 mm to be a risk factor for dental trauma (20,21).

In our study, we found a statistically significant

correlation between the overjet >3 mm and the presence of a dental trauma (Kendall's rank correlation coefficient $\tau = 0.41$, $p = 0.013$).

Others have reported a strong correlation of a higher overjet to dental trauma. The risk increases when the labial incompetence is present too. Furthermore, children with increased overjet seem more predisposed to experience crown fracture. There are other studies which have not found this correlation. These different results may occur due to differences of the population and the year in which the research is conducted.

Conclusion

The percentage of the subjects who had experienced a dental trauma in our study was 23%. Traumas on primary dentition not only are accompanied with pain, aesthetic and functional issues, but also can lead to anomalies in the permanent dentition. In our study, 41

subjects showed dental anomalies of the permanent dentition as a result of traumas on primary dentition experienced at the age of 3.5-6 years. This age resulted the age in which the traumas were more frequent.

It is important for the dentists to treat the traumatic injuries in the proper mode, and it is also important to inform the patients and the parents for eventual consequences that they can lead to. Having an increased overjet can increase the probability of experiencing dental trauma. The only benefit for providing early orthodontic treatment for patients with class II malocclusions was a reduction in the incidence of incisal trauma. It is important to perform an early orthodontic treatment of the class II malocclusion in order to reduce the risk of these individuals for experiencing a dental trauma.

Conflicts of interest: None declared.

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