

Original Article

Dental Avulsion: Are the Dentist Prepared to the Correct Management?

Laís Nicolay Pizzatto¹, Stefanie Bressan Werle¹, Jonas Almeida Rodrigues¹, Fernando Borba de Araujo¹, Thiago Machado Ardenghi², Fernando Neves Hugo³, Luciano Casagrande¹

¹Department of Pediatric Dentistry, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil.

²Federal University of Santa Maria, Santa Maria, RS, Brazil.

³Department of Social and preventive Dentistry, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil.

Author to whom correspondence should be addressed: Luciano Casagrande, School of Dentistry, Ramiro Barcelos, 2492, Porto Alegre, RS, Brazil. 90035-003. Phone: +55 (51) 3308.5493. E-mail: luciano.casagrande@ufrgs.br.

Academic Editors: Alessandro Leite Cavalcanti and Wilton Wilney Nascimento Padilha

Received: 08 June 2014 / Accepted: 28 August 2015 / Published: 05 November 2015

Abstract

Objective: To evaluate the knowledge of dentists from the health units (HU) of Porto Alegre - Brazil, regarding the management of avulsion of permanent teeth. **Material and Methods:** All dentists (n = 117) from HU were invited to answer a self-applied questionnaire regarding the treatment and preservation of avulsed permanent teeth in different clinical scenarios, based on the guidelines of the International Association of Dental Trauma (IADT). The professional data were also collected. The correlation between the performance of each professional and professional data was performed, (Student's t test, Pearson's and Spearman's correlations), assuming 5% significance. **Results:** The response rate was 56.41%. The mean performance rate of the dentists regarding the clinical questions was 69.3%, but 37.4% had poor performance (less than 70% correct). The greatest number of hits was where the patient comes with the already replanted teeth (89.2%); 87.3% agreed in situations where the injured child reaches two hours of trauma with the tooth in a liquid medium, however in cases that period of trauma was more than two hours and tooth was dehydrated, the professionals performance was reduced (64.9%). There was a lack of knowledge about the use of intracanal medication (error rate of 56.9%); 41% are mistaken about the period to start endodontics procedures; 32.8% did the wrong about contention of avulsed teeth and clinical and radiographs follow-up. Dentists with postgraduate performed better than those without (p = 0.011). Professionals with longer time elapsed since graduation had lower performance, as well as those who reported not being satisfied with their knowledge of dental trauma (p<0.05). **Conclusion:** A limited knowledge of dentists from HUs of Brazil regarding the management of avulsed teeth was found. The lack in knowledge suggests the need for implementation of continuing education programs and simulation programs on approaches to dental traumas to improve dental care offered for the population.

Keywords: Tooth Avulsion; Knowledge; Primary Health Care.

Introduction

Dental trauma is recognized as a public health problem, especially in children and adolescents [1,2]. Among all injuries that affect the face, dental trauma is the most frequent [3] and its consequences vary from enamel fractures to tooth avulsion.

The prevalence of dental trauma has increased in recent decades (4). This data varies among studies, mainly due to different methodological aspects and intrinsic characteristics of the population studied [3]. In the southern region of Brazil, the prevalence of dental trauma is high, ranging between 16 and 34% in children aged 7 to 13 years old [4,5]. Considering this age group, this prevalence refers to the permanent dentition, since the exchange of deciduous teeth by permanent is already established in the incisors teeth.

Moreover, in severe cases, dental trauma also causes a negative impact on quality of life [5] because of physical and psychological discomfort, and the high potential for negative interference in social relationships [3].

Epidemiological studies indicate that dental avulsion represents 1 to 16% of all cases of dental trauma, and is considered the most serious dental injury [6]. The prognosis of an avulsed tooth depends on an appropriate approach at or immediately after occurrence, as well as correct follow-up [1].

Specific management of cases of dental avulsion depends particularly on rhizogenesis level and period outside the mouth. Dentists should be conscious of the best clinical protocol for each situation, because traumatized teeth can be retained for a long period if they receive appropriate management and follow-up [7,8].

Dentists serving in health units (HUs) have substantial demand. This demand may increase the possibility of attending patients with dental avulsion, which represents a real emergency situation in dentistry. Even with the possibility of referral patients to specialized centers, the HUs are responsible for the emergency approach, as well as for the problem resolution [9]. Thus, it is important that these professionals have knowledge about diagnosis, treatment and monitoring of avulsed teeth. The aim of this study was to evaluate the knowledge of dentists in HUs of Porto Alegre, Southern Brazil, regarding permanent dental avulsion.

Material and Methods

This cross-sectional study was carried out in all HUs (73) with dental care assistance in Porto Alegre (southern Brazil) from April through June 2012. The study population included all dentists who serve in HUs, comprising 117 professionals (n=117).

The dentists' knowledge regarding the management of avulsion of permanent teeth was evaluated through a self-applied questionnaire, completed during monthly meetings of the HUs, which was based on the guidelines of the International Association of Dental Trauma (IADT) [3]. This questionnaire aimed to analyze specifically the knowledge about ideal treatment for traumatic dental avulsion, not considering the clinical conducts adopted by dentists in these conditions.

The survey consisted of multiple-choice questions, regarding hypothetical clinical scenarios of avulsed teeth and preservation of avulsed teeth, for which the respondents selected methods of treatment. Moreover, age, sex, and professional data about the dentists were collected (university of graduation, time elapsed since graduation, postgraduate study, satisfaction with knowledge about dental trauma, knowledge of the IADT guidelines, experience in private practice, and experience with dental trauma).

There were 6 questions regarding hypothetical clinical cases; these involved teeth with incomplete or complete root formation, each with the following clinical scenarios: (A) patient attended with the tooth already re-implanted, (B) patient arrived with the avulsed tooth in a liquid medium, and (C) patient arrived with a dehydrated avulsed tooth, more than 2 hours after the accident.

Each dentist's performance (final grade) in the survey was based on the sum of the correct answers about the clinical cases ($n = 6$) and avulsed tooth preservation (endodontic treatment period, clinical and radiographic monitoring, and retention period) ($n = 4$). Those professionals that have obtained a final note above 7 were categorized as satisfactory knowledge, while those that obtained less than 7 were considered as unsatisfactory. For exclusive assessment of knowledge about preservation of the avulsed tooth, a percentage of the four questions was used. More than 75% of correct answers was considered satisfactory and lower than 75%, unsatisfactory.

The correlations between each dentist's performance and professional data (Student's *t* test, Pearson's and Spearman's correlations) were evaluated, assuming 5% significance.

This research was approved by the Municipal Health Department of Porto Alegre Research Ethics Committee (process no. 001. 053954.11.4). All professionals who agreed to participate in the study signed free informed consent.

Results

From a total of 117 dentists who serve in the HUs of Porto Alegre, Brazil, 28 refused to participate in the study and 23 were unobtainable (medical license or holidays). Thus, 66 dentists answered the questionnaire. The mean of correct answers was 69.3%, but 37.4% of the dentists did not achieve 70% correct answers. Table 1 shows the distribution of the sample by sex and age groups, and variables related to professional data.

The percentage of correct answers regarding the 6 hypothetical clinical cases was 80.5%. The dentists had a high level of knowledge in cases where the patient presented with the avulsed tooth already re-implanted (89%). Regarding cases in which the patient arrived up to 2 hours after the accident or with the avulsed tooth in a liquid medium, the percentage of correct answers was also satisfactory – almost 85% for incomplete root formation and 90% for complete root formation. However, when the time after the accident exceeded 2 hours or the avulsed tooth was stored dry, these percentages decreased to 62.7 and 67.2%, respectively.

Table 1. Percentage (%) and frequency (n) of variables related to demographic and professional data of dentists in Health Units from April to June 2012, Porto Alegre city - Brazil.

Demographic data	%	n
Sex		
Male	19.7	13
Female	80.3	53
Age groups		
23-30	19.7	13
31-40	24.2	16
41-50	27.3	18
51-60	22.7	15
> 61	6.1	4
Professional data		
University of graduation		
Public	68.2	45
Private	31.8	21
Time elapsed since graduation		
0-10	33.3	22
11-20	13.6	9
21-30	31.8	21
31-40	19.7	13
> 41	1.6	1
Graduate		
Yes	77.1	35
No	22.9	30
Satisfied with knowledge		
Yes	43.3	26
No	56.7	34
Knows guidelines from IADT		
Yes	23.4	15
No	77.6	49
Attended in private practice		
Yes	38.7	24
No	61.3	38
Attended patients with dental trauma		
Yes	63.6	42
No	36.4	24

IADT = International Association of Dental Trauma.

Regarding preservation of avulsed permanent teeth, the correct answers were approximately 59%. Considering temporary intracanal medication for traumatic avulsed teeth, 56.9% of the dentists selected the wrong medication and 41% selected the incorrect time to initiate endodontic treatment. Regarding retention and follow-up of avulsed teeth, 32.8% supplied incorrect answers.

Certain professional data, such as graduation in a public or private university, knowledge about the protocols of the IADT, experience in private practice, promotion of preventive measures regarding dental trauma, and experience with patients affected by dental trauma injuries, did not significantly affect the dentists' knowledge regarding permanent tooth avulsion. The variables that had significant influence on the dentists' knowledge are summarized in Table 2. There was a negative correlation between time elapsed since graduation and final grade ($-0.39, p = 0.002$).

Table 2. Relation between professional data and final grade (mean) obtained by dentists from Health Units in April to June 2012, Porto Alegre city - Brazil.

Variable	Mean (SD)	p
Post graduate		
Yes	7.51 (0.29)	0.011
No	6.28 (0.37)	
Satisfied with knowledge		
Yes	7.65 (1.43)	0.013
No	6.41 (1.94)	

SD = standard deviation; Student's t test, $p = 0.05$.

Discussion

Porto Alegre is the capital of the Rio Grande do Sul state, the most southern populated city in Brazil. The last census (2010) reports a population of approximately 1.410.000 habitants, including approximately 85.000 children aged 5–9 years.

The prevalence of dental trauma in this population is approximately 35%, and is associated with low socioeconomic status [4]. Therefore, many children only have access to the Brazilian Unified Health System (SUS). Although this system allows referral to reference units, like dental specialties centers and hospitals, when the trauma is severe, emergency care must be carried at UHs [9]. Thus, dentists should be prepared to deal with these emergency cases and follow-up.

The dental avulsion management have been evaluated among dental students [10], dentists [11-13], accident and emergency doctors [14] and schoolteachers [15] in several countries. All levels of professional exhibited insufficient knowledge for correct decision making. Thus, the education system seems to be faulty and changes in approach are required.

Although dental avulsion presents a significant prevalence (6), the assistance to trauma patients maybe not a professional routine. In this way, simulation programs as a teaching strategy have been successfully reported in other dental areas [16,17] and could be suitable for teaching dental trauma.

The mean performance of dentists in this study regarding knowledge of dental avulsion reached 69.3%. Previous studies also assessed the knowledge of dentists regarding dental trauma and revealed appropriate [10,11] or unsatisfactory performance [1,11,18].

Surprisingly, the present study showed that the dentists were more knowledgeable regarding certain clinical situations. For example, when the patient presented with an avulsed tooth that had already been re-implanted or was hydrated, the rate of correct answers was approximately 89 and 87%, respectively. However, in cases in which the patient presented more than 2 hours after the accident or with a dehydrated avulsed tooth, this rate decreased to approximately 64.9%. Further, the knowledge related to emergency care was better than that related to preservation of the avulsed tooth.

Therefore, this study revealed a lack of knowledge about preservation of avulsed permanent teeth. This observation is extremely important because inadequate preservation, involving endodontic procedures, tooth retention, and clinical and radiographic follow-up, compromises the

final outcome, even if appropriate emergency care has been administered at the first contact with the patient [19].

Overall, assessment of the professionals' knowledge regarding the management of avulsed teeth with incomplete or complete root formation revealed more difficulties in the management of teeth with incomplete root formation. This result may be associated with a lack of knowledge regarding pulp revascularization in incomplete rhizogenesis, which is extremely important for the completion of root formation [20].

In the present study, 53.8% of the dentists had undertaken postgraduate studies; these individuals performed better in the study questions. This indicates that postgraduate study positively influences knowledge about the management of dental avulsion, which corroborates with the findings of previous study that compared the knowledge of professionals with and without postgraduate qualifications [18].

Some studies have shown a negative association between time elapsed since graduation and knowledge on dental trauma [1,12,18]. The present study, in which 67% of the dentists had more than 10 years of professional experience, showed a negative correlation between time since graduation and performance in the questions on hypothetical clinical cases of avulsed teeth. Furthermore, the dentists who reported not being satisfied with their knowledge regarding dental trauma had lower performance in the questions related to avulsion.

However, a limitation of this study was the response rate (56.4%), which may not be representative of the population of the HU dentists in Porto Alegre. Moreover, these data must be evaluated with caution in extrapolating for professionals of others Health Units.

Continuing education programs for dentists should be set in the context of the SUS [9] to promote appropriate evidence-based treatments to the population. The guidelines from IADT regarding treatment of dental avulsion, although available online free of charge, was unknown by most professionals involved in this study. This guideline can be the material for reference in the drafting for protocols in the HU, where the service needs to be resolute and effective, especially in cases of dental avulsion, when emergency care and adequate preservation is crucial for the maintenance of the tooth [1].

Future studies should evaluate whether the service conditions and material availability can influence the treatment decision in permanent tooth avulsion. However, this study aimed to assess the knowledge, and not the decision on current conditions of each HU.

Conclusion

The results of this study demonstrate a limited knowledge of dentists from HUs Porto Alegre - Brazil, regarding the management of avulsed teeth in some specific situations, such when the time after the accident exceeded 2 hours or the avulsed tooth was stored dry. Besides, a poor performance in the preservation of avulsed teeth was also observed. This results suggests the need for implementation of continuing education programs to appropriate treatment to the population.

References

1. França RI, Traebert J, Lacerda JT. Brazilian dentists' knowledge regarding immediate treatment of traumatic dental injuries. *Dent Traumatol* 2007; 23(5):287-90.
2. Glendor U. Epidemiology of traumatic dental injuries--a 12 year review of the literature. *Dent Traumatol* 2008; 24(6):603-11.
3. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, et al. Guidelines for the management of traumatic dental injuries. II. Avulsion of permanent teeth. *Dent Traumatol* 2007; 23(3):130-6.
4. Damé-Teixeira N, Alves LS, Susin C, Maltz M. Traumatic dental injury among 12-year-old South Brazilian schoolchildren: prevalence, severity, and risk indicators. *Dent Traumatol* 2012; 29(1):52-8.
5. Cetinbas TG, Yildirim G, Sonmez H. The relationship between sports activities and permanent incisor crown fractures in a group of school children aged 7-9 and 11-13 in Ankara, Turkey. *Dent Traumatol* 2008; 24(5):532-6.
6. Traebert J, Lacerda JT, Page LAF, Thomson WM, Carlos M. Impact of traumatic dental injuries on the quality of life of schoolchildren. *Dent Traumatol* 2012; 28(6):423-8.
7. Chan A, Wong TKS, Cheung GSP. Lay knowledge of physical education teacher about emergency management of dental trauma in Hong Kong. *Dent Traumatol* 2001; 17(2):77-85.
8. Andreasen JO, Andreasen FM, Skeie A, Hjørting-Hansen E, Schwartz O. Effect of treatment delay upon pulp and periodontal healing of traumatic dental injuries – a review article. *Dent Traumatol* 2002; 18(3):116-28.
9. Brasil, Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Cadernos de Atenção Básica, n. 17. Série A. Normas e Manuais Técnicos. Brasília: Ministério da Saúde; 2008.
10. Fujita Y, Shiono Y, Maki K. Knowledge of emergency management of avulsed tooth among Japanese dental students. *BMC Oral Health* 2014; 14(1):34.
11. Baginska J, Wilczynska-Borawska M. Continuing dental education in the treatment of dental avulsion: Polish dentists' knowledge of the current IADT guidelines. *Eur J Dent Educ* 2013;7(1):e88-92.
12. de Vasconcellos LG, Brentel AS, Vanderlei AD, de Vasconcellos LM, Valera MC, de Araújo MA. Knowledge of general dentists in the current guidelines for emergency treatment of avulsed teeth and dental trauma prevention. *Dent Traumatol* 2009; 25(6):578-83.
13. Westphalen VP, Martins WD, Deonizio MD, da Silva Neto UX, da Cunha CB, Fariniuk LF. Knowledge of general practitioners dentists about the emergency management of dental avulsion in Curitiba, Brazil. *Dent Traumatol* 2007; 23(1):6-8.
14. Nasr IH, Papineni McIntosh A, Mustafa S, Cronin A. Professional knowledge of accident and emergency doctors on the management of dental injuries. *Community Dent Health* 2013; 30(4):234-40.
15. de Lima Ludgero A, de Santana Santos T, Fernandes AV, de Melo DG, Peixoto AC, da Costa Araújo FA, et al. Knowledge regarding emergency management of avulsed teeth among elementary school teachers in Jaboatão dos Guararapes, Pernambuco, Brazil. *Indian J Dent Res* 2012; 23(5):585-90.
16. Papadopoulos L, Pentzou AE, Louloudiadis K, Tsiatsos TK. Design and evaluation of a simulation for pediatric dentistry in virtual worlds. *J Med Internet Res* 2013; 29;15(11):e240.
17. Soares PV, de Almeida Milito G, Pereira FA, Reis BR, Soares CJ, de Sousa Menezes M et al. Rapid prototyping and 3D-virtual models for operative dentistry education in Brazil. *J Dent Educ* 2013; 77(3):358-63.
18. Hu LW, Prisco CR, Bombana AC. Knowledge of Brazilian general dentists and endodontists about the emergency management of dento-alveolar trauma. *Dent Traumatol* 2006; 22(3):113-7.
19. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, Diangelis AJ, et al. International Association of Dental Traumatology. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol* 2012; 28(2):88-96.
20. Andreasen JO, Andreasen FM. Avulsions. In: Andreasen JO, Andreasen FM, Andersson I. Textbook and color atlas of traumatic injuries to the teeth. 4th. ed. Oxford: Willey Blackwell, 2007.