A retrospective study of 92 avulsed primary teeth in 69 children assisted at a dental urgency service

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ABSTRACT

The purpose of this study was to evaluate the epidemiological aspects associated with avulsion of primary teeth. The sample consisted of 92 avulsed teeth of 69 patients seen at the dental urgency service of the Dental School of the Federal University of Goiás, Brazil, from 1998 to 2005. The data obtained from the records included children's gender and age, causes of tooth avulsion, daily and monthly distribution, type and number of avulsed teeth and the treatment procedures. Frequency distribution and the chi-square test were calculated. The level of significance was set at 5% for all analyses. The highest incidence was found among boys (52.17%) aged 4 years (31.88%). The main etiologic factors were falls (82.61%) and traffic accidents (5.80%). Most cases occurred during weekdays (82.61%), from March to June (autumn; n=28; 40.58%) and from September to December (spring; n=18; 26.09%). Most avulsed teeth were maxillary central incisors (68.48%), followed by maxillary lateral incisors (22.83%). The most frequent treatments were analysis of clinical history and clinical exam (64 teeth; 69.57%) and space maintainer (18 teeth; 19.57%). The epidemiological and clinical aspects of tooth avulsion in this study were similar to those reported in other studies. There was a high number of avulsed primary teeth in boys aged less than 4 years and caused by falls.

Keywords: Avulsion, Dental Traumatology, Primary Teeth, Oral Epidemiology.

Estudo retrospectivo de 92 dentes decíduos avulsionados em 69 crianças atendidas em um serviço de urgência odontológica

RESUMO

O objetivo deste estudo foi avaliar os aspectos epidemiológicos da avulsão de dentes decíduos. A amostra do estudo foi composta por 69 pacientes (92 dentes avulsionados) atendidos no Serviço

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de Urgência Odontológica da Faculdade de Odontologia da Universidade Federal de Goiás, entre os anos de 1998 e 2005. As seguintes informações foram retiradas dos registros odontológicos de cada paciente: gênero, idade, fator etiológico, distribuição sazonal, grupo dentário, número de dentes avulsionados e tipo de tratamento. O tratamento estatístico analisou os dados frente à distribuição de frequência e qui-quadrado. O nível de significância foi de $p<0,05$. Observou-se elevada ocorrência de avulsões em meninos (52.17%) com 4 anos de idade (31.88%). Os principais fatores etiológicos foram quedas (82.61%) e acidentes de trânsito (5.80%). A maioria dos episódios de avulsão ocorreu durante os dias da semana (82.61%). A distribuição sazonal evidenciou elevado número de traumatismos nos períodos de março a junho (outono; n=28; 40.58%) e setembro a dezembro (primavera; n=18; 26.09%). O dente mais comumente afetado foi o incisivo central superior (68.48%), seguido pelo incisivo lateral superior (22.83%). As modalidades terapêuticas mais comumente realizadas foram exame clínico e anamnese (64 dentes; 69.57%) e mantenedor de espaço (18 dentes; 19.58%). Verificou-se elevado número de avulsões dentárias em meninos, com idade inferior a 4 anos e decorrentes de quedas.

Palavras-chave: Avulsão, Traumatismo Dentário, Dentição Decídua, Epidemiologia Bucal.

INTRODUCTION

Traumatic dental injuries (TDI) represent one of the major health problems worldwide (1-3). In the past decades, several studies have reported significant increase in the incidence of these lesions, with significant threat to the quality of life of pre-school children and adolescents (4,5).

Tooth avulsion, which is defined as the complete displacement of a tooth out of its socket, is one of the most serious types of TDI (6). The prevalence of avulsion in the primary dentition ranges from 7 to 13% (7). It may compromise both primary teeth and their permanent successors (1,8) and may lead to physical and emotional changes reflected in the quality of life of both the children and their parents (9). Severity of sequelae is associated with different factors, such as age at the time of the accident, the degree of root resorption of the injured primary tooth, the type and extent of the traumatic lesion, and the stage of development of the permanent tooth germ (6-8,10).

Planning public health policies with emphasis on the prevention of episodes that result in tooth avulsion should be based on regional knowledge of the main risk factors involved. However, information about the characteristics of avulsion in primary dentition in different geographical regions of Brazil is limited. Thus, the purpose of the present study was to investigate the epidemiological aspects of avulsion in the primary dentition of patients seen at a Brazilian dental urgency service.

METHODS

This cross-sectional, descriptive study was conducted by reviewing the dental records of children seen at the dental urgency service of the Dental School of the Federal University of Goiás, Goiânia (latitude 16º43'S and longitude 49º20'W), Brazil, with one or more avulsed primary teeth, from September 18 1998 to November 3 2005.

The data obtained from the records included children's gender and age, causes of tooth avulsion, daily and monthly distribution, type and number of avulsed teeth and the treatment procedures. Cases with incomplete documentation or involving avulsion of permanent teeth were excluded. All teeth were followed-up for a minimum of 1 year.

This study was approved by the local Research Ethics Committee (protocol no. #055/2005).

Data were analyzed using the IBM SPSS for Windows 21.0 (IBM Corporation, Somers, NY, USA), including frequency distribution and cross-tabulation. Comparative statistical analysis was performed using the chi-square test, and the level of statistical significance was set at 5%.

RESULTS

A total of 69 patients aged 9 months to 10 years (mean=3.7 years, standard deviation=2.01) met the inclusion criteria and were enrolled in the study. The highest frequency of tooth avulsion was in the 4-year-old age group (n=22; 31.88%), followed by 3- and 2-year-old participants (n=11; 15.94% each) (Table 1). The distribution of participants by gender showed that boys were slightly more often affected (n=36; 52.17%) than girls (n=33; 47.83%) (boy:girl ratio of 1.1:1). When the cause of tooth avulsion was analyzed, 82.61% were caused by falls, 5.80% by traffic accidents, 4.35% by collisions, 1.45% by sports activities, and 5.80% by other events.

The daily distribution showed that most cases occurred on weekdays (57; 82.61%) rather than on weekends (12; 17.39%). The monthly distribution, in turn, showed that most cases occurred from March to June (autumn; n=28; 40.58%), followed by September to December (spring; n=18; 26.09%), June to September (winter; n=14; 20.29%), and December to March (summer; n=9; 13.04%).

Ninety two of the avulsed teeth were primary, 90 (97.83%) were in the maxillary arch, and 2 (2.17%), in the mandibular arch. Most avulsed teeth were maxillary central incisors (n=63; 68.48%), followed by maxillary lateral incisors (n=21; 22.83%), maxillary canines (n=6; 6.52%), and mandibular central incisors (n=2; 2.17%). Fifty participants (72.46%) had one tooth avulsed, 15 (21.74%) had two teeth, and 4 (5.80%) had three or more avulsed teeth.

The most frequent treatment for primary avulsed tooth was analysis of history and clinical exam (64 teeth; 69.57%), followed by the use of a space maintainer (18 teeth; 19.57%), replantation (9 teeth; 9.78%) with subsequent endodontic treatment, and prosthodontic rehabilitation (1 tooth; 1.09%).

There were no statistically significant differences ($p>0.05$) between the data collected from patients' records for the occurrence of tooth avulsion.

TABLE 1 – Distribution of avulsed primary teeth according to age

Age	Avulsion events	
	n	%
9 to 11 months	2	2.90
1 year	7	10.14
2 years	11	15.94
3 years	11	15.94
4 years	22	31.88
5 years	8	11.59
≥ 6 years	10	11.60

DISCUSSION

Knowledge of the epidemiological aspects of different oral pathologies, events, and injuries adds valuable information on public health and, when associated with clinical observations and trials, provides essential evidence to all science segments (11). Traumatic dental injuries (TDI) are considered a serious public health problem, posing significant threat to the dental health of pre-school children (4,5).

The retrospective epidemiological evaluation conducted in the present study was based on the dental records of patients presenting with primary tooth avulsion treated at a dental urgency service over a 7-year period. The population seen at the service lives in an area with a low social and economical level. Retrospective studies are relatively easy to carry out and inexpensive, and therefore they become a viable option for the establishment of hypotheses (12). However, such studies also present a limitation related with the impossibility to establish the temporal relationship necessary to prove cause and effect, as both are recorded at the same time (13). Moreover, the quality of information depends on the accuracy with which the initial examination has been performed, as well as on the correct recording of data. Thus, if any examination detail or information collected during the analysis of medical history and clinical exam is not observed or recorded on the dental chart, the study's outcome becomes compromised and/or limited (14,15). Patients with incomplete documentation were excluded from this study to minimize that bias.

The data collected in present study demonstrated that boys suffered only slightly more tooth avulsion than girls (1.1:1). This result is in accordance with previously published epidemiological studies carried out with different populations that have shown a reduction or even a reversal in the gender disparity (16-20). In the past, boys were agitated, aggressive, and undisciplined, and girls were calm and obedient, which may have resulted in higher trauma rates among boys in earlier decades (20). Currently, children are encouraged to try and have the chance to do whatever they want, regardless of sex (21).

Tooth avulsion has been shown to be more frequent in patients aged 1 to 3 years (20,22,23). In this study, the age of patients who presented with tooth avulsion ranged

from 9 months to 10 years. The highest prevalence was found in the 4-, 3- and 2-year-old age groups, which, together, accounted for nearly 64% of the sample, probably due to the fact that children aged less than 4 years are still gaining mobility and independence and have little motor coordination (24). Preventive strategies aimed at this age group should be adopted.

According to Chrcanovic et al. (15), a better understanding of the patterns, etiologies, and consequences of oral injuries is essential so that the prevention of injuries and the efficient allocation of health care resources can be achieved. In the present study, the most frequent causes of tooth avulsion were falls (82.61%) and traffic accidents (5.80%), which are considered unintentional factors. This is in agreement with other studies (2,11,19,22,24). Conversely, Guedes de Amorim et al. (20) assessed a sample of 383 children aged 12 to 73 months seen at a specialized pediatric service and found that TDI most often was as a consequence of falls (50.3%) and collisions with objects (18.2%). It has been emphasized that the location where the study is conducted and the age group assessed should receive proper consideration when analyzing the etiology of oral and maxillofacial injuries (25).

School vacation, summer, and weekends have been associated with a higher incidence of oral injuries (15,26). However, the results of the present survey did not show any similar relationship; rather, a high incidence was observed on weekdays (82.61%) and from March to June (autumn 29.39%). Daily and monthly distribution (seasonal analysis) results are directly related to the structure of the service where the study is conducted (e.g., more complex TDI cases are usually found in hospital-based studies). In this sense, it should be emphasized that the present study was developed at a public outpatient service belonging to a dental school, which sees patients from Monday to Friday and during the school year only. This may explain the low number of avulsion events found during weekends and school vacation. In addition, Brazil is a tropical country, where the four seasons are not well defined. Therefore, the comparison of our findings with studies conducted in other geographical areas of Brazil or in other countries should be cautious.

Maxillary central incisors were the teeth most often affected, as previously reported (3,7,27,28). The vulnerable position of these teeth, often protracted and with inadequate lip coverage, may explain this result. In addition, resilience of the alveolar bone, elasticity of the periodontal ligament, crown-to-root proportion, and root resorption may all favor the occurrence of luxation injuries in the primary dentition (1,27,28).

Of the avulsion cases evaluated in the present study, 72.46% involved only one tooth. These frequencies were almost the same as those found in previous investigations, which reported that the majority of injuries involved one tooth (7,16,17,22), and can be explained by the individual characteristics of the child's oral cavity. However, some individuals showed the involvement of 2, 3, even 5 teeth. The number of affected teeth seems to vary according to the etiology of the TDI (11). More severe TDI (tooth avulsion and intrusion), e.g., those resulting from traffic accidents, sports activities, and violence, may increase the number of involved teeth (20).

According to published guidelines, the diagnosis and treatment injuries affecting children with primary dentition should involve pain management and the prevention of possible damage to the developing tooth germ. An avulsed primary tooth should not be replanted, because of the potential damage that this procedure may cause to the developing tooth germ (1). In the present study, the most frequent treatment for primary avulsed teeth was analysis of clinical history and clinical exam (64 teeth; 69.57%), followed by the use of a space maintainer (18 teeth; 19.57%). Cunha et al. (29) evaluated the types of treatment used in cases of traumatized primary teeth and observed that the most prevalent treatment modality was monitoring, followed by tooth extraction and endodontic procedure. It should be mentioned that, after urgency care, the children enrolled in the present study were referred to other departments so that subsequent restorative treatments could be performed.

The lack of epidemiological data about primary tooth avulsion in the different geographical regions of Brazil has motivated this study. This retrospective study was conducted to describe tooth avulsion in Goiânia, a city in Midwestern Brazil. Oral health initiatives should be based on prevalence data and clinical factors, so that adequate and effective policies are implemented. In this sense, the establishment of accurate prevention policies is warranted, as is the promotion of guidelines for the proper management of tooth avulsion. Epidemiological surveys support decisions about public health, and preventive campaigns have lower costs than the treatment of TDI.

CONCLUSIONS

Our findings showed a higher number of avulsed primary teeth in boys aged less than 4 years and caused by falls. Most cases occurred on weekdays, from March to June. Maxillary central incisors were the most prevalent tooth type, and the analysis of history/clinical exam was the most frequent treatment.

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